

# **Stay on Your Feet**

## **Final Report**

**1992 - 1997**





## ACKNOWLEDGMENTS

Thanks to all the older people who participated in Stay On Your Feet especially the 2,000 in the North Coast and 1,500 in Queensland who gave their time as research participants to be surveyed over the five year period. Particular thanks to the older people who trained as Falls Prevention Advisors, Home Safety Advisors and Gentle Exercise Leaders. These community educators were integral to the programme and were excellent role models.

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## EXECUTIVE SUMMARY

Stay On Your Feet has been a four year health promotion programme aimed at reducing the incidence of falling among well older residents of the North Coast of NSW.

It has been a successful intervention on a number of levels:

- ☐ During the intervention period -  
There has been a 22% reduction in self-reported falls among the target population, a result that surpasses the original goal of a 10% reduction.
- ☐ At follow-up -  
The hospital admission rate for falls-related injuries was 20% lower in the target population as compared to a comparable control population.
- ☐ As a result of -  
This significantly lower rate of falls-related admissions, there has been a substantial saving to the health system.
- ☐ The programme has raised the awareness of older people regarding the risk of falling, improved their perceptions in relation to the preventability of falls and increased their knowledge of risk factors
- ☐ There have been important behaviour changes in the target group, particularly an increase in the wearing of safer shoes, greater activity directed to improving balance and decreased use of medications having fall-related side effects.
- ☐ The programme has contributed significantly to the body of knowledge about falls prevention.


Stay on Your Feet has demonstrated that a well planned, well executed and comprehensively monitored and evaluated community intervention to reduce falls can achieve measurable gains in both intermediate and health outcomes.





Figure 1:

Activities and outcomes SOYF programme

<b>Activities</b>		These activities lead to an increase in 			
	1992/93	1993/94	1994/95	1995/96	1996/97
<b>Awareness Raising</b>					
Calendar	25,000	25,000	13,000		
Stay On Your Feet(SOYF) Book	20,000	10,000	10,000	20,000	
(SOYF) Poster	1,000		500		
(SOYF) Fridge Magnets			10,000		
Info-Expo Kit	6				
Stage Show	3				
Norco Milk Cartons	316,000				
Trigger Questions	1,000	5,000			
TV Ads		15sec 9mths (30sec 1mth) (45sec 2.5mths) (30secx4 1mth)			
Radio Messages		6 x 30sec	7 x 30 sec	1 x 60sec	
Media Print		extensive	extensive	extensive	
Pill Bags		10,000			
Safer Shoes Quiz		2,000			
Information Kit				45	15
<b>Community Education</b>					
Gentle Exercise					
- leaders	9	9	12	14	16
- classes	18	99	120	112	104
- participants	160	942	1,027	1,120	1,110
Falls Prevention Advisers					
- leaders	14	8	11	13	
- classes	40	50	40	10	
- participants	1,200	1,875	1,000	305	
Medication Workshops					
- leaders		10			
- participants		473			
<b>Policy Development</b>					
Local Councils Public Places					
- LGAs				230	20
- Shopping Centres				60	5
Seeding grants	4		statewide document written		
- safety rounds	2				
- CBD map	1				
- access committees	2	statewide changes			
- commercial premises					
Dept of Housing - pensioner units (Ballina/Byron)		used by (HSA)			
<b>Home Safety Measures</b>					
Home safety checklist	developed		10,000	6,000	
Model house	constructed				
Home Safety Month Hardware Stores			39		
<b>General Practitioners/ Health Workers</b>					
Assessment tool	developed			GP/HP trainee	
Patient questionnaire	developed		developed		
Referral pad		CHN/HP trainee			
GPs Information Kit				125	
<b>Evaluation</b>					
Risk Factor Survey (RFS) NC	2,005		1,373	1,314	
RFS QLD	1,666		1,004	1,131	
Hospital data analysis	1,400		1,500		
Reach survey		600	700	744	
Transport Policy	34				
Hospital Policy	5				
Focus Groups	10				
Reports	Action Plan		Progress Report		Final Report
LGAs Survey	14				
Papers published			1		3

**Inputs**

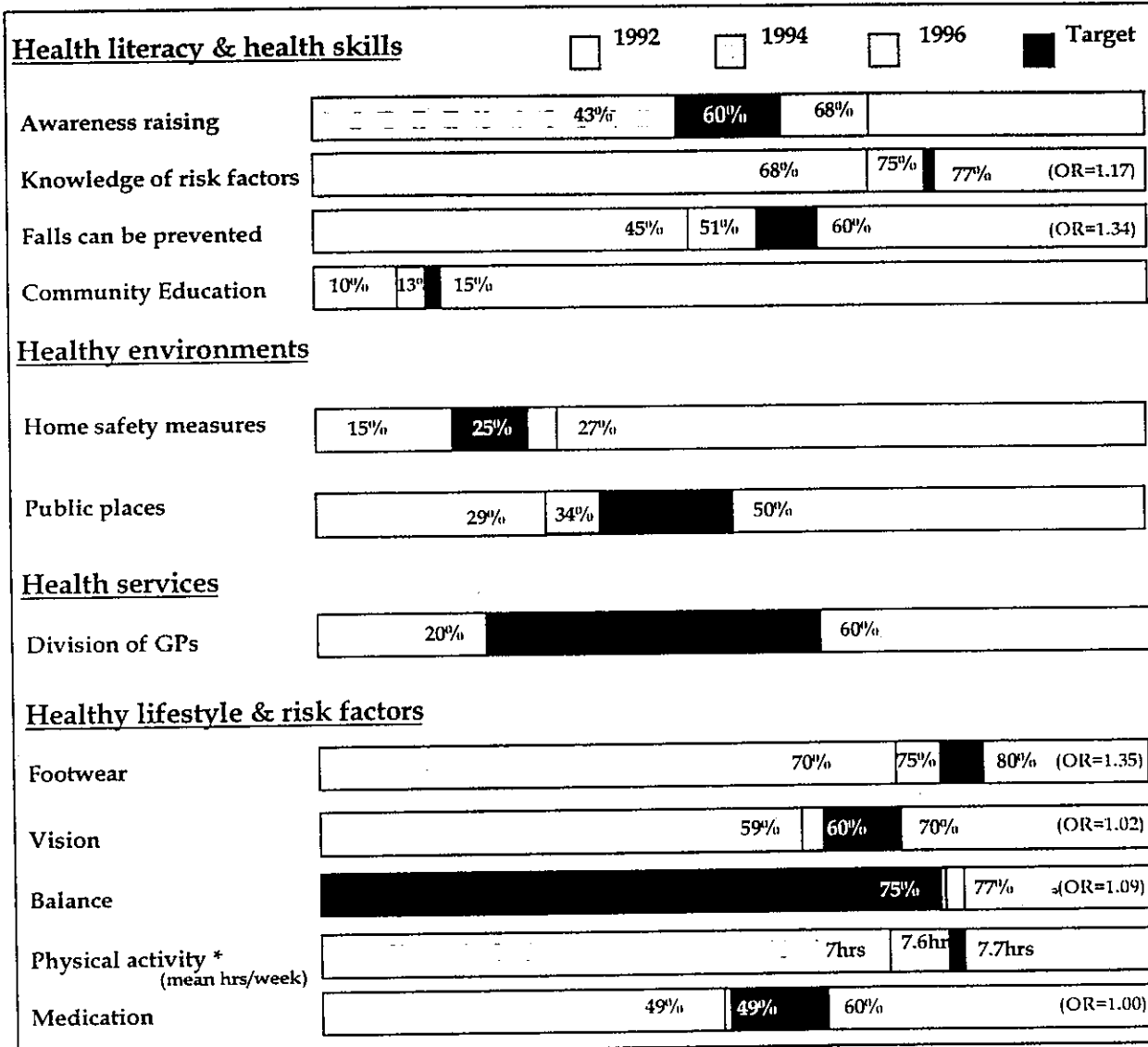


	1992/93	1993/94	1994/95	1995/96	1996/97
Salaries/ wages	79,076	38,229	62,222	44,000	18,625
Goods/ services	87,801	53,500	55,500	86,000	8,750
Evaluation * external grants		50,000 *	8,000	32,000*	55,000*
<b>TOTAL</b>	<b>166,877</b>	<b>141,729</b>	<b>125,722</b>	<b>162,000</b>	<b>82,375</b>



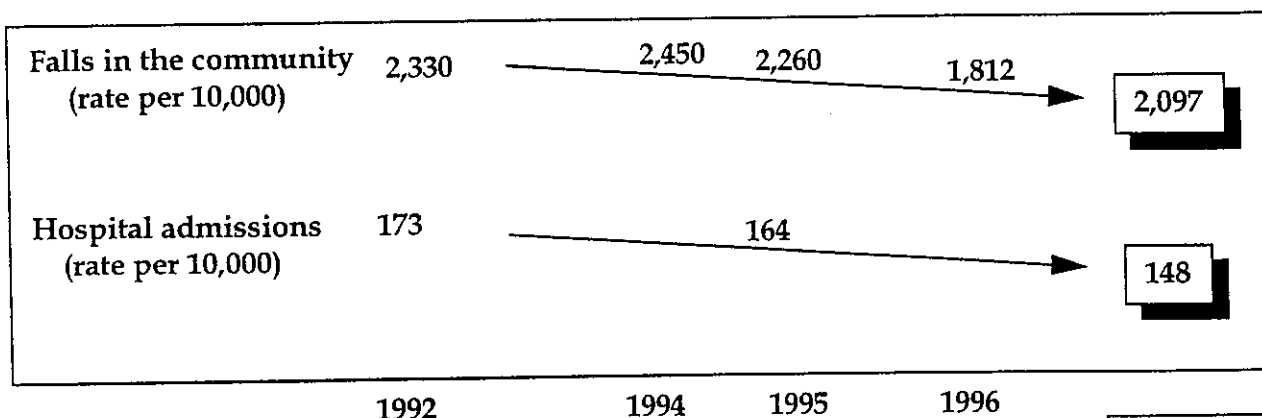
## Intermediate Indicators

Achieving targets leads to



## Outcomes

A change in outcomes



Note: OR= Odds Ratio for exposure to SOYF after adjustment for age & gender.

\* Analysed as a continuous variable.

**1996/97  
TARGET**

## BACKGROUND & RATIONALE

Falls and their resultant injuries are a serious health problem for older people. This is because:

- ❑ falls are the major cause of unintentional injury and death among people aged 65 and over (Baker and Harvey, 1985)
- ❑ older people living in the community fall at a rate of about 1 in 3 per year, a rate which increases with age (Campbell et al, 1981; Tinetti et al, 1988). With an expected growth of the fall-prone population within the coming decade, this rate will result in a large increase in the sheer volume of falls and fall injuries
- ❑ falls have devastating consequences for individuals: medical consequences in terms of health, hospitalisation, illness and disability; social and psychological consequences in terms of fear of falling, curtailment of activities, with physical inactivity leading to reduced mobility and muscle strength and thus increased risk of falling again, social withdrawal leading to isolation and loneliness; and lifestyle consequences in terms of dependence upon family support or community services and often premature institutionalisation
- ❑ injurious falls result in considerable costs to the hospital system. Fall injuries are one of the most expensive causes of admission to hospital (Phillips et al, 1993) with each hip fracture estimated at \$12,000 in hospital costs alone (Lyle, 1994)
- ❑ although a relatively small proportion of falls result in serious injury, over 20% require medical attention (Campbell et al, 1990) and of those falls causing injury, 42% result in admission to hospital (Sattin et al, 1990)
- ❑ some 20% of hospital admissions of older people are attributable to a fall (Naylor and Rosin 1970) with fracture of a limb the most common injury (Langley & Marshall, 1991)
- ❑ even if no fracture occurs, falls can themselves result in a post-fall syndrome of anxiety, immobilisation and early nursing home admission (Walker & Howland, 1991; Tinetti et al, 1988; Schulman & Acquaviva, 1987; Kiel et al, 1991).
- ❑ falls increase the pressure to provide nursing-home places, as about 50% of older people admitted to hospital because of a fall are subsequently discharged to a nursing-home (Sattin et al, 1990)
- ❑ further costs are incurred through increased calls upon general practitioners, other health specialists such as Community Health Nurses, through the use of rehabilitation services, community support and voluntary services, and increased use of medications and walking devices.



Falls can break self-confidence as well as bones. Up to a quarter of those older people who have fallen limit their daily activities and use of public transport because they fear falling again (Cummings et al, 1994). There are also physical, psychological and financial costs to the injured person and their carers and financial costs to the community (NH&MRC, 1994).

A wide range of falls have been described, from minor trips and slips to events causing serious and sometimes life-threatening injury (Downton, 1993). There is a continuum from trips and stumbles, when balance is regained, through near falls to completed falls, when balance is lost.

## 2.1 Risk Factors

No single risk factor explains falls. Rather, falls emanate from a combination of inter-related factors, both intrinsic and extrinsic. Some factors relate particularly to advancing age and will increase in significance in the absence of any positive intervention.

The major known risk factors (Kempton & Vaughan, 1991) associated with falls are:

- ☐ unsafe footwear
- ☐ deterioration of vision
- ☐ changes in balance and gait
- ☐ medication use and misuse
- ☐ underlying physical conditions
- ☐ insufficient physical activity
- ☐ unsafe home environment
- ☐ unsafe public environment

The likelihood of falling increases with an increase in the number of risk factors experienced by each individual. The risk factors tend to increase with age (Tideiksaar, 1989). All the risk factors are amenable to improvement however. For example, appropriate exercise can increase strength, flexibility and general mobility at all ages. Gait and balance also improve markedly with regular appropriate exercise.

On the North Coast, 20% of the population is currently aged 60 years or more and this proportion is increasing more rapidly here than elsewhere in the nation. 50% of injuries to North Coast residents over 60 result from falling (NSW Health, 1993). The rate of falling among people 60 and over living on the North Coast is 2 in every 9 falling at least once per year (Williams et al, 1993). In 1992, the North Coast Falls Risk Factor Survey (Williams et al, 1993) showed 65% of falls occurred in and around the home; 12% on public roads or footpaths and 10% on the premises of shops, cinemas, banks and clubs.



In summary, falls prevention was selected as a major public health programme by NCPHU for the following reasons:

- ☐ we know falls can be prevented
- ☐ there is an increasing proportion of older people living on the North Coast and consequently an increasing likelihood of more falls if no action were taken
- ☐ the high cost to the health system
- ☐ the personal cost to the individual
- ☐ a health promotion intervention measurable within a relatively short time frame
- ☐ such an intervention enables the active participation of older people
- ☐ a reduction in falls should lead to improved quality of life for older people, more years of active living and fewer years of disability (compression of morbidity).

## 2.2 Falls Prevention Interventions Prior to 1992

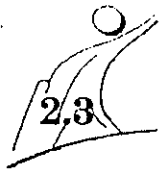
Baseline research for SOYF began in early 1992. At this time, there was no information on any similar large, community-based, multifactorial, multi-strategic falls prevention intervention programme having been implemented.

There was at that time a considerable body of literature on falls and a moderate level of interest, both of which have increased markedly since then. However, despite the amount of material, the complaint was made in a 1990 review of falls research that "because so many different approaches have been adopted, it is difficult to see any clear lessons for developing preventive measures" (Askham et al, 1990). This review noted that in relation to the United Kingdom at least, most existing studies were small, few were concerned with falls in the community and there was a lack of evaluation of any interventions.

When a comprehensive literature review appeared in 1993 (Robertson & Campbell, 1993) there was still very little information on any community health promotion/public health interventions. Those which had been implemented consisted mainly of informational packages and had not been evaluated.

As late as 1995, in their review of the literature, Lilley et al were still pointing out that despite a wealth of research information, "*prevention of falls is a neglected area of research*".

Stay on Your Feet was planned as a health promotion intervention with the potential to add to that scant body of knowledge on the actual prevention of falls.



## **Definition of Terms**

☐ **Fall**

Stay on Your Feet adopted the 1987 Kellogg definition of a fall as “an event which results in a person coming to rest inadvertently on the ground or other lower level and other than as a consequence of the following: sustaining a violent blow/loss of consciousness/sudden onset of paralysis as in a stroke/an epileptic seizure”.

☐ **Older people**

For the purposes of this programme, the term has been used to refer to people aged 60 years and above. The programme has been directed toward people at the younger end of this spectrum.

☐ **Living in the community**

This has been taken to mean people living in accommodation which they control. Thus people living in institutional settings such as retirement hostels or nursing homes have been excluded.



## PLANNING PROCESS

The Stay on Your Feet planning process involved:

- ☐ a literature review to ascertain the extent of knowledge on falls prevention in 1992.
- ☐ analysis of health data, consisting of:
  - ☐ demographic information for the North Coast in relation to the health of older people and the extent of the problem of falls on the North Coast
  - ☐ a baseline survey identifying the levels of falls risk factors on the North Coast
- ☐ an assessment of community needs through focus group discussion
- ☐ an overview of current falls prevention policy and practice in North Coast local government
- ☐ a review of recent falls prevention interventions in NSW
- ☐ application of health promotion principles identified in the Ottawa Charter for Health Promotion
- ☐ inclusion of specific principles in relation to health promotion with older people.

### Literature Review

#### 3.1

##### **Incidence of Falls**

It has been estimated that 1 in 3 people over the age of 65 experience at least one fall within any given 12 month period. This results in an incidence rate between 140-625 falls per 1,000 persons over 65 each year. (Speechley & Tinetti, 1989; Campbell, 1981; Prudham & Evans, 1981; Perry, 1982).

The rate of falling is higher in women than men, 39% compared to 28% (Campbell et al, 1989). After age standardisation, a woman is twice as likely to fall as a man (Prudham & Evans, 1981). Wild et al, 1981) reported that in the over 75 population, women were five times more likely to fall than men. However, Tideiksaar, (1989) found that with age there is an exponential increase in the rate of falling for both sexes. 50% of older people who fall do so repeatedly. Tinetti et al, (1988) found that among 336 people over 75, 32% fell in a year and of those who fell, 46% did so once, 31% twice and 27% at least three times. Gryfe, (1977) reported an increase to 40% among institutionalised older people.



It is suggested that the actual rate of falling may be as much as 20 times the rate reported by general practitioners (Wild et al, 1981; Kellogg, 1987). This is because the great majority of falls do not result in physical injury serious enough to come to the attention of medical practitioners (Nevitt et al, 1989). However all falls have the potential for serious injury.

## **Risk Factors for Falls**

A National Forum on Falls Prevention highlighted eight major risk factors for falls considered to be amenable to prevention (Kempton and Vaughan, 1991).

- ☐ unsafe footwear
- ☐ deterioration of vision
- ☐ changes in balance and gait
- ☐ medication use and mis-use
- ☐ underlying physical conditions
- ☐ insufficient exercise
- ☐ unsafe home environment
- ☐ unsafe public environment

These risk factors are inter-related and no single factor has been identified as the predominant cause of falls.

Rubinstein et al, (1988) also concluded that a fall is a multifactorial event resulting from the interplay of intrinsic, environmental and situational factors:

- ☐ Intrinsic (host) factors refer to factors inherent in the person:
  - ☐ physiological changes related to age or disuse
  - ☐ chronic conditions or disabilities
  - ☐ medication use.

Intrinsic factors are conducive to a 'potential for falling' and are particularly significant for frail, older people.

- ☐ Extrinsic (environmental) factors refer to conditions outside the person, conditions such as:
  - ☐ slippery floors
  - ☐ loose rugs
  - ☐ unmarked steps
  - ☐ insufficient or glaring lighting

and hazards such as:

- ☐ pot-holed footpaths
- ☐ loose gravel
- ☐ uneven paving
- ☐ absence of grab-rails.

Extrinsic factors provide an 'opportunity to fall' for people of all ages.





- Situational factors refer to circumstances in which a fall takes place and to date have received little attention from researchers. This aspect may be more important than previously thought, especially among vigorous older people. 'The emphasis on safe performance, rather than the avoidance, of activities is consistent with the overall goal of elderly persons remaining as active and independent as possible.' (Speechley & Tinetti, 1991).

Anecdotal evidence warrants including 'state of mind' as a situational factor, as shown in the following commonplace statements made by active older people:

*'I fell because I was ..... hurrying ..... not taking care ..... feeling upset ..... distracted ..... too impatient to wait ..... feeling angry ..... sure it couldn't happen to me .....'* (Focus Groups, NCPHU, 1992).

### **Consequences of Falls - Physical**

Almost 70% of older people who fall are injured to some degree, 40% sufficiently to require medical attention and 15% to be hospitalised (Walker & Howland, 1991).

Some 5% of falls in older people result in a fracture, a quarter of which are neck of femur (Tinetti et al, 1988) whilst the remainder are fractures of the humerus, wrist and pelvis (Kellogg, 1987). These fractures are all considered age-related, often consequent upon the underlying effects of osteoporosis (Melton & Riggs, 1985).

Another 5-10% of falls result in other serious injuries such as haematomas, sprains and joint dislocation (Kellogg, 1987). There is occasionally trauma to the nervous system. There can also be hypothermia, dehydration and pneumonia resulting from the "long lie" (i.e. when a person remains on the ground or floor for an hour or more). Wild et al (1981) reported that half of those who endure the "long lie" will be dead within six months even if there is no direct physical injury.

### **Consequences of Falls - Psychological**

Whether or not a fall results in physical injury, it can have serious social and psychological effects. A fall, especially in public, is an undignified and embarrassing event for most older people as well as being painful and frightening. For many, it may mean a loss of confidence in performing previously routine physical and social activities, leading to withdrawal and isolation (Cape, 1988; Kellogg, 1987). Many older people display a 'bunker mentality', becoming reluctant to leave their homes and also becoming increasingly inactive. This in turn leads to a loss of mobility and independence (Schulman & Acquaviva, 1987) which inevitably increases their likelihood of falling again. Yong, (1984) suggested that health professionals and relatives sometimes try to restrict the activity of an older person who has fallen.



Together with the loss of confidence, there can be an increased fear of falling. Walker and Howland (1991) reported that fear of falling was the strongest fear compared with other fears older people might experience (such as robbery or financial difficulty). 41% of the people in their survey had curtailed their activities through fear of falling. Tinetti et al, (1988) reported 48% of older people who had fallen once were very afraid of falling again and 36% of those who had never fallen also expressed this fear.

Cwikel et al (1990) found that the psychological effect of a fall is not so severe in people who already have several chronic conditions (and who therefore may regard themselves as sick). The effect is much more marked among *'... those who view themselves as basically healthy, whose life style requires less illness behaviour, and who view a fall as an insult to their health and self esteem'*. For these people, a fall is a profound dislocation of their self-image.

### **Where do People Fall?**

In general, older people fall both inside and outside the home to the same extent. However, with increased age, there is a corresponding increase in falls at home. Tinetti et al, (1988) found 77% of falls by people over 75 took place inside the home. Walker and Howland, (1991) studying 115 people with a mean age of 78, found 46% fell at home and approximately an equal number of times in the bedroom, living room and kitchen. No falls occurred in the bathroom where 85% of the study group had grab-rails, a result consistent with other findings (Radebaugh, 1985). These findings may be due to a recognition of the bathroom as a particularly hazardous place so that people modify either the room or their behaviour accordingly.

Falls at home appear to have a greater negative impact than those taking place outside. Cwikel et al (1990) reported that self-evaluated health rating is more affected by a fall at home than by an outside fall, possibly because falling in a familiar place is more shocking and indicative of greater vulnerability.

### **When do People Fall?**

Among older people living in the community, most falls take place during the daytime (Wild et al, 1981). Walker and Howland (1991) found that 64% of fall events occurred in the daytime, particularly early and late in the afternoon, near meal times. Only 5% occurred during the night.

Among older people living in institutions, falls tend to be spread throughout each 24 hour period.

### **Who Falls?**

Falling is not peculiar to older people. It occurs at all ages, among children and athletes for example. The special significance of falls by older people is the high incidence rate, increased susceptibility to injury and greater difficulty in recovery.



While there is no 'typical faller' there are a number of attributes common to a large proportion of the older people who fall. These people are more likely to be:

- ☐ in the 'old-old' age bracket (over 80)
- ☐ female
- ☐ living alone
- ☐ taking a number of medications, particularly hypnotics, tranquillisers and sedatives
- ☐ ill or disabled (Wild et al, 1981)
- ☐ with poor vision
- ☐ using a walking aid
- ☐ someone who has fallen recently and/or has had several stumbles
- ☐ home-bound (Teno et al, 1991)
- ☐ experiencing a greater degree of:
  - ☐ postural sway (Overstall et al, 1977)
  - ☐ gait disorders (Sudarsky, 1990)
- ☐ chronic disabilities that increase the risk of falling (Tinetti et al, 1986).

Speechley and Tinetti (1991) demonstrated that fall experiences of people living at home varied with levels of well-being. Participants were divided into three functional groups of vigorous, transitional and frail. The study findings point to the need for different preventive approaches for each identified group in their study.

Their results confirm that a higher percentage of frail older people fall. However, falls by vigorous older people incur a higher percentage of serious injury and occur mainly when they are involved in more active, potentially hazardous activities such as climbing ladders or playing sport. They are also more likely to be in more hazardous environments.

## **3.2      The Problem of Falls on the North Coast**

### **North Coast Demographics**

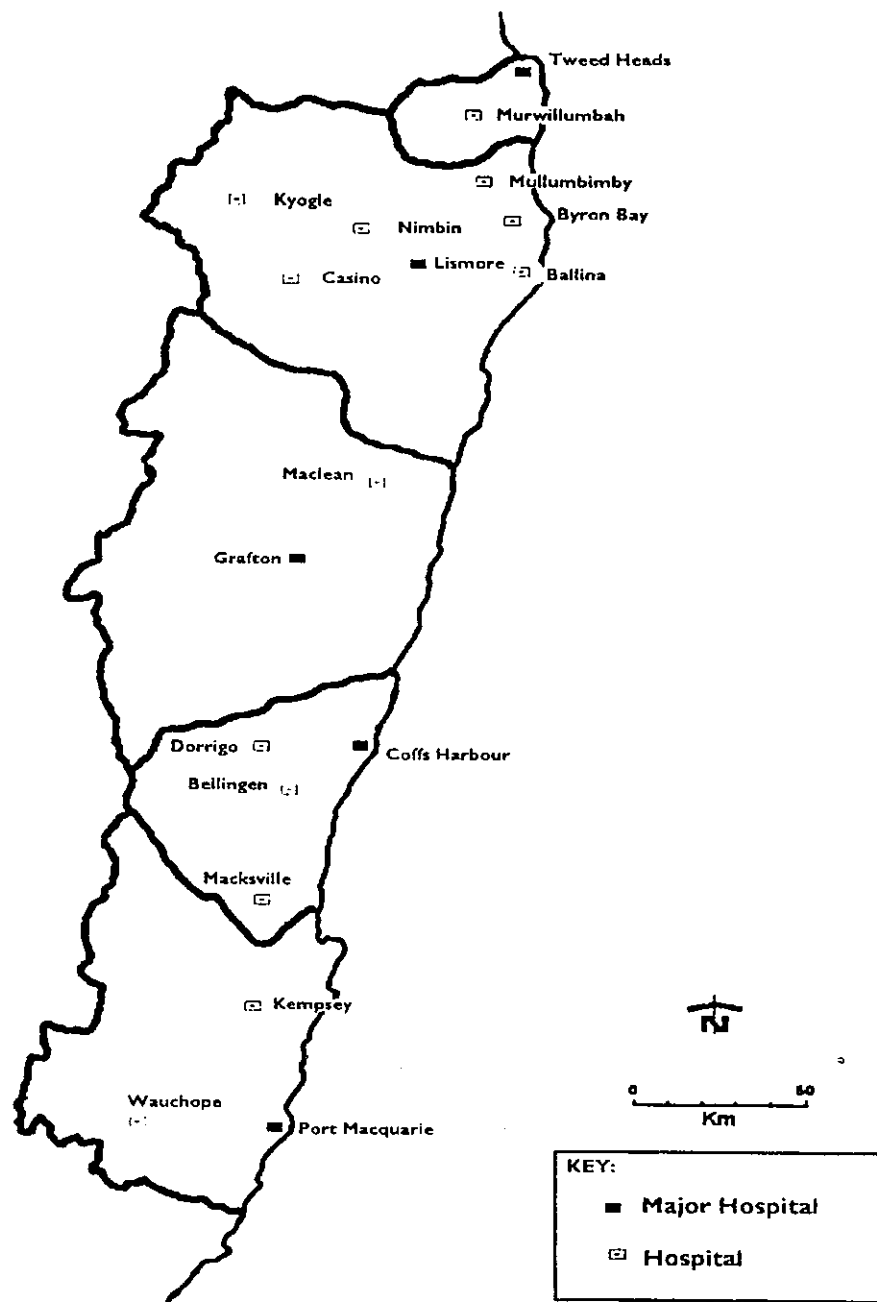
- ☐ The North Coast Setting

The programme extended throughout the NSW North Coast from the Camden River in the South to the Tweed River in the North (Figure 2). It takes in the Local Government Areas of Hastings, Kempsey, Nambucca, Bellingen, Coffs Harbour, Ulmarra, Nymboida, Grafton, Maclean, Copmanhurst, Richmond River, Casino, Lismore, Ballina, Byron, Kyogle, Murwillumbah and Tweed Heads.



Figure 2:

Map of NSW North Coast



As with the rest of Australia, the NSW North Coast is experiencing a rapid ageing of the population. In 1992/93 there were an estimated 80,000 residents over 60 on the North Coast, a figure predicted to increase to 92,000 by 1996. Projections for older people in the Region show an estimated 138% increase for people aged over 60 years between 1986 and 2016, thus adding a further 96,350 people.



Overall, the proportion of older people living on the North Coast is approximately 1 in 5, 21% of all females and 18% of all males as shown in Figure 3. This is a significantly higher proportion than the State average (15.7%).

**Figure 3:** Proportion of North Coast older people to total population by sex

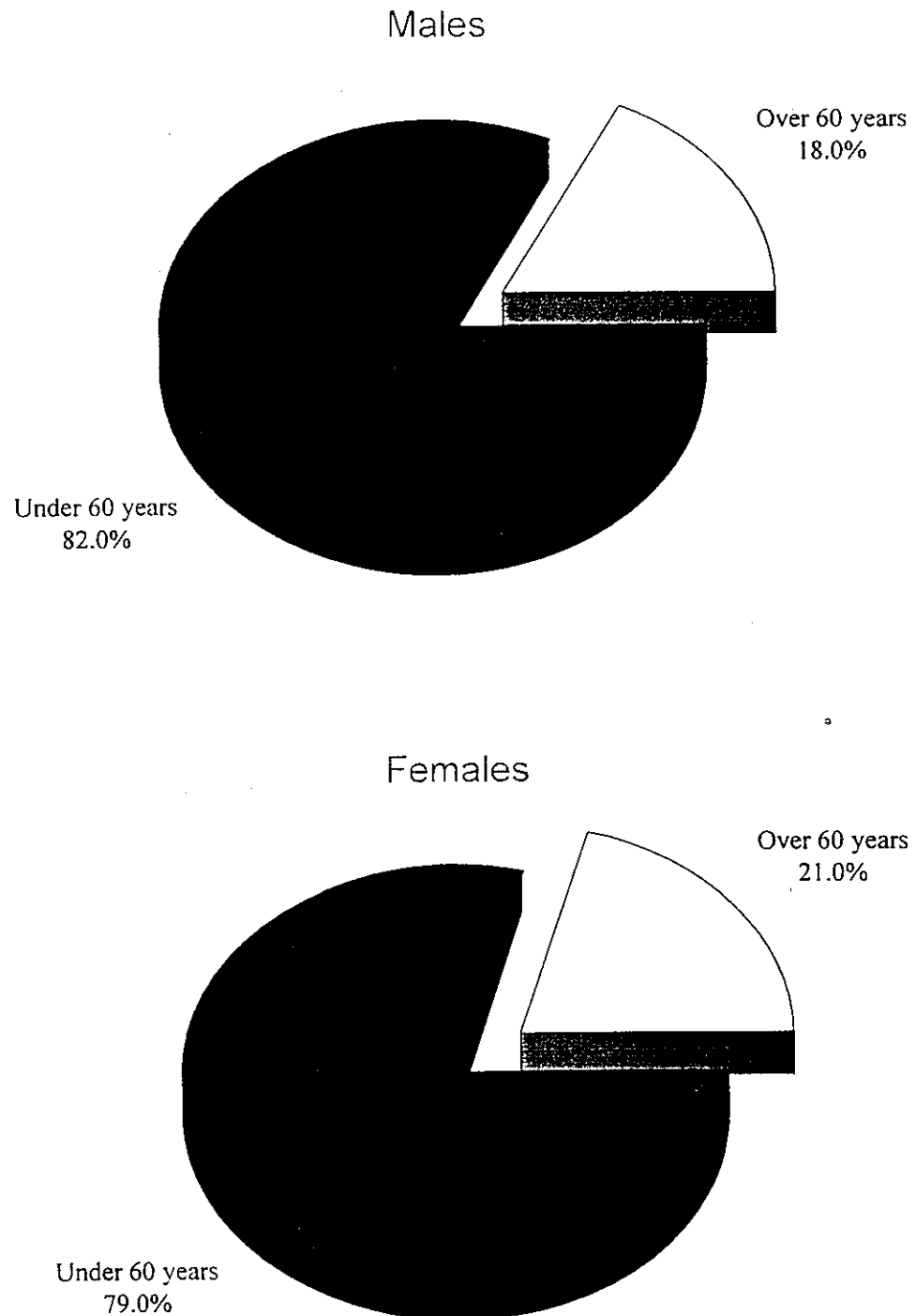
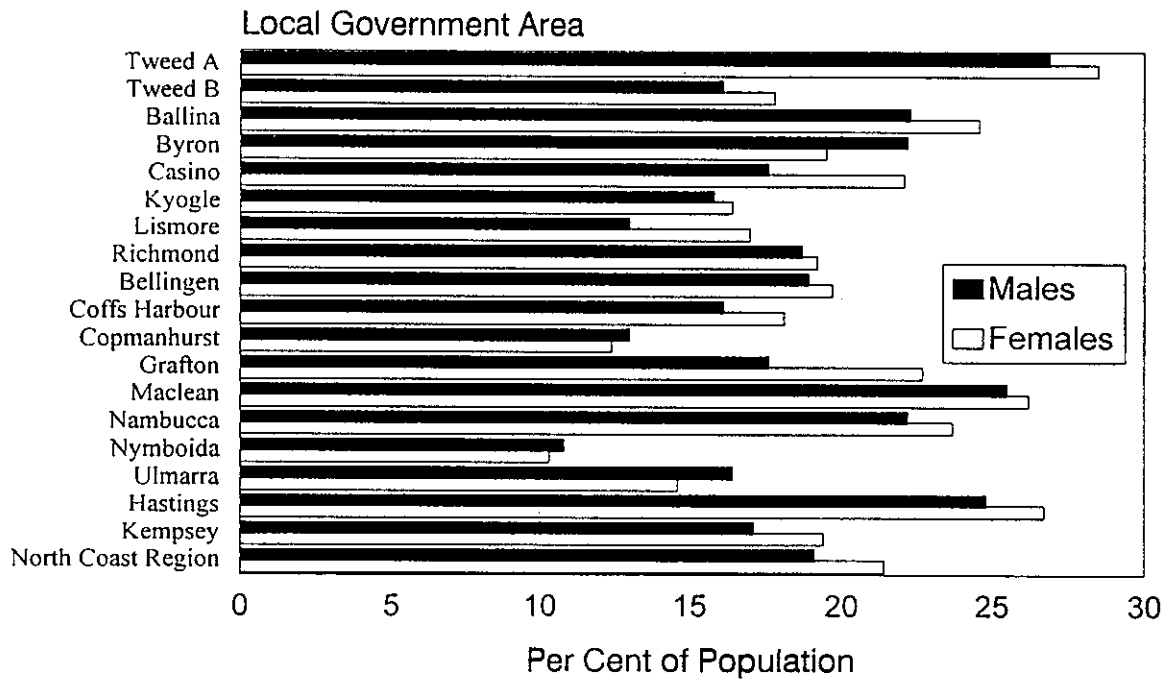




Figure 4 shows the percentage of older people living in each North Coast local government area (LGA). This proportion varies, with Maclean, Hastings, Tweed and Richmond River experiencing higher proportions.

**Figure 4:** Percentage of North Coast older people by Local Government Area



Source: Australian Bureau of Statistics, 1990



## Mortality

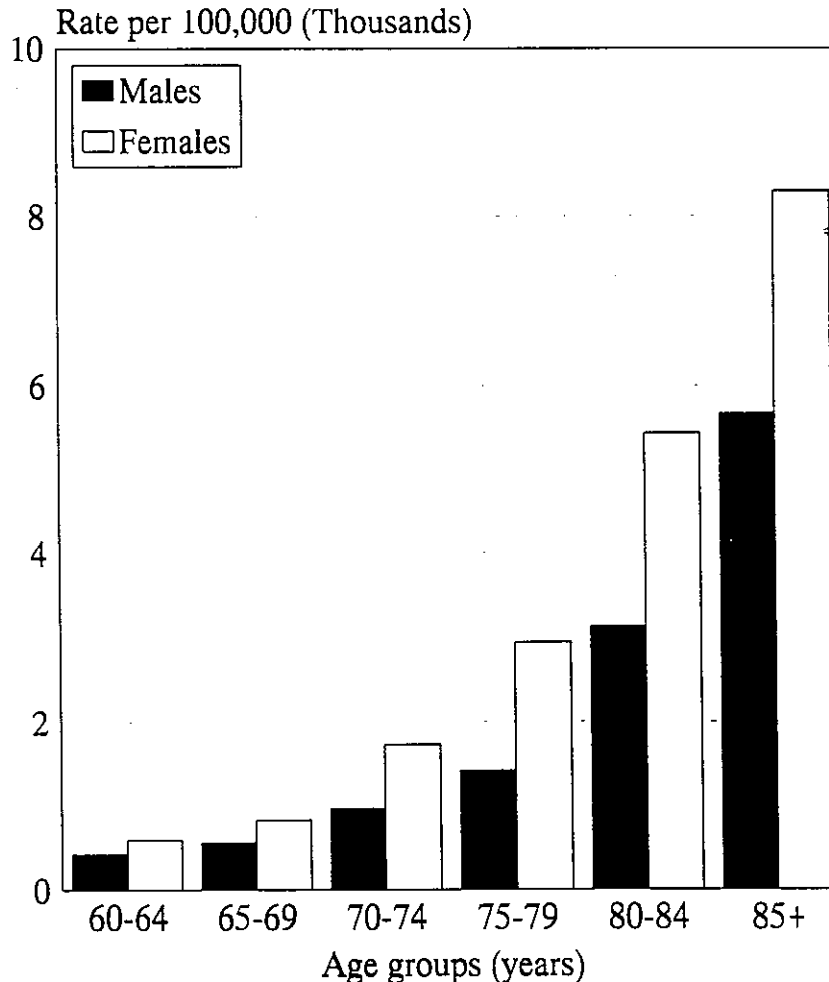
Falling is seldom the principal cause of death, although it is often a contributing factor. Between 1985 and 1989 inclusive, there were 104 deaths due to falls in North Coast residents. Ninety of these (86.5%) were in people aged 60 and over. More older women (58) than older men (32) died of falls.

## Morbidity

In 1992/93, 1,381 North Coast people aged 60 years and over (426 males and 955 females) were admitted to hospital as a result of falls related injuries. The age specific hospital admission rates, in Figure 5, show how the rate of falling increases significantly with age for both men and women.

Falls related hospital separation data (external codes E880 - E888.9 and E929.3) for North Coast and total NSW residents aged 60 years and over were monitored to determine the effectiveness of the programme.

**Figure 5:** Falls-related hospital admission rates per 100,000 North Coast males and females 60+years, by age group (1992/93)

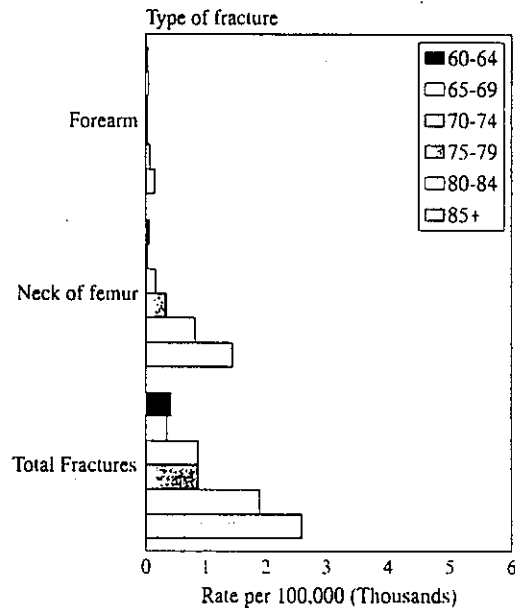




## □ Fracture related admissions

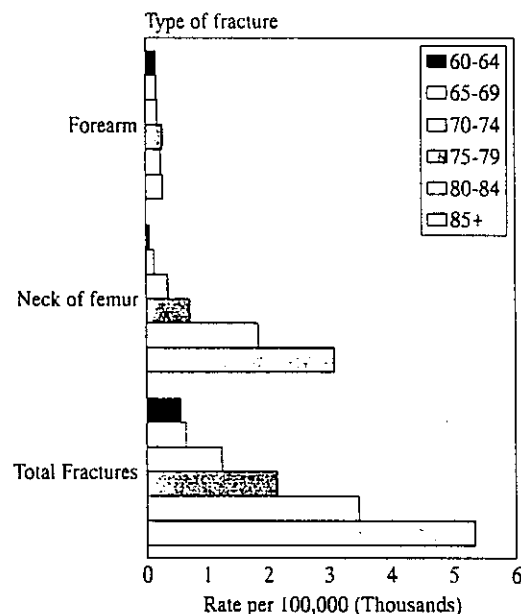
Figures 6 and 7 show rates of all-cause fracture-related admissions as well as specific cause fracture: neck of femur and forearm for both males and females by five year age groups.

**Figure 6:** Fractured neck of femur, forearm and total fracture hospital admission rates per 100,000 North Coast males aged 60+years by age group (1992/93)



Source: NSW Hospital Inpatient Statistics Collection, 1992/93

**Figure 7:** Fractured neck of femur, forearm and total fracture hospital admission rates per 100,000 North Coast females aged 60+years by age group (1992/93)



Source: NSW Hospital Inpatient Statistics Collection, 1992/93

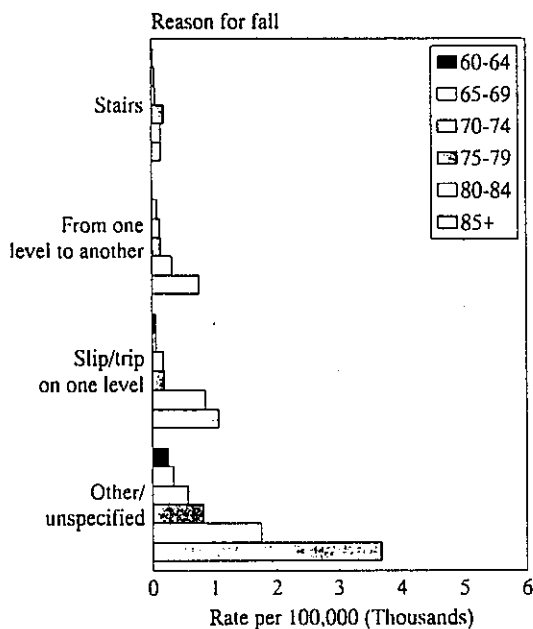




□ Type of falls

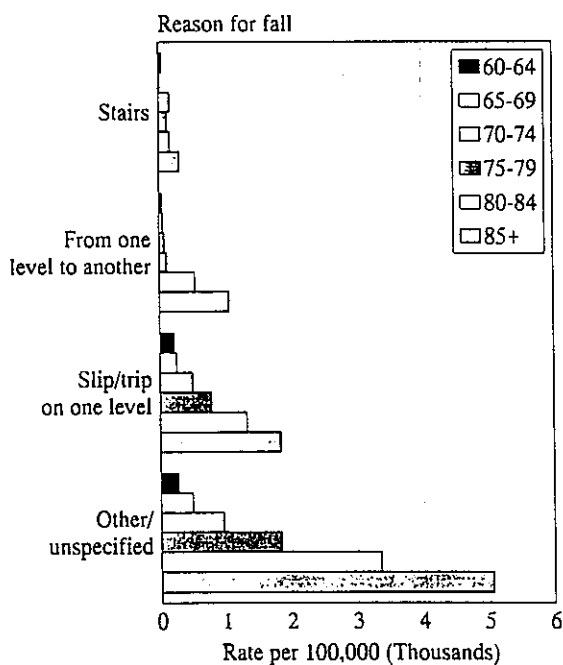
Figures 8 and 9 show reasons for older people falling by 5 year age groups and sex. Slips and trips on one level and falls from one level to another are the major falls incidents for both sexes and, as expected, increase with age.

**Figure 8:** Falls-related hospital admission rates per 100,000  
North Coast males aged 60+years:  
Reason for fall by age group (1992/93)



Source: NSW Hospital Inpatient Statistics Collection, 1992/93

**Figure 9:** Falls-related hospital admission rates per 100,000  
North Coast females aged 60+years:  
Reason for fall by age group (1992/93)



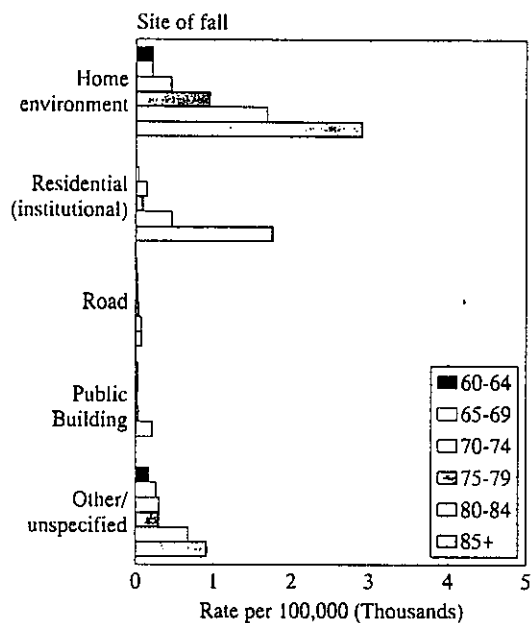
Source: NSW Hospital Inpatient Statistics Collection, 1992/93



□ Place of falls

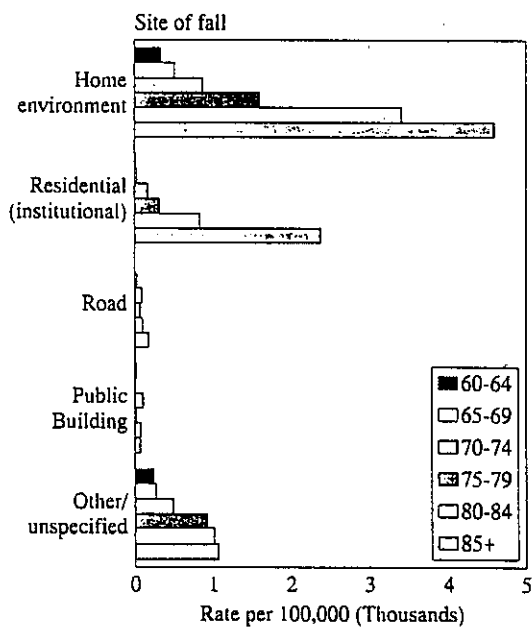
Figures 10 and 11 show the sites where falls occurred for those older people hospitalised for a falls-related injury.

**Figure 10:** Falls-related hospital admission rates per 100,000  
North Coast males aged 60+years:  
Site of fall by age group (1992/93)

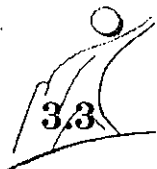


Source: NSW Hospital Inpatient Statistics Collection, 1992/93

**Figure 11:** Falls-related hospital admission rates per 100,000  
North Coast females aged 60+years:  
Site of fall by age group (1992/93)



Source: NSW Hospital Inpatient Statistics Collection, 1992/93



## North Coast Falls Risk Factor Survey

In May 1992, a random sample of 2,005 older North Coast residents (2% of the target population) were surveyed by telephone interviews. The survey was conducted to elucidate the incidence and severity of falls, the prevalence of risk factors, as well as knowledge, attitudes and practice of falls prevention. This survey was repeated midterm and at the end of the intervention (see Section 5).

The demographic profile of the sample group was:

- ☐ 65% females, 35% males
- ☐ 69% living with spouse or friend and 32% living alone
- ☐ 6% living in a retirement village or hostel
- ☐ 86% Australian born, 9% from UK and Ireland
- ☐ 0.3% Aboriginal

### **Major Findings of This Survey**

2 in 9 (35%) older people aged over 60 years in the North Coast Region fell in the period 1990/92.

From this survey, significantly more people who had fallen stated that they:

- ☐ were female
- ☐ had fair/poor vision
- ☐ used an aid for walking
- ☐ had fair/poor balance
- ☐ experienced dizziness regularly
- ☐ suffered from arthritis, Parkinson's disease, stroke, angina and/ or osteoporosis
- ☐ had some medical condition causing unsteadiness e.g. muscle weakness or tremors
- ☐ regularly took medications
- ☐ experienced side-effects from medications
- ☐ rated their own risk of falling as high/moderate
- ☐ lived alone
- ☐ **Where falls occurred**
  - ☐ 65% of falls occurred in or around the home
  - ☐ 12% on public roads or footpaths
  - ☐ 10% on the premises of shops, cinemas, banks and clubs

At the time of the fall, 37% of respondents were walking (either inside or outside), 13% gardening or working outside. When asked what caused the fall, 27% of the respondents mentioned uneven/wet/slippery ground, 17% mentioned specific medical conditions, 15% mentioned tripping and 12% carelessness.



## ☐ Effects of falls

Overall, 84% of people who fell experienced some ill-effects, with 56% suffering an injury, including 12% experiencing a fracture or dislocation. 36% of fallers received medical attention, 51% from doctors and 42% from hospitals. 29% of those receiving medical attention were hospitalised with an average length of stay for both males and females of 9 days.

When asked to rate their risk of falling, 75% of respondents said low to non-existent, 21% moderate and 4% stated high risk.

89% of the respondents thought that falling was a serious problem for older people. Almost half (45%) thought falls could not be avoided. A further 29% thought falls could be prevented and 26% were unsure.

The majority of older people (64%) rated their health as good to excellent, 27% as fair with only 9% rating as poor.

Three quarters of respondents stated that their eyesight was good to excellent, 20% as fair, with only 4% rating as poor. However, only 58% had had their eyes checked in the previous 12 month period.

The large majority (89%) of respondents were able to walk without the assistance of an aid such as a stick or frame, with 75% rating their balance as good to excellent. One quarter of respondents reported regularly feeling dizzy upon rising.

When asked about features of safer shoes, 37% identified low heels as safe, 17.5% grip soles and 17% a good fit.

The percentage of participants who suffered from chronic illnesses were:

- ☐ Arthritis (64%)
- ☐ Parkinson's disease (0.3%)
- ☐ Heart attack (12%)
- ☐ Emphysema (5%)
- ☐ Stroke (6%)
- ☐ Osteoporosis (12%)
- ☐ Angina (16%)
- ☐ Diabetes (6%)

70% of people took medication regularly, including 15% taking sleeping tablets, 7% taking nerve tablets (Serepax, Valium), 22% taking fluid tablets (Lasix, Moduretic) and 34% taking blood pressure tablets.

36% of people reported consuming alcohol 2-3 times a week or more. Of those who drank alcohol, 76% reported consuming 1-2 standard drinks on each occasion.

Only 15% of respondents had modified their homes in order to prevent falls. The most common modifications made were installation of handrails (60%) and converting steps to ramps (8%).



## Community Needs Assessment

Nine focus groups of older North Coast residents were held to gather qualitative data on a range of opinions, beliefs and perceptions about falls and falls prevention.

The major findings from the focus groups were:

- ☐ Falls are a major concern for older people, not only because older people fall but because of the likelihood of severe injury as a result.
- ☐ Many factors were identified as being associated with falls particularly confusion, carelessness, rushing, broken footpaths, illness, unsafe shoes.
- ☐ The major causes of falls at home were believed to be unsafe bathrooms (shower hobs and slippery tile floors), mats, rugs and carpets; unsafe footwear (including loose fitting slippers); and clutter (electrical cords, untucked blankets, toys and pets). Other common causes mentioned included climbing up on stools, chairs and ladders; the size, height and width of steps; poor lighting and glare.
- ☐ The major causes of falls in the external environment were identified as cracks and steps in footpaths and driveways; wet and slippery garden surfaces (pavers, grassy slopes and paths); slippery shopping plaza floors. Other causes were poorly designed stairs, poor stair visibility and insufficient landings; children's toys, bikes and skateboards; slippery ramps; overly smooth cement and tiles (e.g. around swimming pools); and bus boarding problems (large step heights and distance from kerb).
- ☐ Although people of all ages fell, older people faced greater risks due to poor vision, medications, slower recovery from stumbles and their tendency to shuffle.

Emotional states, such as grieving, also played an important role in causing falls.

- ☐ Older people expressed feelings of humiliation, loss of dignity and loss of confidence following a fall. Embarrassment, frustration and self-blame were also mentioned.
- ☐ Older people said they felt uncertain as to what actions to take when a fall occurred.

Suggestions as to how older individuals could prevent falls included:

- ☐ improve the knowledge level of both older and young people about the risks associated with falls; provide falls prevention information
- ☐ modify the environment, e.g. relocate power points and light switches to avoid cords on floors and walking in the dark; home modification (hand-held or height adjustable showers, remove shower hobs, install non-slip bath mats, rails and bath seats)
- ☐ install a personal security system



Suggestions as to what specific actions could be taken by others included:

- ☐ educate designers and builders about hazards; e.g. fewer steps, non-slip tiles, no shower hobs, hand rails for all stairs, lower beds and better walkways
- ☐ encourage bus companies to use fold down stairs and stop closer to the kerb
- ☐ encourage shoe manufacturers to develop budget safe footwear
- ☐ encourage retailers to use non-slip surfaces and to paint shop hobs in contrasting colours
- ☐ install more signs for lifts and safe access routes
- ☐ encourage local councils to improve footpaths, kerbs and parking areas and to ban pavers around trees
- ☐ encourage health professionals to conduct assertiveness training, community action skills courses, exercise programmes and encourage older people to have regular eye tests.

Participants expressed feelings of powerlessness in making their environment safer and identified the need to establish effective support networks.

### **Current Falls Prevention Policy and Practice: North Coast Settings**

A questionnaire was mailed to 14 local councils to determine current policies and practice relating to falls prevention. The major findings in relation to local government were:

- ☐ the majority of local councils (75%) had a registration system for falls or falls-related complaints. Most complaints related to the need for better footpaths (42%) and more adequate lighting (19%)
- ☐ the major concern identified by councils regarding falls prevention was providing access, via stairs and ramps (44%) and improving footpaths (18%)
- ☐ however, only 3 of the 14 councils had a policy relating to non-slip surfaces in buildings, and only 5 used non-slip paint on pedestrian crossings
- ☐ six councils reported having a disabled access committee but only one had a specific falls prevention policy
- ☐ policies and practices were individualised to particular councils with little consistency at a regional level.

### **Review of Recent Interventions in NSW**

In 1991, eight projects in NSW were evaluated and analysed for active measures to modify behaviour of older people and health workers (Overview of Falls Prevention Programs Older People, NSW Health Department, 1991).

Little policy change or significant environmental modifications had been achieved, probably because all projects had not been in existence long enough. Some projects also appeared to be ill-focused and/or under-resourced.



Some of the main suggestions from this overview:

*'... self-sustaining approaches such as policy changes and changes to the home and community environments'.* This pointed to the importance of passive, once-only measures that will continue to have long term impact. They may be measures such as falls prevention policies being taken up by local councils and bus companies or environmental changes such as non-slip tiling on bathroom floors and non-slip paint on pedestrian crossings.

*'Measure the impact in terms of changes in rates or severity of falls'.* This means more rigorous data collection: not simply how many more people have taken up "Walking for Pleasure" for instance, but whether they fall less often or are less severely injured as a result.

*'Measure the impact in terms of changes in the risk of falling'.* This required attention to the known risk factors; (e.g. home, public environment, medication and footwear for example, and measurement of changes to these: for example, an increase in the number of older people wearing safer shoes or a decrease in the number taking sleeping pills).

*'Involve health professionals, the target group and those with regular contact with the target group'.* SOYF sought the active participation of health workers, older people and those who care for frailer older people. The full involvement of older people themselves was a high priority.

*'Programme planning should be mindful of the resources available to the programme'.* It is vital to provide adequate resources in terms of funding, time and staff and equally vital to set specific and achievable objectives.

*'Consider using the existing resources from the programmes covered in this report'* e.g. 'Talking Medicines' and 'Too Much of a Good Thing' and the book 'Staying on Your Feet'.

## Principles Underpinning This Programme

The principles established in the Ottawa Charter for Health Promotion (1986) underpinned the planning and implementation of SOYF. The Charter declares that health promotion should:

- ☐ develop personal skills
- ☐ create environments conducive to health
- ☐ strengthen community action for health
- ☐ re-orient health services to health promotion/disease prevention
- ☐ build healthy public policy

In addition it was considered imperative that health promotion with older people should seek to improve the overall well-being and life-satisfaction of older people. This can be accomplished through programmes which set out to:

- ☐ empower older people
- ☐ involve older people as active participants
- ☐ challenge negative stereotypes of older people
- ☐ make use of older people's skills and experience



SOYF chose to emphasize the prevention of falls rather than the prevention of injury. The choice was made for the following reasons:

- ❑ A fall precedes hip fracture in the great majority (90-95%) of cases (Boonen, 1993; Nyberg et al, 1996). Both studies found that spontaneous fractures are uncommon, as low as 2% (Nyberg et al, 1996). Although not every fall results in an injury, each has the potential for injury and so preventing a fall reduces that potential. Since it is the fall that causes the injury, the fall therefore represents the earliest possible opportunity to counter the problem.
- ❑ Falls and hip fractures share a number of risk factors (lower limb dysfunction, neurological conditions, barbiturate use, visual impairment). Given the prevalence of these problems, " programs to prevent hip fracture should include falls prevention as well as measures to slow bone loss " (Grisso et al, 1991). Osteoporosis, about which there was previously some disagreement, is now definitively seen as a risk factor for injury rather than for falling.
- ❑ Preventing falls is a realistic expectation for a health promotion programme targeting healthy older people. In a programme directed toward frail older people, it may be more realistic to aim at reducing fall related injuries. Preventive strategies for hip fracture should be based on the prevention of falls, use of hip protectors and prevention of bone fragility (Meunier, 1993).

SOYF chose healthy older people 60 years and above as the target group for the following reasons:

- ❑ The younger group appear to be more appropriate for an intervention that depends upon self-determination of falls risk and self-management of preventive measures. The younger age group also provides larger numbers overall and a larger number of highly functional, unimpaired people with a comparatively low risk of falling.
- ❑ Frail older people are at greatest risk of falling often simply in transferring from sitting to standing but it is hard both to determine and to balance the risks and benefits for the very frail. It may also be that many will be too impaired to benefit or that any benefit will be minimal because of the low level of intensity that must apply. (Tinetti & Speechley *in* Weindruch)
- ❑ Although the incidence of falls is lower in the young-old or vigorous (17%) than in old-old or frail (52%) the likelihood of serious injury is higher (22% compared with 6%). An environmental hazard is more likely to be present in falls by the vigorous group (53% vs 29%) (Speechley & Tinetti 1991). This is an important consideration when attempting to spread responsibility for falls prevention across the whole community.
- ❑ The findings of Speechley and Tinetti reinforced the SOYF team's perception that not only does the older community contain within it two distinct generations, but each probably necessitates different strategies. For different reasons and in different settings our research





highlighted environmental risk factors in falls by the vigorous young-old (NCRFS). We found 25% of falls occurred in public places, with 12% on footpaths, indicating the need for including local government and local business as key target groups.

- The work of Ryyannen et al (1991) further supports this approach in that they found falls due to an extrinsic mechanism such as slipping or stumbling were more common in the younger age group (65-74 years) and intrinsic causes were more common in the older age group (over 75 years). They emphasize that in falls by younger people factors such as time of day and amount of activity are important and falls in this group commonly occur while people are outdoors walking.
- The growing number of people living to a greater age and the advancing age of the "baby boomers" emphasizes the need to effect lifestyle changes among those who are becoming old rather than those who are already old. These people have the most to gain in terms of quality of life and the health system has most to gain in cost savings over a longer time-span.

The SOYF team holds the view that increased longevity is desirable only insofar as the years gained are years worth living. Very often they appear to be years of chronic illness, dependency and institutionalisation. It is our belief that the major objective in health promotion with older people should be to extend well-being into the later years so that infirmity and disability take up only a short period of time prior to death, the "compression of morbidity" theory (Fries, 1980).

### 3.4 In Summary

In 1992/93, using evidence collected from available data, from conducting research and from older people, the following was found:

- approximately 1,400 North Coast residents over 60 years were admitted to hospital with falls-related injuries.
- 17,800 older people fell at least once in 1992.

If there were no reduction in the rate of older people falling, then by 1996 when there would be 92,000 older people on the North Coast, the expectation would be:

- 1,610 admissions to North Coast hospitals
- 20,470 older people falling at least once per year.

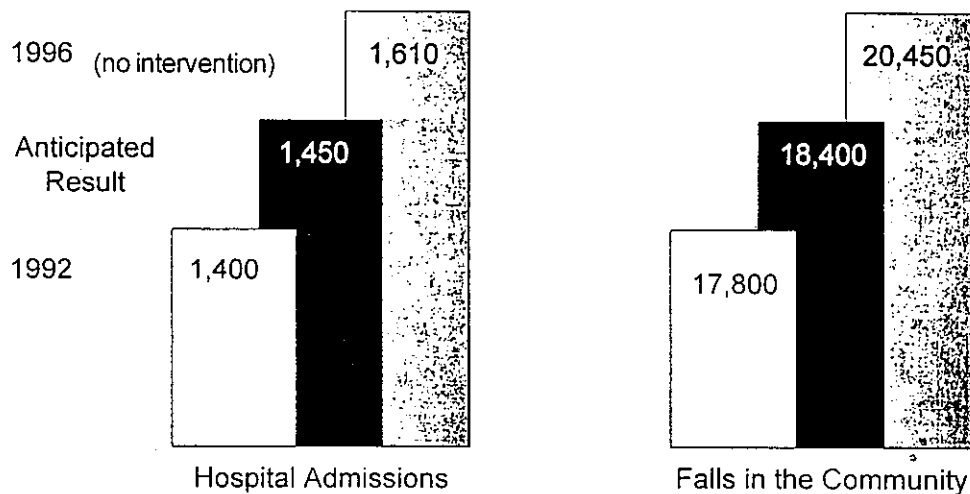


Figure 12 illustrates the 1992 picture of falls and the expected change by 1996 on the North Coast.

The anticipated result of conducting this programme is a 10% reduction in the projected 1996 resulting in:

- ❑ 160 fewer older people being admitted to North Coast hospitals because of a fall
- ❑ a decrease in the rate of falls and consequently, 1950 fewer older people falling in the community.

**Figure 12:** Picture of falls and the expected change on the NSW North Coast (no intervention)





## GOALS AND TARGETS

### Health Status Goal

The overall outcome is to improve the health and well-being of older residents of the North Coast Region.

### Programme Goal

The overall goal of this programme is to reduce by 10% the projected number of falls and consequent injuries among older North Coast residents.

### Target Group

People 60 years of age and over, in moderately good health and living independently in the community.

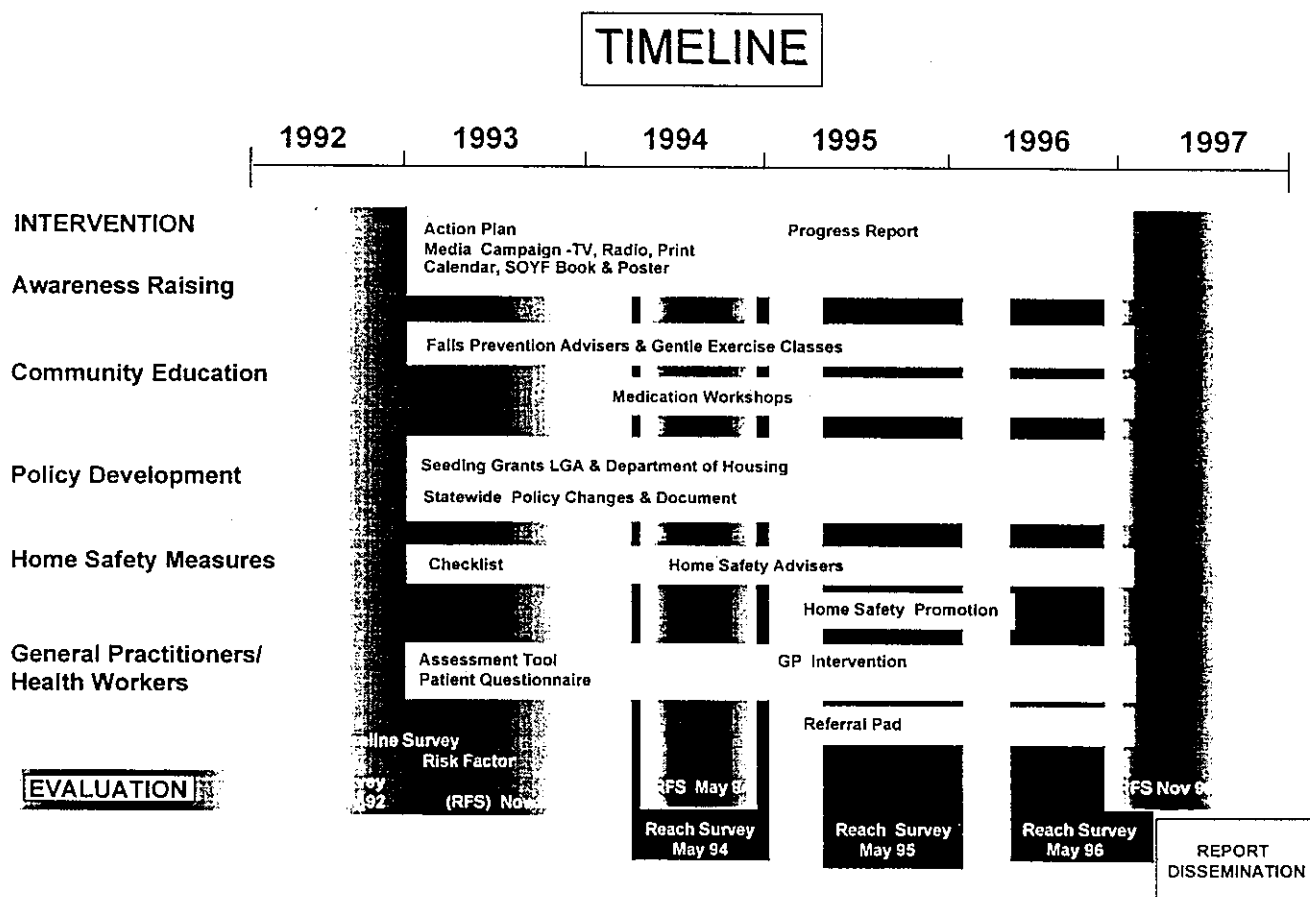
## STRATEGIES AND TIME FRAME

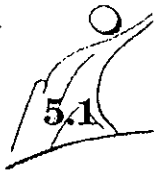
SOYF was implemented along five strategy lines:

- ☐ raising awareness of the problem of falls and dissemination of information on falls prevention
- ☐ community education
- ☐ developing falls-prevention policies
- ☐ home hazard reduction
- ☐ working with health professionals

These major strategies were phased in over the life of the programme and each encompassed numerous activities.

Figure13: Time frame of Stay On Your Feet Programme





## **Awareness Raising**

This was the earliest phase of the programme because so many older people, and others, believed that falls are simply a natural part of ageing and therefore not preventable. Mass media advertising and the distribution of specially-developed resources were the main methods of awareness raising.

### **□ Television**

A series of 15 second community service messages that "life is better without a fall" were telecast throughout 1993. These were shown both day and evening during programme breaks on NRTV (Channel 10) and covered the entire implementation area.

More specific television messages were used later, eg: during Home Safety Week and many SOYF activities attracted local television coverage.

### **□ Radio**

A set of six community-service radio dialogues were developed and broadcast on ABC and community radio. These 30-second messages featured older people discussing falls-prevention measures they had taken.

In addition, local radio stations conducted numerous interviews with SOYF community educators and gave excellent publicity to local activities.

### **□ Print**

Local newspapers across the region ran personal profiles on the SOYF community educators and provided information on community education classes. They gave publicity to local activities and highlighted successes such as the removal of environmental hazards and the launch of new initiatives.

### **□ Milk cartons**

For 3 months in 1993, "Shape" milk cartons carried falls prevention messages, a total of 316,000 cartons being distributed. The dairy company Norco Co-op Ltd. met two-thirds of the cost of this initiative.

### **□ Calendar**

A calendar was produced for each of the first three years of the programme and distributed free of charge through pharmacies, GP surgeries and the community health and community education networks. A total of 47,000 calendars were distributed. One used positive images of older people, all from the North Coast, and the other two used the trademark SOYF cartoons with accompanying messages.

### **□ Fridge magnet**

A simple fridge magnet was produced and 10,000 were distributed throughout the region.



#### ☐ **Expos and stalls**

Falls prevention expos were held in several major towns and in smaller towns, street stalls were set up during Senior Citizens' Weeks. Falls prevention stalls were also included in expos by other groups such as the Arthritis Foundation and at hospital open days. Local Health Promotion Officers and Falls Prevention Advisers organised and staffed these activities.

## **5.2**

### **Information Dissemination**

Once the target group had accepted that falls were preventable it was essential that clear concise information be given about measures to prevent falls. Activities included:

#### ☐ **Action plan**

A 3 Year Action Plan was produced to coincide with the launch of the programme in October 1992. Distribution of the plan was mainly to health workers and service providers within the five Health Districts. Government and non-government agencies also received copies (eg local councils, Department of Sport and Recreation and Department of Housing).

#### ☐ **Stay On Your Feet, books 1 & 2**

24,000 copies of Book 1 were distributed to older people throughout the North Coast. The book was a compilation of information on falls and suggestions for preventing falls.

In October 1994 a new book was published and by 1996, 30,000 copies had been distributed.

Dissemination was via the same extensive falls prevention network used to distribute SOYF calendars each year.

#### ☐ **Falls Prevention Advisers**

In February 1993, 14 people were trained as Falls Prevention Advisers. This was a 4 day live-in training with the major components being content knowledge, presentation and public speaking skills. Some of these original advisers left the programme and new ones were trained. There are currently 11 people active as Falls Prevention Advisers. All are over 50, most over 60, and have great credibility with the target group.

The Falls Prevention Advisers have reached about 3,000 older people in clubs and other organisations. Several gave radio and newspaper interviews about their work as well as doing ad hoc work on an individual basis such as staffing expos and stalls.

The Falls Prevention Advisers were paid for their presentations to groups and were reimbursed for travel expenses.



#### ☐ **Medication Workshop Leaders**

Nine older people were trained to lead discussion groups on the wise use of medication. The training involved the need for compliance with prescribed medication and measures related to safe usage. Grief, sleeplessness, stress and pain, conditions for which remedies other than drugs could be considered, were also included. Some 500 older people attended these discussion or workshop sessions. The original format of 3-4 hours was not popular, and was replaced by a one hour session.

#### ☐ **Home Safety Advisers**

The baseline Risk Factor Survey showed 65% of the North Coast falls taking place in or around the home, so in late 1994, 15 people were trained to give presentations on improving safety in the homes of older people. The Home Safety Advisers had content knowledge plus knowledge of the wide variety of home safety products available as well as presentation skills. They had two target audiences:

- ☐ well active older people living in their own homes
- ☐ adults with older parents who might help their parents with home safety and also consider fall-proofing their own homes.

These Advisers also reached out to community groups and were paid for their presentations.

### **5.3**

#### **Community Education**

Community education has long been conducted on the North Coast by Community Health Education Groups (CHEGS) which is a non-profit, incorporated organisation. It uses community educators to run health education programmes and a community development approach by recruiting and training local people to run classes. Participants pay for their classes and leaders are paid for their time. CHEGS leaders receive on-going support and training from Health Promotion workers.

#### ☐ **Gentle Exercise classes**

Sixteen mature aged people were trained as fitness leaders and then conducted gentle exercise classes for older people throughout the North Coast. Only fully trained accredited leaders were employed by CHEGS.

A gentle exercise course consisted of one class per week over 9 weeks. 99 of these courses were conducted between 1992-96, with 950 older people participating.

Leg strength, balance and self-rated confidence of participants were measured before and after a 9 week course. Leg strength and balance improved significantly but self-reported confidence showed no change.

Gentle exercise referral pads were distributed to General Practitioners, Occupational Therapists and Physiotherapists, with specific information for each town and the local contact person. These were not well-utilised. It seems that contact with a gentle exerciser may have been the main motivation for other older people to attend a class. The use of free vouchers



encouraged some people to try a class and most people who tried one class then stayed on for the course. Attending an exercise class was an effective way to alleviate some of the fears older people have about exercise.

#### ☐ **Community Health Centres**

Community education was also conducted by the staff of Community Health Centres, including Health Promotion Officers, Physiotherapists, Community Health Nurses and Occupational Therapists. Pill-spills were a popular activity. Some pill-spills were District-wide (Richmond, Macleay-Hastings) and some local (Dorrigo). A special pill-bag was produced and used for pill-spill campaigns and also given out by Falls Prevention Advisers so that older people could regularly dispose of their unused/out of date medications.

#### ☐ **Walking for Pleasure groups**

The Department of Sport Recreation and Racing facilitates the Walking for Pleasure programme throughout NSW. Many of the North Coast Community Health Centres supported the setting up of local groups, which now operate in most major centres. Walking addresses two important risk factors for falls: poor balance and gait/muscle weakness and joint inflexibility caused by insufficient physical activity. In the Tweed Health District the walks were publicised as Healthy Heart/Falls Prevention Walks. Also in Tweed a series of historical walks with accompanying leaflets were devised.

#### ☐ **Walking on Air workshops**

Based on the risk of unsafe footwear, the Health Promotion Officer in Maclean developed a footwear/foot care workshop. Given that 75% of older people suffer from painful feet (Lawson, 1991) this workshop was well received and was extended to other centres. It used the expertise of community health teams such as Health Promotion Officers, Physiotherapists and Podiatrists. In addition Falls Prevention Advisers, Gentle Exercise Leaders and Reflexologist were sometimes included. Participants learnt about the general care of their feet, experienced a foot massage, learnt some foot and ankle exercises and examined a range of safe and unsafe footwear.

#### ☐ **Decorate a Walking-Stick classes**

The Health Promotion Officer in Tweed District conducted a series of 9 workshops for older people to paint walking-sticks. The rationale behind this was that many older people who would benefit from using a stick are reluctant to do so, seeing them as symbols of age and infirmity. It was thought that a brighter, personalised stick would be more acceptable. A range of painting styles was offered: one class produced heritage sticks, another learned Aboriginal dot painting.

#### ☐ **Falls Prevention days**

Dorrigo Community Health Centre scheduled a falls-prevention topic for one day each month as part of its community outreach programme. Topics dealt with included safe footwear, osteoporosis, incontinence and gentle exercise.





#### ☐ **Women's Health Matters**

Women's Health Matters, a health service for older women based in Richmond Health District held a series of workshops on a regular basis with falls prevention a core topic. These sessions had input from a Gentle Exercise Leader and a Falls Prevention Adviser.

#### ☐ **Belly-dancing classes**

Two courses of belly dancing were conducted in Lismore. They were a joint initiative between Women's Health Mattera and the Public Health Unit. Pre and post balance testing was not done although there is anecdotal evidence from the participants that they believed their balance improved. A core group from the two courses continued to meet for a session each week.

## **5.4**

### **Policy Development**

Policy development involved working inter-sectorally with other government and non-government organisations. Activities included:

#### **Working with Local Councils**

In 1993 four North Coast local councils received seeding grants from the Public Health Unit. They each contributed to preventing falls by older people in the community in different ways:

#### ☐ **Bellingen Shire Council**

This project aimed to identify falls hazards in the four town centres of Bellingen Shire, present the findings to Council and raise general awareness of access issues. The council employed a trained Falls Prevention Adviser was employed to co-ordinate the project, older volunteers were recruited in each of the four centres and safety walks were conducted: hard-to-see changes in level, broken footpaths and service covers standing above or below level were common hazards. Lists were compiled and the recommendations received priority on the Council's works agenda.

#### ☐ **Hastings Shire Council**

The aims of this project were to identify particularly safe and unsafe areas in respect to falls in the Port Macquarie CBD and also to consider questions of access to CBD facilities. A falls prevention/access map was produced. The project was undertaken by the Hastings Access Committee and the map shows facilities considered fall-safe and easy-access. Distribution of the map enables older people and people with disabilities to make better use of their community. In a follow-up to the map, Hastings Council recently allocated \$20000 to rectify the more serious fall hazards.

#### ☐ **Kempsey Shire Council**

The aims of this project were to bring falls prevention to the notice of the general public and particularly business proprietors; to audit the falls safety of business premises and feed back the results to the businesses together with recommendations for improvement where necessary; and to formulate a falls prevention and access policy for council.



A Falls Prevention/Access Audit checklist was developed, business proprietors were invited to participate and a group of older people recruited. An outstanding level of co-operation was achieved from the business community. On completion of the audit each business received a report rating the internal and external environment, stating the problems observed and suggesting possible solutions. A public ceremony was held at which the Mayor presented framed certificates to those businesses which scored especially well.

Kempsey Council adopted a falls prevention and access policy based on the findings of the audit. It encourages consideration and improvement in these areas by waiving fees on building applications designed to prevent falls and improve access.

#### ☐ **Nambucca Shire Council**

The project aims were to raise awareness of falls and falls prevention; develop falls prevention and access policies for adoption by Council; and contribute to the ongoing improvement in physical access and falls safety in the streets, public buildings and homes in the Nambucca Valley.

A high level of intersectorial collaboration was achieved, with Nambucca Council, the Community Health Centre, the Chamber of Commerce, and a number of older people working on the project.

The most significant outcomes were:

- ☐ Council changed the method of laying street pavers in order to minimise displacement.
- ☐ Council instituted a footpath rating system which will eventually rate all the footpaths in the shire.
- ☐ An Access document was produced showing how falls safety and access could be improved. This was distributed to community groups and services, Chamber of Commerce, local builders and developers.
- ☐ A safety assessment was made of the CBD, business proprietors were informed of hazards identified and given a copy of the Access document.
- ☐ A Falls Prevention Adviser was employed to compile a list of all activities in the shire that could contribute to falls prevention. This resulted in a brochure which was then launched in Senior Citizens Week and distributed throughout the shire.

#### **Guidelines for Local Councils**

In 1996, SOYF developed a set of guidelines intended to assist local government in taking falls prevention measures. Multiple copies of the document, 'Preventing Falls in Public Places: challenge and opportunity for local government' were distributed to all councils on the North Coast. A variety of professions within local government, (eg planners, engineers and landscapers) may be involved in preventing falls and the document attempted to give them an understanding of the problem. It examined some of the actions they might take and provided checklists for known hazardous areas such as footpaths. The majority of the North Coast councils have made use of the document. (For further information see section 6, Evaluation).



## **Working with the Department of Housing**

The Department of Housing provides accommodation for pensioners either by building or commissioning housing units. The majority of their pensioner clients are older people.

In 1993, a group of 12 units was planned for Ballina and a block of 30 for Byron Bay, so the opportunity was taken for the Departments of Housing and Health to co-operate to make them as fall-safe as possible. It was possible to build in many improvements, particularly those relatively small changes in level that older people find difficult to see. The local Occupational Therapists advised on the correct placement of grab rails, stairs were given railings on both sides and the leading edge of all steps outlined with white paint.

As a result of this collaboration, a Department of Housing officer listed useful falls prevention measures that could be taken and these are being incorporated in the Department's specifications for future pensioner units at a state level.

## **5.5**

### **Home Safety Measures**

#### **Home Safety Check-List**

A seeding grant was given early in 1993 to Hastings Community Health Centre for a community nurse and two students to trial a home safety checklist. The list had been compiled by the North Coast Public Health Unit and was intended to be a tool which could be used either by older people alone or by a health worker if necessary. It was trialed and modified first in Hastings and then in Kempsey.

It was distributed to older people by the Falls Prevention and Home Safety Advisers. It was also an integral part of the Macleay-Hastings project involving Community Health Nurses (see special projects section following) .

#### **Safety Product Availability Lists**

A master file was kept at the North Coast Public Health Unit containing information on a range of safety products. Each Home Safety Adviser was given a safety product list and kept a regular check on local availability. Each also had a sample kit of safety products.

#### **Home Safety Month**

The Home Safety project was a 6 month project implemented across three Health Districts of Richmond, Clarence and Mid North Coast as part of the NSW "Take Steps to prevent a Fall" campaign to encourage older people to make their home environments safer. The project was conducted from January to June 1995. The core of the project was a Home Safety Month in April 1995.



The strategies of the project included: awareness raising, information dissemination, a multimedia campaign, developing sustainable initiatives within hardware stores and working with health professionals and general practitioners to upgrade their knowledge of safety products pertaining to falls prevention.

90% of the 48 hardware stores and 100% of the 19 tile stores situated between Macksville in the south and Murwillumbah in the north participated in the project. Trained Home Safety Advisers made 14 in-store appearances during April.

Three quarters of the stores considered the intervention beneficial to their customers and staff and half are now stocking new falls safety products. 90% would like to take part in future interventions of this nature.

Such interventions need adequate lead time to ensure that chain stores can include advertising in their brochures. Problems were also identified in that stores are not always able to obtain safety products from their suppliers. This needs to be tackled at a state rather than local level.

## 5.6

### Working With Health Professionals

#### General Practitioners

General Practitioners are the major providers of health care and advice to the older Australian population. Yet some three-quarters of falls by older people are not reported to medical services. This highlights the need to encourage older people to discuss any fall with a GP or Community Health Nurse (CHN). A North Coast GP was employed by SOYF as a health promotion trainee to develop a quick, easy and effective falls intervention for other GPs. GPs in focus groups saw medications, lack of physical activity, foot problems, vision and home hazards as important risk factors which they could address. They saw the need for specific resources to help them intervene but noted barriers in regard to lack of resources, time and skills, the range of risks to be addressed and lack of remuneration. Feedback on their efforts was considered important to the proposed partnership with health promoters. This information was used as a basis for the GP SOYF intervention.

The GP health promotion trainee developed a brief intervention package designed to have flexibility enough to suit the individual needs and consulting styles of a range of GPs and relevance to most consultations with older people.

The package included:

- ☐ background information about falls
- ☐ a guide to drug prescribing for older people
- ☐ patient-held medication record cards
- ☐ follow-up reminder stickers for patient notes
- ☐ a copy of the Stay on Your Feet book
- ☐ a home safety checklist
- ☐ CHEGS gentle exercise information and free trial offers
- ☐ a copy of the NH&MRC's "Drugs and Elderly People"



This package was piloted with ten GPs who then provided valuable feedback, resulting in modifications to the original package. The GPs especially favoured the inclusion of a patient questionnaire which would introduce the topic of falls to patients in the waiting room. The drug reference guide and the reminder stickers were also refined. The final package included:

- ☐ a guide to drug prescribing for older people
- ☐ follow-up reminder stickers for patient notes
- ☐ a Stay on Your Feet book
- ☐ a home safety checklist
- ☐ falls information for the locality relevant to each GP
- ☐ information on motivating people toward increased physical activity and localised information on available activities
- ☐ quantity of patient-held medication record cards
- ☐ quantity of patient questionnaires, to be handed out by receptionists

Information evenings were organised in conjunction with Divisions of General Practice and interested GPs attending received CME points. The packages were demonstrated and distributed at these evenings. About 100 GPs attended the sessions and the feedback was that they found them very satisfactory in terms of falls prevention information and also in enhancing their view of the potential and value of the GP in health promotion. Many GPs had previously expressed doubts about their efficacy as health promoters.

As well as these sessions, the GP project officer made personal visits to another 33 GPs at their practices, again distributing the packages. This method was less than ideal, although in group practices it often resulted in wider exposure through tea room discussions.

The advice of GPs is a powerful agent for change among older people. GPs are keen to play a role in falls prevention but training programmes and interventions must be closely tailored to fit in with what they see as potential entry points and also with the many other demands on their time.

### **Community Health Nurses**

A Community Health Nurse developed a referral pad by which CHNs could refer at-risk older clients to a range of other services such as occupational therapists, podiatrists, optometrists, gentle exercise classes and general practitioners. The referral pad was piloted in the Macleay-Hastings Health District and then given a more extensive trial throughout the other four North Coast Health Districts. Evaluation of the trial gave a referral compliance rate of 96% overall. It also highlighted a shortage of podiatrists; they were the most frequent referrals but also the ones involving the longest wait for an appointment. CHNs provide a way of reaching older people who may be house-bound or frail. A referral pad which provides nurses with a well-researched response to any identified falls risk factor has great potential to reduce falls and falls injury.

## 6.1 Methods

Evaluation strategies included annual reach surveys; a pre/post survey of local government policy and practice; pre, mid and post surveys of knowledge, attitudes, and behavioural risk factor prevalence in both intervention and control cohorts; and comparisons of hospital admissions in the intervention area with the rest of New South Wales and with the Queensland control area (Kempton et al, 1992)

### Reach Survey

An annual survey was conducted to determine reach of the various SOYF strategies into the target group and was a guide for further strategy development. The final survey results consisting of a random (0.8%) sample of 744 North Coast residents aged 60 plus was obtained using an electronic White Pages list of 3,300 numbers. The five Australian Bureau of Statistics (ABS) interviewers were instructed to dial each number up to three times, screen for a respondent and complete the interview with them. Data were coded and entered into a SAS database from which frequencies, proportions, confidence intervals were calculated.

### Survey of Local Government Policy and Practice

A survey questionnaire was sent to 17 North Coast Local Government Authorities in 1992 and 1996. The questionnaire covered: falls reporting protocols; complaints and hazard reporting protocols; prevention policies; urgency of attention and scheduling of falls related improvements; Risk Management Appraisal process; for upgrading safety in older buildings; falls safety in relation to transport and pedestrian crossings; falls prevention initiatives and other influences of the SOYF intervention.

Major issues, themes and concepts pre and post were extracted qualitatively from open ended questions. Responses to closed questions were tallied and pre/post frequencies compared.

### Risk Factor Survey (NCRFS)

Intermediate and health outcomes were evaluated via a longitudinal telephone interview study of 2,000 randomly selected older residents in the intervention area and 1,600 in a control area. The control community in Queensland's Sunshine Coast was chosen because of its demographic and geographic similarity to the intervention area and because no falls prevention activities were planned there. The methodology has been detailed elsewhere (Van Beurden et al 1993, Hahn, 1996). Final tracking of the cohort was comprehensive. Analysis with SAS statistical software included univariate procedures of basic frequency tables, Cochran's Test to test for changes prior to adjustment, multivariate procedures of Mantel



Haenszel tests and both multiple logistic and linear regression analysis to test for differences after adjustment for changes in the control area confounding due to age and gender (SAS).

## Hospital Separation

Age standardised falls separation rates and 95% confidence limits were calculated for Sunshine Coast, North Coast and all NSW residents aged 60 plus from Hospital Inpatient Statistics Collections. For the years 1991/92, 92/93, 93/94 and 94/95 and ABS population estimates available, from the Health Outcomes Information and Statistical Toolkit (HOIST).

## 6.2 Findings (1996)

### Reach Survey

#### □ Sample

As with previous reach surveys the gender ratio was 2:1 females to males. The age distribution was: 71% aged 60-74, 24% aged 75-84 and 5% aged 85 plus.

#### □ Participation in SOYF

Proportions of respondents having various types of contact with SOYF are depicted in Table 1. The 1996 results when compared with the previous two annual reach surveys demonstrate dramatic and significant increases in awareness of and involvement in the various components of SOYF.

Table 1: Proportion of reach survey respondents involved in SOYF components

SOYF COMPONENT	1994 n=494 (%)	1995 n=709 (%)	1996 n=744 (%)
Seen read or heard about falls and falls prevention	212 (43.0)	399 (56.4)	504 (67.7)**
Heard of SOYF	117 (23.7)	310 (43.7)	378 (50.8)**
Seen a falls TV ad	119 (24.1)	238 (33.6)	248 (33.3)**
Seen a falls newspaper item	100 (20.2)	168 (23.7)	294 (39.5)**
Received a SOYF book	60 (12.1)	155 (21.8)	233 (31.3)**
Seen a SOYF milk carton ad	39 (7.9)		
Received a SOYF calendar	37 (7.5)	64 (9.0)*	
Heard a SOYF radio ad			98 (13.2)
Used a "Pill Bag"		36 (5.1)	69 (9.3)*
Attended a SOYF talk about falls	28 (5.7)	39 (5.5)	46 (6.2)*
Attended a CHEGS exercise class	26 (5.3)	37 (5.2)	59 (7.9)*
Had a SOYF home safety check	11 (2.2)	30 (4.2)	81 (10.9)**
Attended a Wise Medication Workshop	7 (1.4)	4 (0.6)	18 (2.4)**
Attended a SOYF Falls Expo	1 (0.2)	2 (0.2)	
Involved with any component of SOYF	255 (51.6)	480 (67.7)	572 (76.9)**

\* p<0.05, \*\* p<0.001 ( $\chi^2$  test comparing first and last instance: df=1)



The increase to almost one third (31%) in older people having received a copy of the SOYF book represented a significant 259% increase since the first reach survey. That 77% of the sample had seen, read, heard of or participated in at least one component of SOYF represented a significant doubling (149% increase) in awareness.

Effectiveness of media releases and promotions was reflected in that almost 40% of respondents reported having read a newspaper item about falls, one third (33%) reported having viewed a TV advertisement about falls and 13% had heard a SOYF radio advertisement.

There was a steady increase in the proportion of respondents reporting participation in gentle exercise classes. In the final survey 8% of the sample reported doing so and while this was a small percentage, it extrapolates to over 6,000 older people.

There was a five fold increase in the proportion of older people who had a safety check done in their home and 27% of the sample reported having made changes to their home to prevent a fall. Half (55%) of these changes were handrails and most (91%) reported that the reason for the change was as a precaution for falling.

#### ☐ **Gender**

Gender differences in the 1996 survey results reflected those found in previous reach surveys.

Females were more likely than males to have:

- ☐ Seen, read or heard about falls and how to prevent them:  
72% cf 58% ( $\chi^2=15.5$ ,  $p=0.001$ )
- ☐ Taken steps to prevent a fall: 29% cf 15% ( $\chi^2=4.0$ ,  $p=0.045$ )
- ☐ Talked with someone about falls: 19% cf 7% ( $\chi^2=17.2$ ,  $p=0.001$ )
- ☐ Attended a meeting or class about falls prevention:  
9% cf 3% ( $\chi^2=8.8$ ,  $p=0.003$ )
- ☐ Attended a SOYF talk: 8% cf 2% ( $\chi^2=13.5$ ,  $p=0.001$ )
- ☐ Attended a CHEGS gentle exercise class:  
11% cf 3% ( $\chi^2=13.5$ ,  $p=0.001$ )
- ☐ Had a home safety check: 13% cf 8% ( $\chi^2=4.0$ ,  $p=0.047$ )
- ☐ Made changes to their homes to prevent falls:  
30% cf 21% ( $\chi^2=6.3$ ,  $p=0.012$ ).

#### ☐ **Age**

Age differences were that younger respondents aged 60-74 were more likely when compared with those aged 75-84 and 85+ to have:

- ☐ Seen the SOYF promotion to 'take steps':  
32% cf 24% & 11% ( $\chi^2=9.9$ ,  $p=0.007$ ),
- ☐ Noticed falls-safe changes in public places:  
34% cf 19% & 5% ( $\chi^2=23.9$ ,  $p=0.001$ ).

and less likely to have:

- ☐ Talked to anyone about falls: 12% cf 24% & 19% ( $\chi^2=16.3$ ,  $p=0.001$ ),
- ☐ Had a home safety check: 9% cf 18% & 19% ( $\chi^2=16.7$ ,  $p=0.001$ ),
- ☐ Made changes to their homes to prevent falls:  
23% cf 39% & 32% ( $\chi^2=17.4$ ,  $p=0.001$ ).





#### ☐ **Fallers and non-fallers**

Differences between fallers and non fallers were that fallers were more likely to have:

- ☐ Talked with someone about falls 21% cf 13% ( $\chi^2=5.49$ ,  $p=0.019$ ) and
- ☐ Had a home safety check 18% cf 9% ( $\chi^2=8.59$ ,  $p=0.003$ ).

#### ☐ **February/March Home Safety SOYF Promotion**

Twenty nine percent (n=217) of respondents reported seeing or hearing elements of this major SOYF promotion. Less than half (43%) of these remembered something specific. Of these the most common items recalled were to 'take care' (46%), to replace or secure loose mats (17%) and general home safety messages (9%). Of those who recalled the promotion half (n=46) reported taking steps to prevent a fall including taking more care (33%), replacing or securing loose mats (15%) and switching to more sensible footwear (11%).

#### ☐ **Talking with others**

The proportion of the sample who said that someone had talked to them on a one to one basis about falls and how to prevent them illustrated that the SOYF message was promoted by community networks. One in 9 (15%) respondents reported talking on a one to one basis with someone about falls or how to prevent them. One third (32%) of such discussions were with GPs, a quarter (23%) were with family, one in ten (10%) were with community health nurses and another one in ten with other health workers. This represented a wider spread of people discussing falls than in 1994 when three quarters (76%) of discussions were with GPs, family or other health workers. The most common messages given were to be more careful and avoid risk factors for falls.

#### ☐ **Meetings and classes**

The most commonly reported attendance at falls prevention meetings or classes was to gentle exercise classes. The 8% of respondents who reported doing so represent a larger proportion of the older community than that of the SOYF instigated CHEGS classes. Other classes are known to have been established by other organisations and, as with the broadening base of one to one advising, this may also reflect a broader community response to SOYF.

Attendance at SOYF talks by Falls Advisers (6%) represents 5,000 older residents who have received the key messages for preventing falls. As with other self selected audiences at health meetings and classes, participants may be the more health conscious 'early adopter' type. However they may also be important catalysts for developing a broader falls-preventing culture.

#### ☐ **Home safety**

More than a quarter (27%) of respondents reported modifying their home environment in order to reduce the chance of a fall. There was some change in the distribution of types of changes but handrail installation (59%) remained the most popular change (Table 2). Older people or their spouses made most of the modifications themselves (Table 3).



**Table 2: Type of modification made to home**

Change Made	1994	1996
	n (%)	n (%)
Handrails - bathroom	22 (20)	86 (31)
Handrails - ramps/steps	31 (28)	60 (21)
Floor	12 (11)	46 (16)
Bathroom	9 (8)	27 (9)
Handrails - other	23 (21)	19 (7)
Steps	20 (18)	18 (6)
Paths	4 (4)	12 (4)
Other (eg moved house)	23 (21)	18 (6)

**Table 3: Person who made the modification**

Change made by	1994	1996
	n (%)	n (%)
Respondent/spouse	47 (46)	129 (47)
Relative/friend	21 (20)	33 (12)
Tradesman/other	35 (34)	111 (41)

**Physical activity**

Reported levels of physical activity were very similar and not significantly different from those of the baseline cohort of older people in 1992 (Table 4). This was in spite of flood rains in 1996 in the week to which the activity questions referred and 70% of respondents reporting that they normally did more. Fourteen percent of respondents were sedentary.

**Table 4: Physical activity at baseline and 1996 Reach Survey**

Survey Year	Mean hours activity /week			% of sample	
	All	Male	Female	>7hrs/wk	Sedentary
1992 Baseline	10.5	11.8	9.8	54.3%	16%
1996 Reach	10.9	11.5	10.6	54.2%	14%

For those who were not sedentary (86%), in 1996 walking was by far the most common form of activity (37%) followed by gardening (19%) and housework (15%).

The main difference in activity type across age categories was such that with increasing age gardening became the more likely reported activity at the expense of walking and in the highest (85 plus) age group, walking and gardening rated equally at 30%.



#### □ **Comments on SOYF**

Four in ten (n=302) of respondents offered comments in relation to SOYF. These included that they are now more aware of falls (38%), requests for more information (27%) and approval of SOYF (26%). There were only 4 negative comments and 3 of these referred to the perceived repetitive nature of questions in the survey. Almost three quarters of respondents (n=541, 73%) took up the offer of a free SOYF kit which included the SOYF book.

### **Survey of Local Government Policy and Practice**

#### □ **Sample**

In 1992 14 of 17 Local Authorities responded. In 1996 13 responded and of these 10 had responded in 1992.

#### □ **Falls reporting protocols**

In 1992 10 of the 14 LGAs had falls registers whereas in 1996 12 of the 13 reported having one. The total number of registered falls in the two years preceding survey rose by 219% from 90 to 197 in the 10 LGAs surveyed on both occasions. This increase in reporting rate may reflect an increase in awareness of local government responsibilities.

#### □ **Complaints and hazard reporting protocols and rates**

Most LGAs (12/13) have a complaints file for recording falls hazards in their area. Grafton and Ulmarra reported none in 1992 but did by the 1996 survey. The ranking of prevalence of complaints was similar in 1992 and 1996 and was as follows in Table 5.

**Table 5: The frequency of recorded complaints in 4 LGAs**

<b>Complaint</b>	<b>1992</b>	<b>1996</b>
Improve / provide footpaths	41	176
Improve lighting	20	67
Improve surface finish	15	54
Provide ramps	3	36
Improve access to facilities	2	35
Provide crossings	6	29
Improve transport access points	3	24
Provide handrails	2	24
Provide seating	2	24
Improve crossings	3	22
Improve existing stairs	3	22
Reduce congestion	0	1
<b>TOTAL</b>	<b>100</b>	<b>514</b>

This illustrates a dramatic increase in falls related complaints over the period of the SOYF intervention, which is consistent with the large increase in awareness within the community and within LGAs of the importance of preventing falls in public places.

#### ☐ **Prevention policies**

When asked if there were specific policies which directly address issues relating to falls prevention, only 2 LGAs claimed they had in 1992 and 1996. However most (8/13) reported that they now have active access committees, at least two of which were instituted as a direct result of the SOYF programme. These committees are in the process of upgrading current access policies to cover falls prevention issues raised by SOYF. Most (12/13) also have specific protocols for dealing with a reported fall in terms of insurance and hazard rectification.

#### ☐ **Urgency of attention and scheduling of falls related improvements**

The mean urgency rating by LGAs for falls-related issues was 2.29 in 1992 and 2.25 in 1996 (where 1=very, 2=quite, 3=not very). There was little change in the rank order for the various issues with improvement of existing footpaths rating most urgent pre and post and improved access to facilities, improved surface finish and provision of ramps also rating highly on both occasions. How these issues rate on the current works program of an LGA is the critical issue and the post SOYF profile (Table 6).

**Table 6: Works program for 1996/97 (13 of responding LGAs)**

Issue	No of LGAs
Provide footpaths	12
Improve footpaths	11
Provide handrails, improve crossings	9
Improve transport access points, improve lighting, improve access to facilities	8
improve surface finish, provide ramps	7
Improve existing stairs	6
Provide crossings, provide seating	4
Reduce congestion	

The works program data clearly show footpaths, lighting, handrails, improved crossings and provision of ramps on the agendas of many LGAs on both occasions. Three important improvements in prominence on works programmes during the four year period were in provision of footpaths (7/12 to 12/13), improvement of transport access points (4/12 to 8/13) and improvement of existing stairs (4/12 to 7/13).

#### ☐ **Risk management appraisal process**

Most (10/13) LGAs are in the continual process of Risk Management Appraisal by their insurance underwriters. The underwriters provide guidelines for injury minimisation and these include most of the above falls related issues.

#### ☐ **Process for upgrading safety in older buildings**

Most LGAs (9/13) now take the opportunity of a 'Change of Use Application' or a 'Fire Notice' for existing buildings to enforce new safety regulations including disabled access improvements. The increase in number and assertiveness of access committees and their additional focus on falls prevention can ensure that falls issues are not overlooked in this process.



- ❑ **Falls safety in relation to transport and pedestrian crossings**  
Nine of the 13 LGAs now use non-slip paint on pedestrian crossings compared with only 5 of 14 LGA's prior to SOYF. This is a dramatic shift and early initiatives by SOYF may well have been instrumental in achieving this improvement.

As yet only 3 LGAs have a policy for step heights and step distances into public transport. This has not changed in the 4 years. Although not targeted by SOYF this is an issue for which specific strategies might well be developed. All surveyed LGAs provide seating at bus and taxi stops but few do so at all stops and there does not appear to have been any improvement on this front. Grab rails at transport access points appear to be almost non-existent as they were in 1992.

- ❑ **Falls prevention initiatives**

Six (of 13) councils reported having initiated their own falls prevention activities or doing so in conjunction with community groups (compared with none in 1992). These initiatives addressed issues of access and falls hazard identification in town situations. The access committees which developed or transformed as a result are an ongoing feature of these LGAs, representing an important element of sustainability.

- ❑ **Other influences of the SOYF intervention**

Of 13 responding LGAs post intervention 3 reported that SOYF had 'considerable' or 'a great deal' of influence upon them especially in terms of raising awareness of the importance of falls and identifying issues on which they could act. A further 8 LGAs reported 'moderate' influence mainly in terms of awareness raising. One of these reported buying an edging machine to make footpaths safer as a direct result of SOYF. In another case the officer reported that SOYF had given them good information for lobbying council for resources. Only one LGA reported no influence.

Ten of the LGAs actually have current proposals to continue falls prevention activities. These include Mobility Maps to assist older people to move safely around in urban areas, disabled access plans, more funding for falls initiatives, footpath inspections, improved access and more use of tactile and non-slip surfaces.

When asked what documents or guidelines LGAs used to develop strategies to prevent falls 6 (of 13) responses specifically mentioned the SOYF Guidelines for Public Places. Other documents included the Disabled Discrimination Act, Disabled Access guidelines, building codes, Australian Roads Guidelines and insurance company risk management guidelines (eg: Jardines).

## **Risk Factor Survey**

- ❑ **Sample**

Table 7 shows the sample size and response rates for each NCRFS survey. Because power calculations were originally based on a published fall rate (33.3%) which proved to be higher than the actual rate (21.5%) the achieved sample was not adequate to statistically detect the targeted



14% reduction. In fact almost twice the achieved sample size would have been required (ie 2182 each instead of 1131 and 1314). Comparisons are based on an almost identical two thirds response rate in both intervention and control areas.

**Table 7: Sample sizes pre and post intervention**

Sample	Intervention		Control	
	n	%	n	%
Pre	1992	(100%)	1665	(100%)
Pre & Post	1314	(66.0%)	1131	(67.9%)

#### ☐ Non-response bias

Non-response bias due to attrition was minimal and only significant in 3 of 15 variables tested (Table 8). Registry records combined with reports by family indicate a minimum of 9.5% mortality and, as expected, this rate was age dependent (5.6% for 60-64 years cf 30.0% for 85 plus).

**Table 8: Variables showing significantly different baseline distributions between follow-up samples and original cohorts**

Variable	Intervention		Control	
	Bias at follow-up df, $\chi^2$ , sig		Bias at follow-up df, $\chi^2$ , sig	
Age	Fewer aged 75+: 3, 18.1 20% cf 26%. ** Mean of 69.2 cf 70.1 years.		Fewer aged 75+: 3, 11.3 18% cf 22% * Mean of 68.8 cf 69.6 years.	
Gender	Fewer males: 1, 3.9 31% cf 35% *		34% cf 36% ns	
Active 7+ Hrs.week	More active: 1, 8.5 53% cf 48% **		More active: 1, 4.8 59% cf 55% *	

\*  $p \leq 0.05$ , \*\*  $p \leq 0.005$

#### ☐ Programme reach

Three questions in the final SOYF risk factor survey were designed as cross checks of the final reach survey which measured contact respondents may have had with various elements of SOYF. Responses to these revealed that some respondents in the control area recalled items concerning falls and falls prevention, spoke on a one to one basis to others about falls and their prevention and in a few instances attended meetings or classes. The difference between intervention and control responses provided a more accurate measure of the extra exposure to falls and falls prevention messages provided in the intervention area by the SOYF programme over and above the influence of the surveys themselves.



The main change was in having seen, read or heard about falls. Over half responded 'yes' in the intervention area (Table 9) and this represents an extra one third of the sample compared with the control group. There was no significant difference between the proportion of respondents reporting one to one discussions about falls. Many of these people had actually fallen during the 4 year period and the reported discussions may represent consultations with various friends, family and health professionals at the time. One in 15 respondents in the intervention area reported having attended a meeting or class about falls. This is more than 3 times that in the control area and reflects concerted community education efforts within the intervention area.

**Table 9: Frequency of responses in the 1996 survey to reach questions**

Question (re. last 4 years)	Intervention n=1315		Control n= 1132		Diff %	$\chi^2$	p
	n1	%	n2	%			
					n1-n2		
1. Have you seen, read or heard anything about falls or how to prevent them?	687	52.4	191	17.7	35.8	326.12	0.000
2. Has anyone talked to you on a one-to-one basis about how to prevent falls ?	106	8.1	72	6.4	1.7	2.51	0.113
3. Have you been to any meetings or classes about preventing falls?	87	6.6	21	1.9	4.7	32.5	0.000
4. Any of the above?	734	55.8	249	22.0	33.8	289.5	0.000

#### ☐ Univariate analysis of outcome indicators

A range of changes occurred in one or both of the survey areas (Table 10).

#### ☐ Self reported falls

There was a net 22.4% non-significant univariate reduction in falls incidence in the intervention ( $t=1.37$ ,  $df=2216$ ,  $p(t)=0.1699$ ). As expected with an ageing cohort reported falls incidence for the year prior to survey increased in intervention (0.215 to 0.269) and control areas (0.186 to 0.270).

#### ☐ Attitudes

There was an increase in recognition of falls as a problem for older people in both groups but only 1% difference between them. Change regarding the preventability of falls differed markedly between areas with the nett adjusted difference representing a 14% relative increase on initial rates in the intervention area. Self rated risk of falling increased in the intervention area but not in the control area and the net adjusted change represented a 20% relative increase in the intervention area when compared with initial rates. This is consistent with older people becoming more aware of the possibility of falling as a result of SOYF.



#### ☐ **Knowledge of risk factors**

There was a decrease in correct identification of falls risk factors in both areas. Because the change was greater in the control area (by 5.2%) it would seem that the constant awareness raising by SOYF in the intervention area slowed a general trend for older people to be less able to recall specific potential causes of falls as they age.

#### ☐ **Risk factors**

Among risk factors for falling there was an increase in respondents from the intervention cohort reporting eye checks within the past 12 months. However this did not translate into a real relative change when compared with the control area. There was a significant reduction in physical activity in both areas and the univariate comparison revealed a 6% greater reduction in the intervention area. In both areas fewer respondents reported their balance to be excellent or good at follow-up. The change was more pronounced in the control area consistent with a potential beneficial effect of the intervention but the adjusted difference was not significant.

In both areas there was an increase in walking-aid use which may again reflect ageing for the comparison proved non significant. There was no change in reported footwear safety in the intervention group however the adjusted comparison revealed a 6.4% relative increase on initial rates. Use of medications known to pose a falls risk increased in both areas but the comparison proved non-significant.

There was a reduction in both areas in the proportion of respondents who made falls-safe changes to their home environment during the past 12 months and a relative 8% but non-significant increase on initial rates in the intervention area.





**Table 10:** Unadjusted proportions for positive values of outcome variables in North Coast and control areas

Variable	Category	North Coast			Control		
		Pre (%)	Post (%)	Diff (%)	Pre (%)	Post (%)	Diff (%)
Fell	yes	21.5	26.9	+5.4	18.6	27.0	+8.4
Falling a problem	yes	88.0	93.4	+5.4	86.0	92.4	+6.4
Falling preventable	yes	45.5	66.6	+21.1	47.0	60.8	+13.8
Knowledge of risk factors	identify 3 known factors	70.6	64.7	-5.9	72.4	61.2	-11.2
Risk of falling	high/medium	29.7	36.2	+6.5	26.0	29.5	+3.5
Eyes checked	annually	57.5	64.1	+6.6	60.4	63.4	+3.0
Dizziness	never/rarely	22.2	20.1	-2.2	21.4	21.3	-0.1
Physically active	7+ hours/week	52.7	44.6	-8.1	59.4	51.7	-7.7
Balance	excellent/good	82.1	78.5	-3.6	85.2	78.3	-6.9
Walking aid	yes	7.3	14.5	+7.2	8.3	14.9	+6.6
Footwear safety	wear grips or buy safe	73.4	74.8	+1.4	63.6	66.9	+3.3
Medication	take falls inducing	48.6	56.9	+8.3	40.0	52.1	+12.1
Made changes	yes	14.6	12.0	-2.6	13.7	11.1	-3.6

**Table 11:** Comparison of univariate differences for intervention and control areas adjusted by Cochran's method \*

Variable	Category	Net % Difference (corrected for initial rates) and 95% CIs	
Fell	yes	-0.5	(-4.0 - 2.9)
Falling a problem	yes	0.6	(-1.3 - 2.7)
Falling preventable	yes	6.1	(2.4 - 9.9)
Knowledge of risk factors	identify 3 known factors	3.7	(-0.2 - 7.5)
Risk of falling	high/medium	5.8	(1.5 - 10.1)
Eyes checked	annually	1.2	(-2.6 - 5.0)
Dizziness	never/rarely	-0.6	(-3.7 - 2.6)
Physically active	7+ hours/week	-5.5	(-9.3 - -1.6)
Balance	excellent/good	1.4	(-1.8 - 4.6)
Walking aid	yes	1.2	(-1.4 - 3.6)
Footwear safety	wear grips or buy safe	4.7	(1.3 - 8.1)
Medication	take falls inducing	-0.1	(-3.2 - 3.0)
Made changes	yes	0.8	(-1.7 - 3.3)

\* Cochran's comparisons adjust using relative differences in proportions of negative and positive responses. The adjusted differences in Table 11 are therefore are not simply the differences between changes shown in Table 10.

## Multivariate Analysis

### Effects of Intervention

#### □ Self reported falls

After controlling for covariates the intervention was associated with a 5% (non significant) reduction in odds of a respondent reporting having had one or more falls in the past year (Table 12).

Table 12: Logistic regression for the effect of the intervention for each dependent variable

Dependent variable	Category	Odds ratio of the Intervention	95% Confidence Interval
Fell	yes	0.95	0.79, 1.15
Falls a problem	yes	1.10	0.80, 1.52
Falls preventable	yes	1.34	1.13, 1.59*
Knowledge score(0-3)	identify 3 known factors	1.17	0.99, 1.38 p=0.07
Risk of a fall	high/medium	1.31	1.08, 1.59*
Eyes checked	annually	1.02	0.86, 1.21
Dizziness	never/rarely	0.96	0.79, 1.18
Balance	excellent/ good	1.09	0.89, 1.35
Walking aid	yes	1.00	0.75, 1.32
Footwear	wear grips or buy safe	1.35	1.11, 1.64*
Medication	take falls inducing	1.00	0.82, 1.23
Improved home safety to prevent falls	yes	1.05	0.81, 1.36

(\* Wald's  $\chi^2$  p<0.05)

When the actual number of falls reported in the past year were analysed as a continuous variable the result was a non significant reduction of 0.066 falls/person/year. When expressed as a percentage of the mean number of falls/person/year (0.297) this represents a 22.2% reduction in falls (B for intervention= -0.071, SE=0.047, F=2.22, p=0.1361) .



The difference between the outcome of the two analyses results from the disproportionately much greater changes amongst multiple fallers (Table 13). For example one respondent reported falling 10 times in 1992 but only once in 1996.

**Table 13: Post-pre changes in falls incidence for intervention and control cohorts by category of faller**

Treatment	Item	Category at baseline survey			Total
		No fall	Single fall	Repeat	
SOYF	n in cohort	1031	216	66	1313
	change in falls frequency	303	-105	-134	64
	n falls pre	0	216	174	390
	change	+++	-48.6%	-77.0%	16.4%
Control	n in cohort	921	154	56	1131
	change in falls frequency	312	-47	-116	149
	n falls pre	0	154	163	317
	change	+++	-30.5%	-71.2%	47.0%

#### ☐ **Attitudes**

SOYF had a significant influence on attitudes to preventability of falls, such that the intervention produced a 34% increase in odds of respondents considering falls preventable and a 31% increase in respondents considering they were at moderate or high risk of having a fall. There was a 10% increase in odds of respondents considering falls a problem for older people but this change did not reach significance.

#### ☐ **Knowledge of risk factors**

There was 17% increase in the odds of a respondent knowing three of the recognised risk factors for falls but the change was not statistically significant.

#### ☐ **Risk factors**

There was a 35% increase in odds of respondents wearing jogger style footwear or considering falls safety factors of prime importance when purchasing footwear. The odds of respondents reporting their balance as good or excellent increased by 9% but this change was not significant. Other non-significant improvements were a 5% increase in the proportion of respondents who reported making falls-safe changes to their homes; a 4% reduction in reported dizziness on rising and a 2% increase in odds of respondents reporting having had their vision checked in the past 12 months.



There were negligible changes in use of falls related medication or use of a walking aid.

When the physical activity risk factor was analysed as a continuous variable (ie: post-pre change in hours of activity) the multiple linear regression returned a non significant 5.8% increase of 0.64 hours/person/week associated with the intervention (B for intervention= 0.738, SE=0.672, F=1.21, p=0.2720). Interestingly when dichotomised as: reporting <7 hours per week; or reporting 7+ hours per week a significantly negative odds ratio of 0.80 was associated with the intervention indicating a reduction in the odds of a respondent reporting 7 or more hours of activity for the week prior to survey. As with the falls/year variable the discrepancy is likely to be due to the highly skewed distribution of hours of activity such that large changes can occur in relatively few individuals. It would appear that SOYF was associated with fewer older people doing 7+ hours per week. This result may also reflect success of the physical activity component of the Queensland '60 and Better' intervention which was launched in the control area during the second phase of SOYF.

### **Effects of Self Reported Exposure in the Intervention Area**

In an attempt to further identify changes that may have resulted directly from the intervention multiple logistic regression was used to test whether self reported exposure to the SOYF intervention (defined as a 'yes' response to questions 1, 2 or 3 in Table 9) within the intervention area had a significant effect on dichotomised response variables controlling for age, gender and baseline values of the dependent variable.

#### **❑ Self reported falls**

After controlling for covariates there was a non-significant 11% greater odds of having reported a fall among those recalling exposure to SOYF. (Table 14).

#### **❑ Attitudes and knowledge**

Exposure to SOYF components was significantly associated with improved attitudes to preventability of falls including a 42% increase in respondents considering falls preventable and a 76% increase in respondents considering falls a serious problem for older people. Reported exposure to one or more intervention components was also associated with non-significant 14% reduction in odds of knowing three risk factors for falls.

#### **❑ Risk factors**

The following non significant improvements in risk factor profiles were associated with exposure to SOYF elements: making falls safe changes within the home (28%), using falls safe footwear (23%), having eyes checked (17%), engaging in 7+ hours of physical activity (6%). Detrimental changes were observed in terms of an increase in reported use of medication (24%) and reduced balance rating (23%).



**Table 14:** Logistic regression results for exposure to SOYF component within the intervention area with covariates for each dependent variable

Dependent variable	Category	Odds ratio (95%CI) for reported exposure
Fell	1= fell in last 12 months, 0= no fall	1.11(0.87- 1.44)
Falls a problem	1= yes, 0= no	1.76(1.12- 2.77) *
Falls preventable	1= yes, 0= no	1.42(1.12- 1.80) *
Knowledge score (0-3)	1= score of 3, 0= score < 3	0.86(0.69- 1.09)
Risk of a fall	1= high/moderate, 0= low/non-existent	1.05(0.82- 1.35)
Eyes checked	1= checked annually, 0= not	1.17(0.92- 1.47)
Dizziness	1= never/rarely, 0= sometimes/always	1.07(0.80- 1.41)
Physical activity	1=7+hrs/week,0=<7hrs/week	1.06(0.84- 1.33)
Balance	1= excellent/good, 0= fair/poor	0.77(0.58- 1.03)
Walking aid	1= yes, 0= no	1.46(1.01- 2.09)
Footwear	1=Wear grips or buy safe, 0=neither	1.23(0.94- 1.61)
Medication	1=take 1+ falls related, 0=take none	1.24(0.93- 1.66)
Improved home safety to prevent falls	1= yes, 0= no	1.28(0.90- 1.81)

### Effects of Improved Awareness of Falls Issues in the Intervention Area

A similar statistical process was used to test whether self reported improvements in attitude or knowledge within the intervention area were significantly associated with dichotomised response variables controlling for age, gender and baseline values of the dependent variable.

(Improvement was here defined as a positive pre/post change in response to the questions: "Do you think falling over is a serious problem for older people?"; "Do you think people can avoid falling over as they get older?"; "Can you tell me three things that might cause older people to fall?").

**❑ Self reported falls**

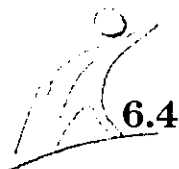
After controlling for covariates there was a non-significant 13% lower odds of having reported a fall among those with improved awareness. (Table 15).

**❑ Risk factors**

Those with improved awareness had a significant 62% lower odds of taking falls related medications, 43% greater odds of having good or excellent self reported balance status but not significant 21% lower odds of feeling dizzy on rising and 14% greater odds of doing 7+ hours of physical activity per week. They also had 11% greater odds of having made falls safe changes to their homes but 9% lower odds of wearing safe footwear though again these changes were not significant.

**Table 15: Logistic regression results for awareness of falls issue within the intervention area with covariates for each dependent variable**

Dependent variable	Category	Odds ratio (95%CI) for improved awareness
Fell	1= fell in last 12 months, 0= no fall	0.87(0.68- 1.13)
Risk of a fall	1= high/moderate, 0= low/non-existent	0.97(0.76- 1.25)
Eyes checked	1= checked annually, 0= not	1.01(0.81- 1.28)
Dizziness	1= never/rarely, 0= sometimes/always	0.79(0.60- 1.04)
Physical activity	1=7+hrs/week,0=<7hrs/week	1.14(0.91- 1.43)
Balance	1= excellent/good, 0= fair/poor	1.43(1.07- 1.91) *
Walking aid	1= yes, 0= no	0.93(0.64- 1.35)
Footwear	1=Wear grips or buy safe, 0=neither	0.91(0.69- 1.19)
Medication	1=take 1+ falls related, 0=take none	0.38(0.29-0.50) **
Improved home safety to prevent falls	1= yes, 0= no	1.11(0.79- 1.57)



## **Hospital Admissions**

### **Methods**

Falls related hospital separation data (External Cause Codes E880-E888.9 and E929.3) for North Coast and total NSW residents aged 60 years and over were obtained from the NSW Inpatients Statistics Collection via HOIST for the years 1991/92 through to 1994/95. As the NSW North Coast borders Queensland with a significant flow of NC residents to Queensland hospitals, analysis was currently restricted to years for which interstate data were available (1994/95 was the latest) even though the intervention continued into 1996. Patient re-admissions were included in the analysis.

Similar data for residents of the Sunshine Coast in Queensland were obtained from the Queensland Hospital Morbidity Data Collection (years 1991 and 1992) and the Queensland Morbidity and Mortality System (1993 to 1995). Queensland data were regrouped into financial year periods for direct comparison with NSW data. End of year Estimated Resident Population (ERPs) by 5 year age group and sex were obtained for residents 60 years and over in the above areas (HOIST). The 1991 standard Australian population was used as a reference population (HOIST), for calculating direct age-standardised separation rates using the methods of Armitage and Berry (1987). Upper and lower 95 per cent confidence limits (95% CIs) for the observed number of hospital separations were computed based on the Poisson distribution, and 95% CLs for the standardised rates were calculated according to Dobson et al (1991). SAS software was used throughout for all calculations. Standardised separation ratios with 95% CIs comparing North Coast with Queensland and total NSW standardised rates were also calculated, as well as ratios comparing baseline to follow-up rates for each area.

### **Results**

Figure 14 shows annual direct standardised hospitalisation rates for falls per 100,000 female and male NSW North Coast and QLD Sunshine Coast residents aged 60 years and over. Rates in the intervention area had fallen slightly at early follow-up (1994/95) with an apparent downward trend. Rates have risen steadily in the control area as well as across NSW during the same period. Hospitalisation data will continue to be monitored to observe if the above trends are sustained.

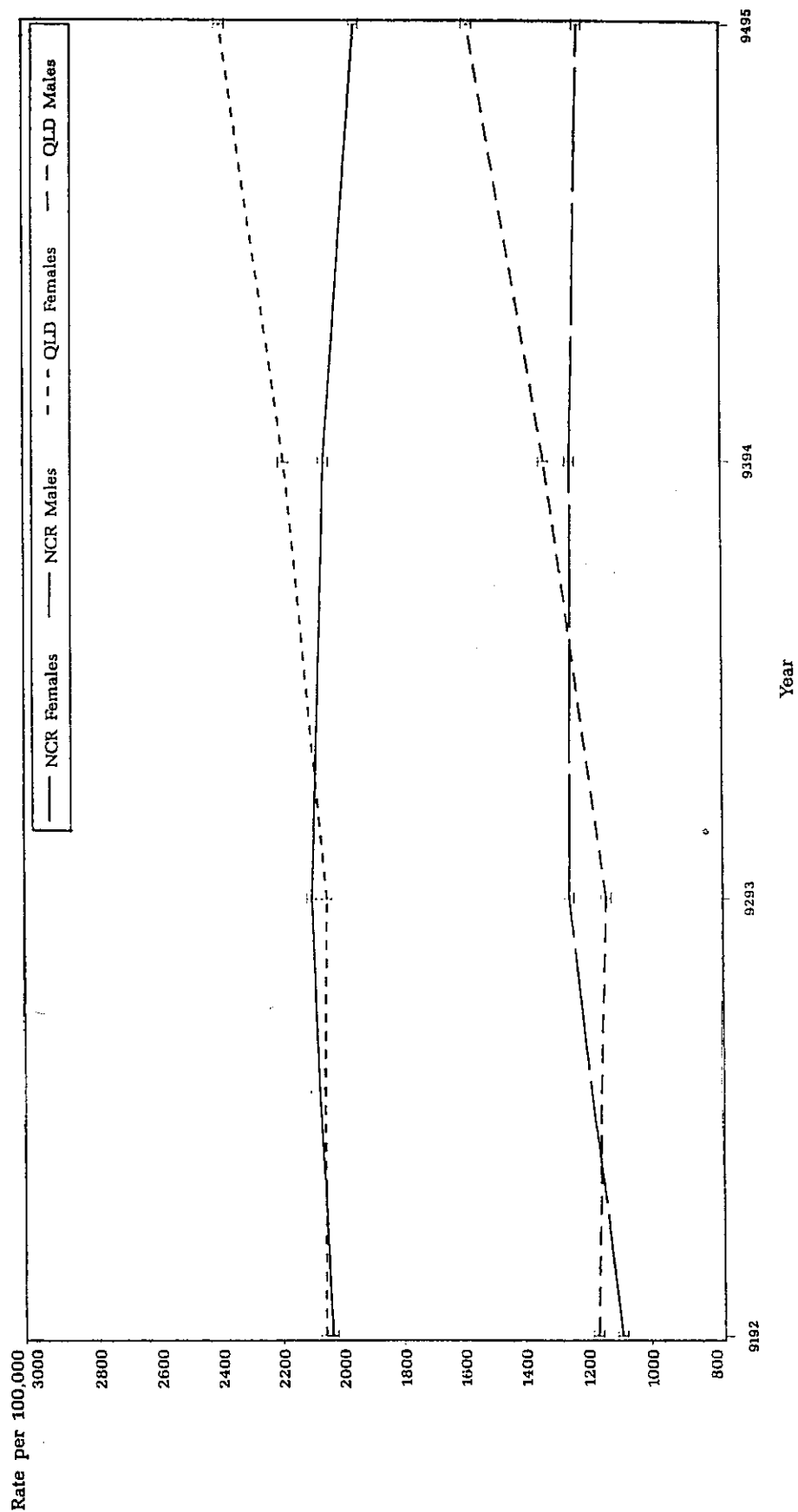
Standardised separation rates and ratios for each year are given in Table 16. The increasing falls rates in both the control area and across NSW give significantly lower standardised rate ratios when comparing the intervention area with these other areas at follow-up (NC vs SSC rate ratio=0.80, 95%CI 0.76 to 0.84,  $p<0.01$ ; NC vs total NSW rate ratio=0.81 95%CIs 0.77 to 0.86,  $p<0.01$ ). North Coast rate ratios comparing baseline to follow-up standardised rates show a 4 per cent reduction in hospitalisation rates for female residents and a 12 per cent rise for males. Baseline to follow-up ratios for the Sunshine Coast indicate a rise of 17 per cent for women and 36 per cent for male residents over the same period.





Figure 14:

1991/92-1994/95 direct standardised falls -  
related hospitalisation rate per 100,000  
North Coast (NCR) and Sunshine Coast (QLD)  
residents (60+years) by sex (with 95% CIs)





**Table 16:** Falls-related hospital separation frequencies and crude rates per 100,000 male & female NSW North Coast, QLD Sunshine Coast & NSW total residents aged 60 years and over (1991/92 to 1994/95)

Year Gender	North Coast			Sunshine Coast			Total NSW		
	No.	Pop.	Rate	No.	Pop.	Rate	No.	Pop.	Rate
1991/92									
Females	889	41767	2128.4	667	31940	2088.3	12931	53882	2399.6
Males	365	37000	985.7	290	28590	1014.3	4646	431469	1076.8
Persons	1254	78676	1591.6	957	60530	1581.0	17577	970351	1811.4
1992/93									
Females	955	43124	2214.7	700	33457	2092.2	13924	544656	2556.5
Males	426	38144	1116.8	298	29763	1001.2	5269	42512	1349.6
Persons	1381	81269	1699.4	998	63220	1578.6	19193	981926	1954.6
1993/94									
Females	982	44526	2205.5	792	35027	2261.1	14773	549850	2686.7
Males	445	39260	1133.5	375	31019	1208.9	5972	442512	1349.6
Persons	1427	83786	1703.1	1167	66046	1767.0	20745	992362	2090.5
1994/95									
Females	985	46095	2136.9	914	36541	2501.3	15220	555390	2740.4
Males	454	40396	1123.9	465	32218	1443.3	6101	447999	1361.8
Persons	1439	86491	1663.8	1379	68759	2005.6	21321	1003389	2124.9

Source: NSW ISCH<sup>HOIST</sup>, QLD MDC & MMDC.



Table 17:

Direct age standardised falls-related hospital separation rates per 100,000 male & female NSW North Coast, QLD Sunshine Coast & NSW total residents aged 60 years and over (1991/92 to 1994/95)

Year Gender	North Coast (NC) rate/100,000 (±95%CLs)	Sunshine Coast (SSC) rate/100,000 (±95%CLs)	Total NSW rate/100,000 (±95%CLs)	NC vs SSC Rate Ratio (±95%CLs)	NC vs Total NSW Rate Ratio (±95%CLs)
1991/92					
Females	2035.1 (2019.2, 2051.9)	2057.7 (2040.5, 2075.9)	2187.8 (2179.2, 2196.5)	0.99 (0.92, 1.05)	0.93 (0.87, 0.99)*
Males	1088.7 (1074.1, 1104.5)	1165.4 (1149.4, 1182.8)	1217.9 (1209.5, 1226.4)	0.93 (0.84, 1.03)	0.89 (0.80, 0.99)*
Persons	1653.5 (1640.3, 1667.3)	1666.0 (1651.8, 1680.9)	1808.8 (1801.6, 1816.1)	0.99 (0.94, 1.05)	0.91 (0.86, 0.96)**
1992/93					
Females	2095.9 (2080.0, 2112.6)	2046.9 (2030.0, 2064.8)	2288.3 (2279.7, 2297.1)	1.02 (0.96, 1.09)	0.92 (0.86, 0.97)**
Males	1249.4 (1234.3, 1265.6)	1132.9 (1117.3, 1149.9)	1345.8 (1337.4, 1354.5)	1.10 (0.99, 1.21)	0.93 (0.84, 1.02)
Persons	1732.4 (1719.2, 1746.2)	1649.4 (1635.4, 1664.0)	1919.1 (1911.8, 1926.4)	1.05 (0.99, 1.11)	0.90 (0.85, 0.95)**
1993/94					
Females	2056.1 (2040.5, 2072.5)	2186.7 (2169.7, 2204.6)	2365.9 (2357.3, 2374.7)	0.94 (0.88, 1.00)*	0.87 (0.81, 0.92)**
Males	1245.5 (1230.6, 1261.4)	1329.5 (1313.5, 1346.7)	1476.2 (1467.7, 1485.0)	0.94 (0.85, 1.03)	0.84 (0.76, 0.92)**
Persons	1712.2 (1699.2, 1725.8)	1822.6 (1808.5, 1837.4)	2017.7 (2010.4, 2025.1)	0.94 (0.89, 0.99)*	0.85 (0.80, 0.89)**
1994/95					
Females	1955.5 (1940.3, 1971.6)	2399.5 (2382.3, 2417.6)	2370.5 (2361.8, 2379.2)	0.81 (0.76, 0.87)**	0.82 (0.77, 0.88)**
Males	1220.7 (1206.1, 1236.4)	1582.3 (1565.8, 1600.0)	1473.5 (1465.0, 1482.2)	0.77 (0.70, 0.84)**	0.83 (0.75, 0.91)**
Persons	1641.8 (1629.1, 1655.0)	2051.2 (2036.8, 2066.2)	2016.5 (2009.2, 2023.8)	0.80 (0.76, 0.84)**	0.81 (0.77, 0.86)**

Reference Population: 1991 Australian Standard Population

\*p<0.05, \*\*p<0.01

North Coast Rate Ratio 1991/92 (baseline) vs 1994/95 (follow-up): Females=0.96, Males=1.12, Persons=0.99;

## Conclusions

SOYF has been a successful intervention at a number of levels. It has achieved a 22% reduction in self-reported falls in the target group. The overall goal of reducing falls by 10% has therefore been surpassed. It would be advantageous to monitor falls-related admissions for the next 3-5 years to determine if the observed downward trend in admissions continues.

The flow on effects into the quality of life and cost to the health system have been substantial. It has also raised the awareness of older people regarding the risk of falling, improved their attitude in terms of preventability, increased their knowledge of risk factors for falls, and changed some important behaviours such as wearing safe footwear, improving balance and taking fewer medications with falls related side effects.

Implementation of all strategy components occurred as planned with reach into the target older community of North Coast NSW exceeding expectations throughout the programme. Results of process evaluation suggest that most of the strategies employed could be recommended at least as a means of communicating falls prevention messages in other areas.

Strategies for reorienting local government towards falls prevention have influenced attitudes, practice and policy. Notably the public are now much more likely to confront their LGA with falls related issues and their LGA is more likely to respond positively as evidenced by a doubling of falls registrations, a quadrupling of falls related complaints and close matching of LGA priorities and works programs to complaint profiles. The influence of SOYF is evidenced by the majority of LGAs reporting that the SOYF guidelines for Public Places are used as a resource for decision making. The fact that the majority of LGAs also have ongoing falls initiatives and that two claimed that access committees were established as a response to SOYF bodes well for long term sustainability of these strategy initiatives.



## RECOMMENDATIONS

### **Programme Length**

A longer time-span would be beneficial for a programme such as this. SOYF was originally planned as a three-year intervention and although it was extended to four, in hindsight five years would have been more appropriate. This would have allowed the first year to have been spent in engaging appropriate sectors of the health service, such as general practitioners.

### **Active Engagement of Older People**

Older people trained in falls prevention and public speaking were found to be highly credible and acceptable to other older people. Such trained peer educators have a valuable role to play in the preliminary phase of raising awareness of the problem of falls and pointing out methods by which people can help themselves prevent falls. They can function well as resource people in small communities with their advisory role complementing that of professional health workers.

SOYF employed an older woman as the Falls Prevention Co-ordinator and this high-profile role also added to its credibility and acceptance.

### **Participation of General Practitioners**

GP involvement is crucial to a falls prevention programme for older people. SOYF employed a GP as a project officer in the latter half of the intervention, but would have achieved a higher level of GP involvement had she been part of the team from the programme's inception.

### **Employing Specific Professional Skills**

It proved both efficient and rewarding to employ appropriate professionals to carry out particular strategies of the programme. A GP and a Community Health Nurse were trained in falls prevention and both proved able, enthusiastic and credible in taking the message to their peers. They were clearly more acceptable than someone from another discipline and added a dimension of sustainability to the programme.

### **Multifactorial Approach**

SOYF concentrated on the eight risk factors identified in a national forum in 1990 (Kempton & Vaughan, 1990). Of these, the influence of chronic conditions on falls proved the most difficult to convey adequately. In addition, it may be worth examining the effect of emotional and psychological state at the time of the fall. Although there is little in the literature to support this as a risk factor, there is a wealth of anecdotal evidence from older people themselves that it is often a significant factor.



As well, in the younger more active age group, there may be a case for emphasising risk taking behaviour as a factor in falls. Linked to a denial of the ageing process, there is again strong anecdotal evidence that inappropriate behaviour and lack of planning plays a significant role in many falls.

### **Multi-strategic Approach**

Five major strategy components were developed for the SOYF programme:

- ☐ awareness raising and information dissemination
- ☐ community education
- ☐ policy development
- ☐ home safety measures
- ☐ working with health professionals

The strategies were phased in during the first two years of the intervention and were monitored through the annual reach surveys.

#### ☐ **Awareness raising and information dissemination**

Because there is a strong widespread belief that falls are an inevitable part of ageing, any similar intervention needs to spend considerable time and energy on this strategy. It is vital to counteract negative perceptions not only among the older community but among many health professionals working with older people. We would recommend this as a core component of any falls prevention intervention.

#### ☐ **Community education**

SOYF chose to have both health professionals and trained older people as community educators. The health professionals were mainly Health Promotion Officers and Community Health Nurses. Both proved acceptable to older people. The trained older advisers enabled the programme to reach larger numbers and were favourably seen as adding credibility.

#### ☐ **Policy development**

The intervention would have benefited from an earlier introduction of this strategy. Policy development with local councils did not take place until the last year of the intervention but many councils would have been enthusiastic partners earlier than this. Shopping centres also would often be receptive to co-operative ventures.

We would recommend well-publicised partnerships with local councils and shopping centres as valuable falls prevention strategies wherever possible.



## ☐ **Home safety measures**

SOYF found this a particularly difficult strategy to implement. One possible reason for this may be that our younger more active target group did not regard home safety as particularly relevant. They saw its relevance to their older parents/friends but were on the whole not ready to make too many adjustments in their own homes. (In this they are to an extent quite correct in that they do not fall at home as frequently as people aged 80+). Another reason is almost certainly the fact that home safety products are not readily available. There are number of excellent products in existence but they are not to be found on the shelves of most hardware stores.

We would recommend that similar interventions investigate alternative methods of making useful falls-prevention products more easily available (eg. selling products by party-plan, currently being tried in Western Australia).

## ☐ **Working with health professionals**

It is essential to engage partners such as general practitioners, community health nurses, occupational therapists and physiotherapists. Their value becomes greater with an increase in age of the target group.

## **Target Group**

SOYF strongly recommends that similar health promotion interventions target a specific age-group rather than attempt to cover all people over the age of 65 for example. People aged 60-75 were the main focus for SOYF and this was not an easy target group. It contains a large number of people who do not choose to recognise their own likelihood of falling. We would suggest people aged 70-80 as a target group, possibly requiring different strategies.

## **Research**

For future evaluations of similar programmes sample sizes will need to be based on a falls rate of 20% and a potential reduction of 10%.

Cross sectional designs should be considered for ease of interpretability of results although researchers should be aware of possible loss of accuracy of estimates depending upon context (see Diehr et al, 1995; for a full discussion of criteria).

When using hospital 'E' codes in analysis of admission data care must be taken to use codes that are consistent with the intervention eg: falls on the same level as opposed to falls from high places.

Allen-Narker, R.C., Isaacs, B. & Nayak, U.S. L. (1986). *Prognostic factors in fractures of the wrist in patients aged 65 and over*. (Unpublished paper quoted in Kellogg 1987).

Armitage, P. & Berry, G. (1987) *Statistical methods in medical research*. 2nd edn.. Blackwell Scientific Publications. Oxford UK.

Askham, J., Glucksman, E., Owens, P., et al. (1990). *A Review of research on falls among elderly people*. Age Concern Institute of Gerontology, King's College, London. September.

Australian Bureau of Statistics. (1989-90) *National Health Survey: Summary of results*.

Baker, S. P., & Harvey, A.H. (1985). *Falls injuries in the elderly*. Clinical Geriatric Medicine 1(3): 501-12.

Boonen, S., Dequeker, J., Pelemans, W. (1993). *Risk factors for falls as a cause of hip fracture in the elderly*. Acta Clin. Belg. 48 (3) : 190-4.

Borkan, J.M., Quirk, M. & Sullivan, M. (1991). *Finding meaning after the fall : injury narratives from elderly hip fracture patients*. Soc. Sci. Med.33 (8) : 947-57.

Buchner, D. M., Cress, M. E., Wagner, E. H. et al. (1993). *The Seattle FICSIT/Movelt study : the effect of exercise on gait and balance in older adults*. J. Am. Geriatr. Soc. 41(3) : 321-5.

Campbell, A. J. (1991). *Drug treatment as a cause of falls in old age. A review of the offending agents*. Drugs Ageing 1(4) : 289-302.

Campbell, A.J., Borrie, M.J., & Spears, G.F. (1989). *Risk factors for falls in a community-based prospective study of people 70 years & older*. Journal of Gerontology 44(4): M112-17.

Campbell, A.J., Reinken, A.J., Allan, B.A., et al. (1981) *Falls in old age: a study of frequency and related factors*. Age Ageing 10: 264-270.

Cape, R.D.T. (1988) *Falls in the elderly*. Australian Family Physician 17: 524-27.

Chen, H. C., Schultz, A. B., Ashton-Miller, J. A. et al. (1996) *Stepping over obstacles : dividing attention impairs performance of old more than young adults*. J. Gerontol. A. Biol. Sci. Med. Sci. 5(3) : M116-22.

Cumming, R. G., Miller, J. P., Kelsey, J. L., Davis, P., Arfken, C. L., Birge, S. J. & Peck, W. A. (1991) *Medications and multiple falls in elderly people: the St Louis OASIS study*. Age Ageing, 20(6): 455-61.

Cummings, S.R., Kelsey, J. et al. ( *Epidemiology of osteoporosis and osteoporotic fractures*. Epidemiologic Review 7: 178-208.





Cutson, T. M. (1994) *Falls in the elderly*. Am. Fam. Physician 49(1): 149-56.

Cwikel, J., Fried, A.V., Galinsky, D., Ring, H. (1995). *Gait and activity in the elderly : implications for community falls-prevention and treatment programmes*. Disabil. Rehab., 17 (6) : 277-80.

Daly, L. (1992). *Simple SAS macros for the calculation of exact binomial and Poisson confidence limits*. Comput. Biol. Med. 22: 351-361.

Diehr, P., Martin, D.C., Koepsell T., Cheadle, A., Psaty, B.M., Wagner E.H. (1995). *Optimal survey design for community intervention evaluations: cohort or cross-sectional?* Journal Clinical Epidemiology. Dec 48(12): 1461-72.

Dobson, A. J., Kuulasma, K., Eberle, E. & Scherer, J. (1991). *Confidence intervals for weighted sums of Poisson parameters*. Statistics in Medicine 10:457-462.

Downton, J. H. & Andrews, K. (1991). *Prevalence, characteristics and factors associated with falls among the elderly living at home*. Ageing Milano, 3(3): 219-28.

Dunne, R. G., Bergman, A. B., Rogers, L. W. et al. (1993). *Elderly persons' attitudes towards footwear - a factor in preventing falls*. Public Health Rep. 108 (2): 245-8.

Falls Prevention Project (1990). *National Forum Proceedings*. Health Promotion Unit, Central Sydney Health Service.

Ficat, J.J., Vellas, B. & Albarede (1986). *Mechanism and prevention of falls with hip fracture in the elderly*. (Communication to Kellogg 1987).

Fries, J. (1980). *Ageing, natural death and the compression of morbidity*. N. Eng. J. Med. 303 (3): 130-135.

Graafmans, W. C., Ooms, M. E., Hofstee, H. M. et al. (1996). *Falls in the elderly : a prospective study of risk factors and risk profiles*. Am J. Epidemiol. 143 (11): 1129-36.

Grisso, J. A., Kelsey, J. L., Strom, B. L. et al. (1991). *Risk factors for falls as a cause of hip fracture in women. The Northeast Hip Fracture Study Group*. N. Engl. J. Med. 324 (19) : 1326-31.

Grisso, J.A., Schwarz, D.F. et al. (1990). *Injuries in an elderly inner-city population*. Journal of American Geriatrics Society. 38: 1326-31.

Gryfe, C.I., Amies, A. & Ashley, M.J. (1977). *A longitudinal study of falls in an elderly population. 1. Incidence & morbidity*. Age and Ageing 6: 201-210.

Haddon, W. (1980) *Advances in the epidemiology and injuries as a basis for public policy*. Public Health Reports. 95:411-22.



Hahn, A., Van Beurden, E., Kempton, A., Sladden, T., Garner, E. (1996) *Achievements of a community-based falls prevention programme in 18 months*. Health Promotion International. 11(3): 203-211.

Hale, W.A., Delaney, M.J., McGaghie, W.C. (1992) *Characteristics and predictors of falls in elderly patients*. J Fam Pract. 34 (5): 577-581.

Health Promotion Unit, NSW Health. (1989). *Health for all: promoting health and preventing disease in NSW*.

Health Targets & Implementation (Health for All) Committee (1988). *Health for all Australians*. Community Services and Health, Canberra Department.

Herings, R. M., Stricker, B. H., de Boer, A. et al. (1995). *Benzodiazepines and the risk of falling leading to femur fractures. Dosage more important than elimination half-life*. Arch. Intern. Med. 155 (16): 1801-7.

HOIST. *The Health Outcomes Indicator Statistical Toolbox*. A data access, analysis and reporting facility established and operated by the Public Health Division of NSW Health Department, North Sydney, NSW.

Hornbrook, M. C., Stevens, V. J., Wingfield, D. J. (1993). *Seniors' Program for Injury Control and Education. (SPICE)*. J. Am. Geriatr. Soc. 41 (3): 309-14.

Hornbrook, M. C., Stevens, V. J., Wingfield, D. J. et al. (1994). *Preventing falls among community-dwelling older persons : results from a randomized trial*. Gerontologist 34 (1): 16-23.

Hugo, G. & Wood, D. (1984). *Ageing of Australia's population, 1981 Census study, working paper No.8*. Department of Immigration & Ethnic Affairs, Canberra.

Hunt, M. T., Chapman, M., Lloyd, G. (1991) *Injuries due to falls as a result of uneven pavements*. Arch. Emerg. Med. 8 (4): 263-5.

Kellogg International Work Group (1987). *The prevention of falls in later life*. Danish Medical Bulletin. 34: Suppl.4.

Kempton, A. & Vaughan, S. (1991) *Prevention of falls and injuries amongst older people*. The Fall Prevention Project Report 1990-1991. Central Sydney Health Service.

Kiel, D.P., O'Sullivan, P. et al (1991). *Health care utilisation & functional status in the aged following a fall*. Medical Care. 29: 221-28.

Lilley, J. M., Arie, T., Chilvers, C. E. D. (1995). *Accidents involving older people : a review of the literature*. Age- Ageing 24: 346-365.

Lord, S. R., Anstey, K. J., Williams, P., Ward, J. A. (1995). *Psychoactive medication use, sensory-motor function and falls in older women*. Br. J. Clin. Pharmacol. 39(3): 227-34.



Lord, S. R., Clark, R. D. & Webster, I. W. (1991). *Visual acuity and contrast sensitivity in relation to falls in an elderly population*. Age-Ageing 20(3): 175-81.

Lord, S. N., Sambrook, P. N., Gilbert, C. et al. (1994). *Postural stability, falls and fractures in the elderly : results from the Dubbo Osteoporosis Epidemiology Study*. Med. J. Aust. 160(11): 684-5, 688-91.

Lord, S.R. & Sinnett, P.F. (1986). *Femoral neck fractures: admissions, bed use, outcome & projections*. Medical Journal of Australia. 145: 493-96.

Lord, S. R., Ward, J. A., Williams, P. (1996). *Exercise effect on dynamic stability in older women : a randomized controlled trial*. Arch. Phys. Med. Rehab. 77 (3) : 232-6.

Lord, S. R., Ward, J. A., Williams, P., Strudwick, M. (1995). *The Effect of a 12-month exercise trial on balance, strength and falls in older women : a randomized controlled trial*. J. Am. Geriatr. Soc. 43(11): 1198-206.

Liu, B. A., Topper, A. K., Reeves, R. A. et al. (1995). *Falls among older people : relationship to medication use and orthostatic hypotension*. J. Am. Geriatr. Soc. 43(10) : 1141-45.

Lundkvist, L., Jensen, P. E., Kruse, T. et al. (1992). *Physical causes of accidental falls in the elderly in their own homes*. Ugeskr. Laeger. 154(43): 2959-63.

Luukinen, H., Koski, K., Hiltunen, L., Kivela, S. L. (1994). *Incidence rate of falls in an aged population in northern Finland*. J. Clin. Epidemiol. 47(8): 843-50.

Melton, J.L. & Riggs, B.L. (1985). *Risk factors for injury after a fall*. Clinical Geriatric Medicine 1: 535-539.

Meuleman, J. R., Hoffman, N. B., Conlin, M. M. et al. (1992). *Health status of the aged : medical profile of a group of functional elderly*. South. Med. J. 85(5):464-8.

Meunier, P. J. (1993). *Prevention of hip fractures*. Am. J. Med. 95(5A): 75S-78S.

Mills, E. M. (1994). *The Effect of low-intensity aerobic exercise on muscle strength, flexibility and balance among sedentary elderly persons*. Nurs. Res. 43(4): 207-11.

Muir, L., Kanwar, S. (1993). *Ladder injuries*. Injury 24(7): 485-7.

McMurdo, M.E. & Gaskell, A. (1991). *Dark adaptation and falls in the elderly*. Gerontology 37(4): 21-4.

Nelson, D. E., Sattin, R. W., Langlois, J. A. et al. (1993). *Alcohol as a risk factor for fall injury events among elderly persons living in the community*. J. Amer. Geriatr. Soc. 41(3): 346-7.



Naylor, R. & Rosin, A.J. (1991). *Falling as a cause to a geriatric unit*. Practitioner, 205: 327-30.

NSW Health Department (1991). *Preventing injury in NSW*. Discussion document.

NSW Health Department (1989). *Report of the Healthy Older People Project*. Sydney Health Promotion Unit.

Nevitt, M.C., Cummings, S.R., Kidd, S. & Black, D. (1989). *Risk factors for re-current non-syncopal falls. A prospective study*. Journal of American Medical Association. 261(18): 2663-68.

North Coast Health Region (1991). *Strategic Plan for Health Promotion*.

Nyberg, L., Gustafson, Y., Berggren, D. et al. (1996). *Falls leading to femoral neck fractures in lucid older people*. J. Am. Geriatr. Soc. 44(2): 156-60.

O'Loughlin, J. L., Robitaille, Y., Boivin, J.F., Suissa, S. (1993). *Incidence of and risk factors for falls and injurious falls among the community-dwelling elderly*. Am. J. Epidemiol. 137 (3): 342-54.

Overstall, P.W., Exton-Smith, A.N. et al. (1977). *Falls in the elderly related to postural imbalance*. British Medical Journal 1: 261-64.

Prudham, D. and Evans, J.G. (1981). *Factors associated with falls in the elderly; a community study*. Age Ageing, 10:141-146.

Parliament of the Commonwealth of Australia: House of Representatives Standing Committee for long term strategies (1992). *Expectations of life. Increasing the options for the 21st century*. AGPS Canberra April.

Perry, B.C.(1982). *Falls among the elderly: A review of the methods & conclusions of epidemiologic studies*. Journal of American Geriatrics Society 30(6): 361-371.

Prudham, D. & Evans, J.G. (1981). *Factors associated with falls in the elderly: a community study*. Age Ageing 10: 141-46.

Radebaugh, T.S., Haley, E. & Suzman, R. (Eds) (1985). *Falls in the elderly: Biological and behavioural aspects*. Clinical Geriatric Medicine. 1(3): 497-697.

Ray, W.A., Griffin, M.R., Schaffner, W., et al. (1987). *Psychotropic drug use and the risk of hip fracture*. N Engl J Med, 316:363-369.

Reuben, D. B., Maly, R. C., Hirsch, S. H. et al. (1996). *Physician implementation of and patient adherence to recommendations from comprehensive geriatric assessment*. Am. J. Med. 100(4): 444-51.

Robertson, M. C., Campbell, A. J. (1993). *Preventing falls and fall-related injuries in the elderly : a literature review*. Fall Prevention Research Group, University of Otago Medical School, Dunedin, New Zealand. July.



Rozycki, G. S. & Maull, K. I. (1991). *Injuries sustained by falls*. Arch. Emerg. Med. 8(4):245-52.

Rubenstein, L.Z., Robbins, A.S. et al. (1988). *Falls & instability in the elderly*. Journal of American Geriatrics Society 36(3): 266-78.

Ruthazer, R., Lipsitz, L. A. (1993). *Antidepressants and falls among elderly people in long-term care*. Am. J. Public Health 83(5) : 746-9.

Ryyanen, O. P., Kivela, S. L. and Honkanen, R. (1991). *Times, places and mechanisms of falls among the elderly*. Z. Gerontol., 24 (3) : 154-161.

Ryyanen, O. P., Kivela, S. L., Honkanen, R. et al. (1991). *Incidence of falling injuries leading to medical treatment in the elderly*. Public Health 105(5 ):373-86.

SAS Institute Inc. Statistical Analysis System. Cary, NC: SAS Institute (1991,1992).

SAS Institute Inc. SAS/STAT Guide for Personal Computers, Version 6 Edition.

Sattin, R.W., Lambert Huber, D.A. et al. (1990). *The incidence of fall injury events among the elderly in a defined population*. American Journal of Epidemiology 131: 1028-37.

Schulman, B.K. & Acquaviva, T. (1987). *Falls in the elderly*. Nurse Practitioner 12(11): 30-37.

Sheahan, S. L., Coons, S. J., Robbins, C. A. et al. (1995). *Psychoactive medication, alcohol use and falls among older adults*. J. Behav. Med. 18(2): 127-40.

Shepherd, J., Lutz, L. J., Miller, R. S., Main, D. S. (1992). *Patients presenting to family physicians after a fall : a report from the Ambulatory Sentinel Practice Network*. J. Fam. Pract. 35(1): 43-8.

Smallegan, M. (1983). *How families decide on nursing home admissions*. Geriatric Consultant. 1 (5): 21-24.

Speechley, M. & Tinetti, M. (1991). *Falls and injuries in frail and vigorous community elderly persons*. J Am Geriatr Soc. 39(1): 46-52.

Studenski, S., Duncan, P. W., Chandler, J. et al. (1994). *Predicting falls : the role of mobility and nonphysical factors*. J. Am. Geriatr. Soc. 42 (3): 297-302.

Sudarsky, L. (1990). *Geriatrics: gait disorders in the elderly*. New England Journal of Medicine. 322: 1441-46.

Suzuki, M., Yamada, K., Takahashi, H., Tsuchiya, S. (1993). *A Study of falls among elderly living in the community*. Nihon Kango Kagakkaishi 13(2): 10-19.



- Teno, J., Kiel, D.P. & Mor, V. (1990). *Multiple stumbles: a risk factor for falls in community dwelling elderly*. Journal of American Geriatrics Society. 38: 1321-25.
- Tideiksaar, R. (1989). *Falling in old age: its prevention and treatment*. New York: Springer.
- Tinetti, M. E., Baker, D. I., Garrett, P. A. et al. (1993). *Yale FICSIT : risk abatement strategy for fall prevention*. J. Am. Geriatr. Soc. 41(3): 315-20.
- Tinetti, M. E., Baker, D. I., McAvay, G. et al. (1994). *A multifactorial intervention to reduce the risk of falling among elderly people living in the community*. N. Engl. J. Med. 331(130): 821-7.
- Tinetti, M. E., Doucette, J. T., Claus, E. B. (1995). *The Contribution of predisposing and situational risk factors to serious fall injuries*. J. Am. Geriatr. Soc. 43 (11): 1207-13.
- Tinetti, M. E., Doucette, J., Claus, E., Marottoli, R. (1995). *Risk factors for serious injury during falls by older persons in the community*. J. Am. Geriatr. Soc. 43(11): 1214-21.
- Tinetti, M. E., Mendes-de-Leon, C. F., Doucette, J. T., Baker, D. I. (1994). *Fear of falling and fall-related efficacy in relation to functioning among community-living elders*. J. Gerontol. 49(3): M140-7.
- Tinetti, M. E., Speechley, M. *Multiple risk factor approach to prevention of falls*.  
in Weindruch Hadley and Ory.
- Tinetti, M., Speechly, M. & Ginter, S.F. (1988). *Risk factors for falls among elderly people living in the community*. New England Journal of Medicine. 39 (26): 1701-07.
- Tinetti, M., Williams, T.F. & Mayewski, R. (1986). *Fall risk index for elderly patients based on number of chronic disabilities*. American Journal of Medicine 80:429-34.
- Turano, K., Rubin, G. S., Herdman, S. J., Chee, E., Fried, L. P. (1994). *Visual stabilisation of posture in the elderly : fallers vs. nonfallers*. Optom. Vis. Sci. 71(12): 761-9.
- Urton, M. M. (1991). *A Community home inspection approach to preventing falls among the elderly*. Public Health Rep. 106(2): 192-5.
- Van Beurden E., Williams A., Sladden T., Kempton A., Garner, E. (1993). *Stay on Your Feet, Technical Report No. 1 Needs and Baseline Information*. North Coast Public Health Unit.
- Vandervoort, A. A. (1992). *Effects of ageing on human neuromuscular function : implications for exercise*. Can. J. Sport Sci. 17(3): 178-84.
- Vaughan, S. & Kempton, A. (Eds.). (1990). *Prevention of falls and injuries amongst older people. Forum proceedings*. Sydney: Central Health Promotion Unit.



Walker, J.E. & Howland, J. (1990). *Falls & fear of falling among elderly persons living in the community: occupational therapy interventions.* American Journal of Occupational Therapy. 45:119-22.

Weindruch., Richard., Hadley., Evan C. & Ory, Marcia G. (1991). *Reducing Frailty and Falls in Older Persons.* Charles C Thomas, Springfield Ill.

Wettstein, A. (1992). *Falls as a side effect of drugs.* Schweiz. Rundsch. Med. Prax. 81(46): 1383-7.

Wild, D., Nayak, U.S.L. & Isaacs, B. (1981). *How dangerous are falls in old people at home?* British Medical Journal 282:266-68.

Wolf, S. L., Barnhart, H. X., Kutner, N. G. et al. (1996). *Reducing frailty and falls in older persons : an investigation of Tai Chi balance training .* Atlanta FICSIT Group. J. Am. Geriatr. Soc. 44 (5): 489-97.

Yong, L.C. (1985). *Physiological changes and medical problems in old people.* Singapore Elders. Vol 8, Nos. 1 & 2.

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