A WHO Global Report on Falls among Older Persons

Prevention of falls in older persons:
Africa case study

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Contents

Summary

Falls are a major cause of morbidity and mortality in the elderly. A fall results from an interaction of intrinsic and extrinsic factors as well as situational factors and commonly heralds the presence of an underlying medical problem. The incidence of falls and fall related injury increases with advancing age. Older populations of developing countries, including Africa, are expanding and the number of older persons at risk of falls is increasing. Research on falls and related injuries in Africa's older population is sparse. Few earlier studies reported falls, but recent research on injuries in general has shown that falls are an increasing cause of injury, especially fractures, in the elderly.

Falls, especially recurrent falls, in the elderly are avoidable. A lack of awareness of the syndrome, risk factors and consequences of falls for older persons call for intervention, as they impact not only an individual and her/his family but also society through associated direct and indirect costs. Studies in developed countries show that falls prevention programs are especially effective when targeted at individuals at increased risk of falls: persons age 75 and over and persons with a prior history of falls. Multifaceted fall prevention programs which address interacting risk factors for falls have been shown to be successful in reducing falls and fall related injuries in both community dwelling and institutionalised individuals when offered by trained professionals, but they are labour intensive and costly.

Apart from South Africa, no other African countries provide guidelines for the management and prevention of falls in the elderly. However, despite the availability of the guidelines and a booklet, there is no evidence of their employment in the South African target population. Implementation of falls prevention programs in African countries will be challenging in terms of costs, other priorities, and a lack of awareness of the complexity of falls. Thus, the programs may need to be taken forward in tandem with health promotion programs and research.

Introduction

Falls are more common in children below the age of five and in persons age 65 and over than in other age groups. A fall is defined as unintentionally coming to rest on the ground or other lower surface with or without loss of consciousness and other than a consequence of sudden paralysis, epileptic seizure, or overwhelming external force. Compared to children, older persons are more likely to be hospitalised and die as a result of a fall.[1] Falls account for 10 percent of emergency hospital visits and 6 percent of hospital admissions.[2] The incidence of falls increases exponentially with age: an incidence rate of 30 percent in persons age 65 and over increases to 50 percent in persons age 80 and over.[3] Twenty to 30 percent of older persons who fall suffer serious injury, such as hip and other fractures, dislocations, subdural haematoma, head injury and other soft tissue injuries.[2] More than 60 percent of people who die from falls are age 75 and over. Those who survive a fall suffer significant morbidity with greater functional decline in activities of daily living (ADLs) and physical and social activities, and are at a greater risk of institutionalisation, than persons age 65–74 years.[1] Falls that do not result in serious injury may still have serious consequences for an older person, who may fear falling again, which can lead to reduced mobility and increased dependence through loss of confidence.

Ageing in Africa

Africa's population is ageing, although at a slower pace than other world regions. By 2050 the proportion of people age 60 and over in the total population is projected to increase from 5 to 10 percent. Life expectancy at birth remains low due to sustained fertility and high infant, child and adult mortality, and the burden of HIV/AIDS, tuberculosis and malaria. The absolute number of older persons is projected to increase dramatically: from 47.4 million in 2005 to 193 million by 2050. Life expectancy at age 60 is 15 years for men and 17 years for women, fairly similar to that in other developing and developed regions.[4]

The increase in the number of older persons in Africa, together with longevity, will expose a greater number to a risk of falls. Of an estimated 6.26 million hip fractures globally in 2050, 4.43 million (71%) are expected to occur in developing countries, including Africa.

Methods

Objectives

The goal of this paper is to contribute to the production of a WHO Global Report on Falls among Older persons which will serve to increase awareness and knowledge of the importance falls in older adults and encourage action to prevent falls and fall-related injuries in all regions of the world. The global report will in addition provide practical recommendations to countries to improve information and action to reduce falls and injuries from falls. This background paper presents falls and falls-related injury data, research knowledge and practice evidence from the African region. Where there is a lack of regional data, data from an international perspective has been presented.

Search strategy and selection criteria

A Medline, EMBASE and Biblioline (Africa-wide database) search was conducted of reviews, research articles and guidelines over the past 15 years, rather than the recommended 10 years, because of the paucity of research in the subject area in Africa. Only sources in English were accessed, and sources based on work in Francophone, Lusophone and Arabic African countries may have been overlooked. Journal articles not accessible on websites were obtained from libraries around South Africa. Electronic enquiries to colleagues in Africa and beyond failed to provide additional information.

The search revealed fourteen papers with relevance to falls among the elderly in Africa. Six papers on fractures, three on domestic injuries and deaths, three were on bone mineral density, one review article on approach to falls and one on emergency

management of falls. These publications were on studies from the following countries: Cameroon, South Africa, Nigeria, Gambia, Ghana, Kenya and a study from Morocco was included though Morocco is part of the Eastern Mediterranean region. A summary of research articles is shown in figure 1. Due to paucity of regional studies, a Medline search was conducted for international studies and reviews and guidelines for the relevant sections to complement a lack of regional information.

Figure 1: Review of studies on falls and injuries in older persons in Africa (1996–2005)

Reference	Country	Year of publication	Target age	Incident rate / 100 000	Study focus
Fractures					
El Maghraoui *et al.* [15*]	Morocco	2005	>50 years	52 female; 43.7 male	Epidemiology of hip fracture
Zebaze & Seeman [18*]	Cameroon	2003	>35 years	5.4 female; 4.2 male (50-64 years) 24.4 female; 20.7 male (≥65 years)	Epidemiology of hip and wrist fracture
Schnaid *et al.* [24***]	South Africa	2000	>30 years	12 blacks, 100 Caucasians	Osteoporosis and hip fracture
Aspray *et al.* [22**]	Gambia	1996	>44 years	British > Gambian BMC (female) [§§§]	Bone mineral density measurement
Adebajo *et al.* [23*]	Nigeria	1991	>50 years	2.0 females; 2.1 males (Nigeria) [#] 172 females; 56.8 males (Britain) [#]	Fractured hip or distal forearm
Injuries/deaths					
Fasola [27*]	Nigeria	2003	>60 years	Fall as a cause in 20.8 % [§]	Maxillofacial fractures
Seleye-Fubara & Ekere [28*]	Nigeria	2003	All ages	26% accidental deaths in those age ≥ 70 years (77% secondary to falls) [§]	Domestic accidental deaths

Cont.

Reference	Country	Year of publication	Target age	Incident rate / 100 000	Study focus
Monk *et al.*[37*]	Ghana	1999	All ages	467 rural; 2671 urban[§§]	Incidence and outcome of injury
Amuyunnzu *et al.*[26*]	Kenya	1997	≥55 years	35 % indoor falls[§] 8.9 % outdoor falls[§]	Domestic injuries
Falls management					
Kalula *et al.*[20*]	South Africa	2006	≥ 65 years	Low reference rate for risk factor management[##]	Emergency management of falls

* Retrospective.
** Prospective.
*** Recalculated data from earlier study (Solomon 1968).
§ Percentage.
§§ Disability days per 1000 person–years.
§§§ BMC= Bone mineral content.
# Age group 65-74 years.
Low referral rate for risk factor management.

Results

Epidemiology of falls in older populations

Distribution of falls

Incidence

No data are available on the incidence of falls in older persons in Africa. Globally, the incidence may vary depending on interaction of intrinsic and extrinsic factors, but risk factors for falls in older persons should be similar in the developing and developed world. Prospective studies have reported an incidence of 30 to 60 percent falls in community dwelling older persons per year (range 0.6 to 1.6 falls per person); of 16 to 75 percent in institutionalised individuals, with an incidence rate of 1.6 falls per bed per year (range 0.2–3.6 falls per bed); and of 1.4 falls per bed per year (range 0.5–2.7) hospital based surveys.[5] Differences in incidence rates may be accounted for partly by the frailty of institutionalised individuals and reporting systems based on recall in community populations; nursing homes and hospitals have more accurate reporting systems. Incidence rates also vary due to differences in case-mix, ambulation levels, and the availability of falls prevention policies and programs.[5]

A complex interaction occurs in falls between intrinsic impairment and extrinsic factors, i.e. environmental demands and hazards, and situational factors, such as aspects relating to performance of an ADL.[5-7] See figure 2.

Medications are a major risk factor for falls and fall related injuries. The mechanism varies for different categories of medications such as reduced alertness, retarded central processing, impaired cerebral perfusion, direct vestibular toxicity and extrapyramidal syndromes.[6] Environmental hazards can contribute to falls when tasks performed demand greater postural control and mobility and a situation requires changing position such as turning and transferring.[8,9]

Figure 2: Multifactorial causes of falls

Intrinsic Risk Factors	Precipitating Causes	Extrinsic Risk Factors
Gait and balance impairment Peripheral neuropathy Vestibular dysfunction Muscle weakness Vision impairment Medical illness Advanced age Impaired ADL Orthostatis Dementia Drugs	Trips and slips Drop attack Syncope	Environmental hazards Poor footwear Restraints

Rubenstein & Josephson.2006.[7] ADL = Activities of daily living

Location of falls

The relative contribution of intrinsic, extrinsic and situational factors to a fall varies. In community dwellers environmental demand and hazards play a significant role, while in nursing homes residents are more frail and exposed to fewer environmental hazards and demand, and intrinsic factors play a greater role.[5] Where a fall occurs also depends on an individual's level of activity. Active individuals are likely to sustain falls outside the home, while impaired older adults are more likely to fall inside the home. Falls in the latter group occur commonly on a level surface during activities which require alteration in the centre of gravity, e.g. reaching, bending, transferring, standing and walking. In nursing homes and hospitals most falls occur at the bedside or in the bathroom, and usually occur on change of posture, e.g. rising from bed, transferring to a chair, bed or toilet, or entering and leaving the bathroom.[5,10] Environmental hazards that contribute to these falls include wet floors from urinary incontinence, spillage, poor lighting, improper bed height and bed rails.[5]

Multivariate analyses in studies comparing fallers and non fallers for risk factors for falls have shown that muscle weakness increased a risk of a fall fourfold (range 3.0–5.9); balance deficits, a history of falls, cognitive impairment, age 80 and over and visual impairment increased the risk threefold; and gait deficits increased it twofold.[5] Research on risk factors for injury following a fall have identified similar risk factors for a predisposition to fall, with the addition of female gender and low body mass, both related to osteoporosis and higher physical activity.[5, 11]

Falls typically result from an interaction of multiple and diverse, sometimes correctable, risk factors and situations. A risk of falling increases with an increase in the number of risk factors in an individual. A risk of recurrent falls in community dwelling individuals, increases from 10 to 69 percent as risk factors increase from one to four or more.[12] Similar results have been found in institutionalized populations.

Differences in risks

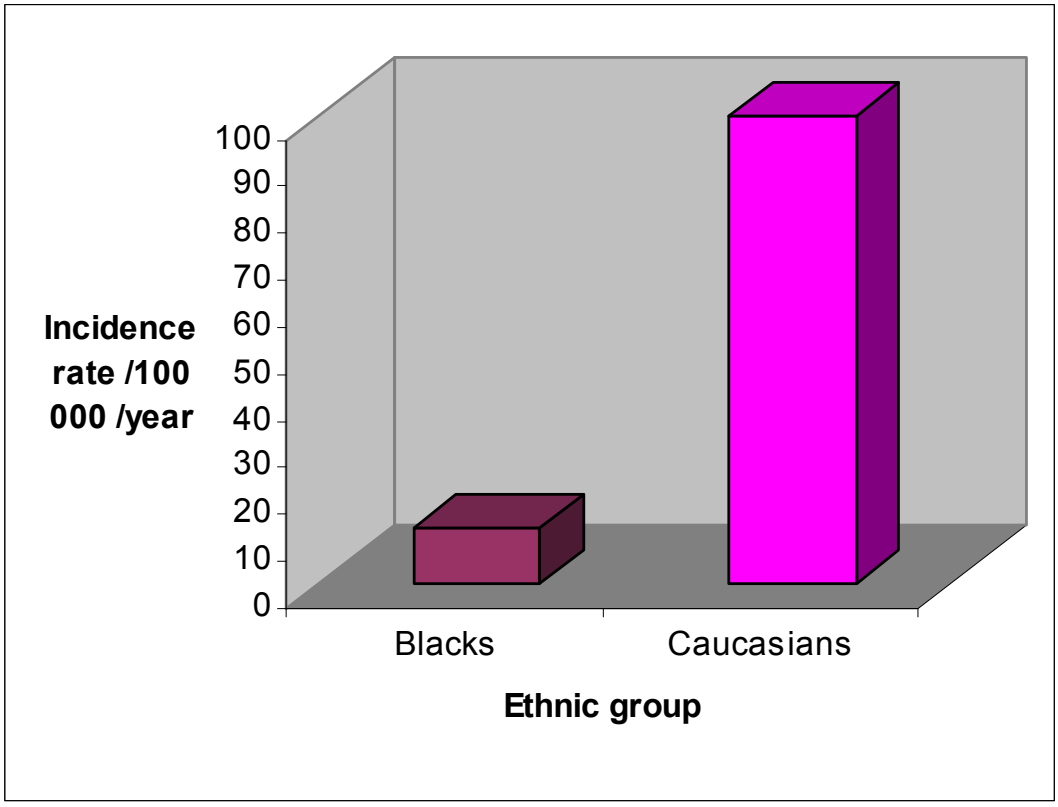
Most incidents of a fall come to the attention of the health care system through the injuries sustained. Fractures (especially of the hip) following a fall are a major cause of morbidity and mortality in the elderly. Studies indicate a mortality rate of between 15 and 35 percent in the first year following a fracture; among survivors, 25 to 75 percent will be disabled or unable to walk.[13, 14] The incidence rate of hip fractures varies in different populations but increases with age in every population. An increase in falls with age and an associated increase in osteoporosis may explain an increased hip fracture rate with age. Incidence of hip fracture varies considerably between countries, and according to the age, gender and ethnic distribution of the population. Highest rates are observed in Scandinavia and in Caucasians in the USA; intermediate rates in Southern European and Asian countries; and lowest rates in Africa, but where only sparse information is available on hip fractures.[15]

The incidence of hip fractures is lower in people of African descent than Caucasians. Within both races, in developed countries, it is generally only half as common among men.[16] In developing countries, including South Africa, the incidence of hip fractures

in men approximates that of women, and reasons for this occurrence are not understood.[17] Nonetheless, some reports have shown an increased incidence of hip fractures in women in these countries.[18]

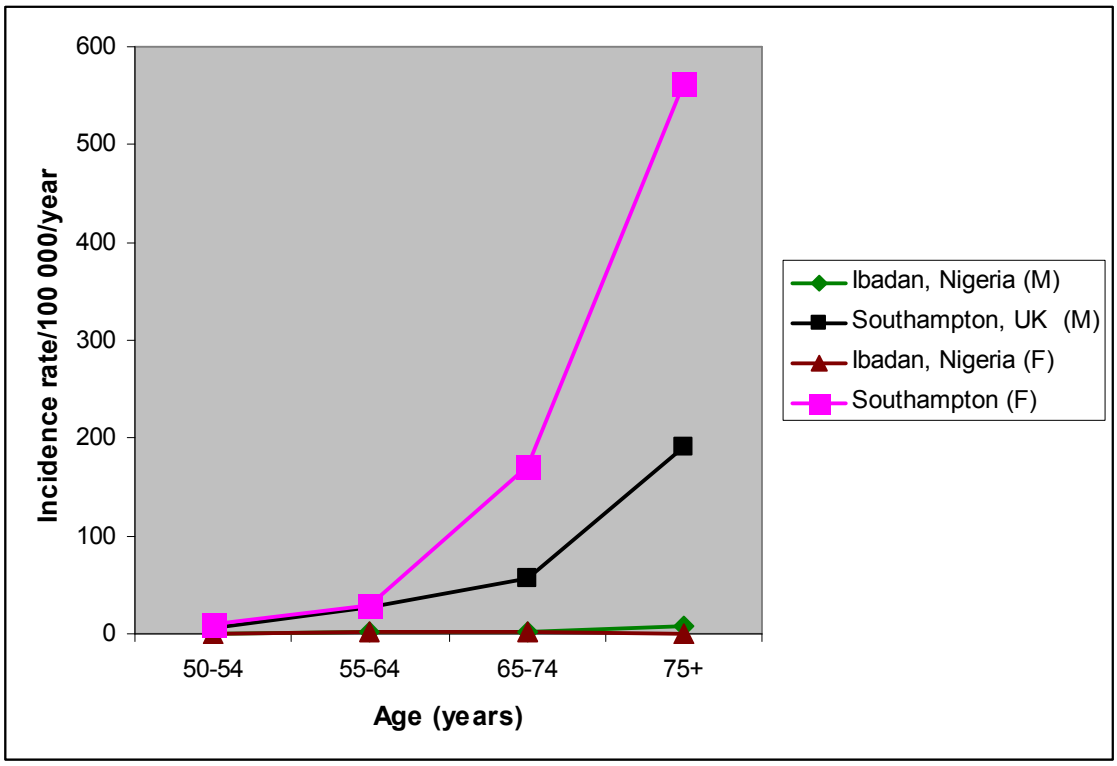
See figures 3 and 4.

Figure 3: Incidence of hip fractures. Johannesburg, South Africa



Schnaid *et al.,* 2000.[24]

Figure 4: The incidence of hip fractures. Ibadan, Nigeria and Southampton, UK



Adebajo *et al.,* 1991.[23] M = men, F = Female

Injuries secondary to falls in Africa

Information on the epidemiology of falls in older persons in Africa is lacking generally. However, so are special health care services for older clients lacking and very few health professionals have special training in the needs of older persons. There is a general acceptance moreover that old age equates ill-health and older persons and their carers may view seeking help for health conditions as futile.[19] Attending health professionals may simply attribute symptoms to the ageing process and facilities may be under pressure to distribute scarce health care resources to the young. A fall in an older person may therefore be viewed as accidental and medical attention will not be sought, even in the presence of minor injury. However, even in the presence of major injury, health care services are likely to deal with the injury

without establishing underlying risk factors.[20] A fall may not be recognised as heralding underlying medical illness.

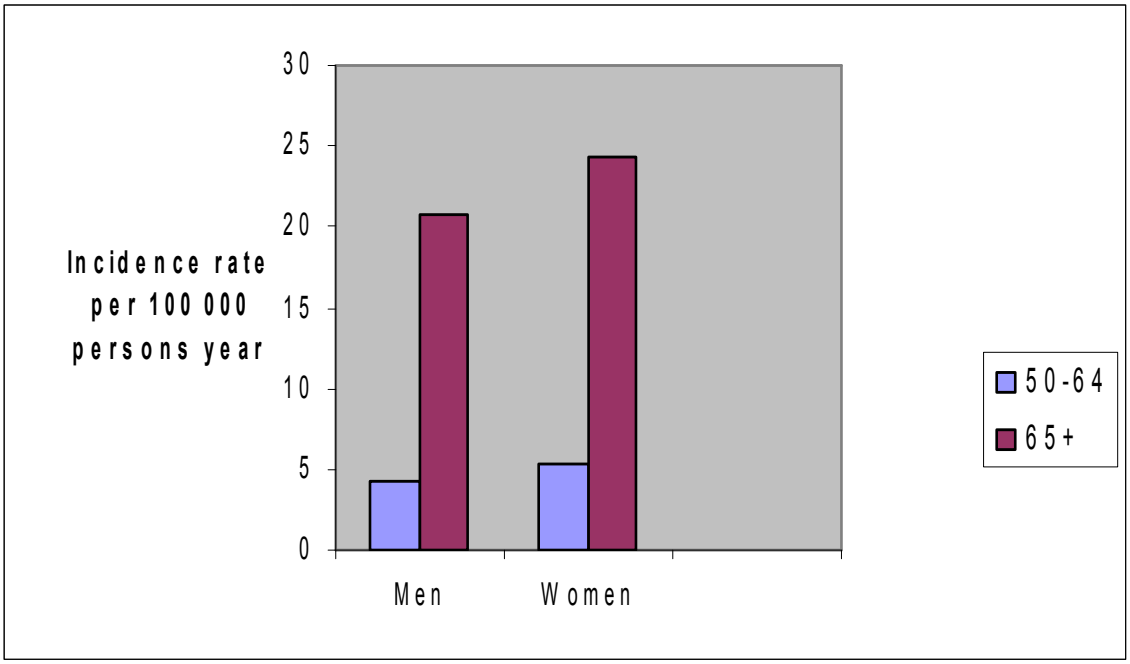
In Africa, as in many developing countries, provision of health care in rural and urban areas is unequal. In rural populations, a first port of call for a health care client may be the local herbalist or traditional healer; in the case of a fracture, an individual may seek help from a bone setter.[21] Not all patients who have sustained a major injury such as a fracture will access a hospital or clinic. Even if a local clinic is available, a lack of transport, including ambulances, may render such a clinic inaccessible to them. Formal health care services are more available in urban areas, but overcrowded facilities and a transport system neither geared to older persons also constitute access barriers to health care for frail older clients. A lack of economic resources may be an additional barrier; in developing countries, older persons are among the poorest of the poor and cannot afford to pay for health care. For such reasons, hospital based studies may lead to an incomplete measure of the burden of falls in Africa's older population.

Unlike the abundance of global literature on falls, only single studies have been conducted in this area in Africa. However, certain studies on the burden of trauma have included intentional and unintentional injuries, including falls.

In The Gambia, no minimal trauma fractures were reported in rural women, despite low bone mineral content compared to Caucasian women in UK.[22] A comparison of the incidence of hip and forearm fractures in Ibadan, West Africa and Southampton, UK showed the incidence of fractures in Ibadan to be far lower than in Southampton, with a risk ratio of 20, while no evidence of an age-related increase in rates of hip and distal forearm fractures was found in women in Ibadan.[23] See figure 4. In Johannesburg, South Africa, as early as 1968, Solomon showed an incidence of hip fracture of 12 per 100 000 in black patients per annum and 100 per 100 000 in Caucasians.[24] In Cameroon, a rising incidence of hip fractures has been found in people age 50 and over: an annual incident rate of 24.4 per 100 000 for women and 20.7 per 100 000 for men age 65 and over, and an increase from 5.4 and 4.2 in those aged 50-64 years respectively.[18] See figure 5. In Rabat, Morocco, an incidence of hip fractures of 52.1 per 100 000 was found in women and 43.7 per 100

000 in men.[15] The Moroccan incidence rate is intermediate between European and sub-Saharan African rates.

Figure 5: Incidence of hip fracture in Cameroon



Zebase and Seema 2003.[18]

The incidence of hip fracture in black Africans has apparently doubled over the last 10 years, while the incidence in Caucasians in Africa is increasing. The incidence of fracture neck of femur is ten times greater in Solomon's (1968) South African Caucasians.[24] Similar findings have been established in Harare, Zimbabwe and among Maoris and Caucasians in New Zealand.[24, 25] An increase in incidence rates from mid 20th century to the early 21st century may be due to a secular trend.

Other studies in Africa reporting on causes of injuries or deaths in older persons have included falls as a causative factor. In a study in Nairobi, injuries sustained by older persons through falls inside the house were reported as a leading cause of injury. The injuries were cuts (28.4%), fractures (10.7%) and head injury (12.2%), and 29 percent of injuries in the age group 60–64 years were secondary to falls. Most injuries occurred in low-income areas with overcrowding and poorly constructed high-rise buildings with uneven stairs and floors and poor lighting.[26] In a retrospective study on maxillofacial fractures in the elderly in Ibadan, Nigeria, falls at

home on level surfaces were the cause of fractures in 20.8 percent of patients.[27] Another study in Nigeria reported 26.5 percent accidental domestic deaths in persons aged 70 years and over, 77 percent of which occurred from a fall from a height or on the same level, constituting the most common mechanism of injuries leading to death in the elderly.[28] Although risk factors for osteoporosis (low calcium intake, multiple pregnancies, prolonged breast feeding) are prevalent in black Africans, and the incidence of fracture is increasing in all races, osteoporosis still remains lower in Africans than Caucasians. Differences in bone mass have been used as an explanation, although results have been conflicting.[23] Bone mineral content in Gambian women was lower at all ages in comparison with their British counterparts.[22] South African blacks have been reported to have greater volume and thickness of trabecular bone, higher values of osteoid and erosion variables than Caucasians. It is postulated that black Africans may have greater bone turnover leading to more frequent renewal of fatigue – damaged bone resulting in better bone quality, which together with sturdier bone micro architecture make blacks less prone to fatigue fractures.[24] In Johannesburg, South Africa the mean bone density levels and bone mass values of blacks in every age tested up to 75 years were lower than in their Caucasian counterparts.[24] The femoral neck of black African women is shorter than that of Caucasians and may be partly responsible for the low number of hip fractures reported in African women.[24] Another explanation is a lower risk of falling among black women than Caucasian women. A high level of physical activity associated with a socio-cultural lifestyle, such as walking long distances, agricultural work, and collecting firewood and fetching water, may confer a protective effect in black Africans.[24, 29]

In African American women, peak bone mass is higher and occurs later than in Caucasian women. A higher bone mineral content (BMC) in old age has provided an explanation for the observed low fracture incidence among African American women. A study in the USA on female immigrants from Somali had bone mineral density values in this group intermediate between those of African American and Caucasian women.[30]

A reason for low incidence rates of fracture in developing countries may be lower longevity. Lifestyle changes that accompany urbanization and industrialization

(reduced exercise, smoking, excess alcohol use) in developing countries may result in an increase in fracture.[22] A 1966 South African study, found an association between severe osteoporosis, with vertebral fractures, in black men in association with iron overload and vitamin C deficiency. A similar association has been found in a recent study of patient with hip fractures.[24] The rarity of fractures in African communities where BMC is low challenges current ideas about the significance of bone mineral status as a primary determinant of fracture risk.[22]

Older women sustain fall related injuries, especially hip fracture, at rates 40–60 percent higher than men of comparable age, while hospitalisation rates are 81 percent higher in women than in men. Some observed differences reflect a gender difference in level of physical activity.[31] Follow up surveys have demonstrated that older men remain more physically active than older women. Muscle weakness and loss of lower body strength that follow inactivity are well known risk factors for falls. Although non-fatal injuries are higher in women, fatal fall related injuries are known to be higher in men. Differences in level of physical activity may explain the reduced rate of falls as well as the severity of fall related injuries in men.[12] Injury rate, especially hip fractures, is higher in women and the difference is explained by an increased incidence of osteoporosis in women. Bone mass peaks around the age of 30 in both men and women but declines at a rate of 0.5 percent per year for men and 1 percent per year for women. In addition, women suffer rapid loss in bone mass in the first five years after menopause.[32]

Consequences of falls

Falls have physical, psychological and social consequences. From international studies, we know that falls are a leading cause of injury-related hospitalisation, especially in patients age 75 and over.[33] Falls account for 40 percent of injury related deaths in the older population. Depending on the study population, the rate of injuries following a fall varies between 22 and 60 percent. Ten to 15 percent of older persons will suffer serious injury, while 2–6 percent will sustain fractures and 0.2–1.5 percent will suffer hip fractures.[34] Other injuries include superficial bruises, lacerations, sprains and dislocations. Hip fractures are associated with increased

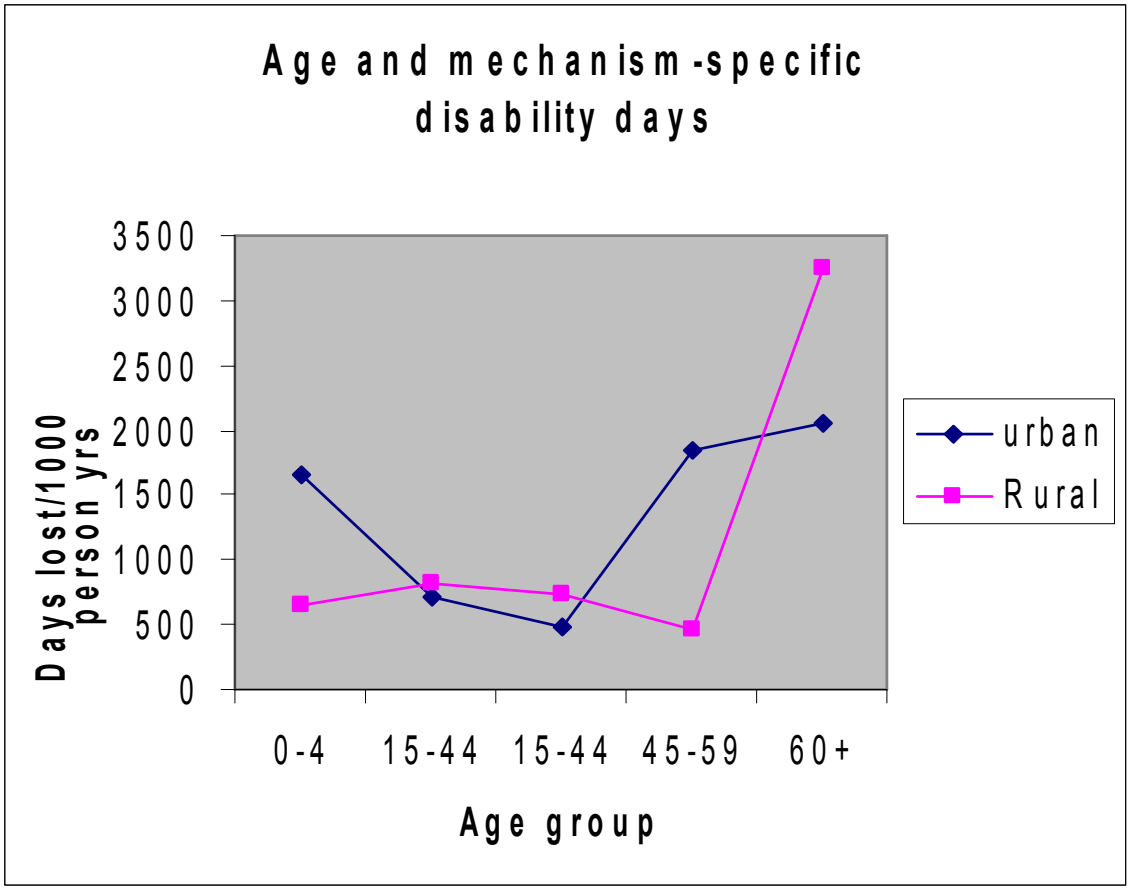
morbidity and mortality. Pneumonia, pressure sores and other infections frequently complicate hospitalisation. Mortality following a hip fracture is high and many who survive never regain their previous level of function.[34]

Inability to get up unassisted is a poor prognostic sign as it indicates muscle weakness. A 'long lie,' i.e. remaining on the floor for more than one hour after a fall, is not only a sign of muscle weakness, but also a sign of illness and social isolation and is associated with a 50 percent mortality rate even in the absence of fall related injury. Hypothermia, pneumonia, pressure sores and dehydration commonly complicate a long lie.[34] A US study found up to 47 percent of uninjured fallers were unable to get up unassisted.[35] In developing countries, a smaller percentage of elderly people live alone and a long lie following a fall would be less common, but there would be an increase in complications during recovery due to limited health facilities.

Falls can result in a restriction of activity and fear of falling (fall anxiety syndrome). Female gender, increasing age, balance and gait abnormalities, and poor self-assessed physical and cognitive health and economic resources have been associated with the development of the fall anxiety syndrome.[36] Fear of falling leads to self imposed reduction in activity, which is associated with further increases in frailty and loss of independence. Fear of falling could be a long lasting condition and must be addressed in intervention studies.[36]

Decreased mobility and disability following a fall results in increased dependence on others, depression and an increased probability of institutionalisation. Rates of disability following a fall are high in developing countries with a limitation in rehabilitation services.[37] See Figure 6

Figure 6: Incidence and outcome of injury (MVA, falls, agricultural): Ghana



Monk *et al.,* 1999.[37]

Impact on health services and costs of falls

Worldwide, fall related injuries are a serious public health issue, especially among older adults. Associated high morbidity and loss of independence demand utilization of health care services at different levels of care. Fall related costs include direct costs (hospital inpatient, outpatient, skilled nursing, rehabilitation, home care, home modifications, hospice, physicians services, and medical equipment) and indirect costs (carer costs and patient morbidity and mortality costs).[34]

Global research on costs of specific medical conditions is sparse. With inadequate information on falls and poor mobility in the elderly in Africa, economic costs for related morbidity and mortality have not been quantified. Information from

international studies is based on estimates and many of these costs are not static and only relevant to the country in which they are incurred, as costs of disabilities and medical care differ vastly.[34] Costs of unintentional injuries in Africa are substantial, but the scant data that exists mainly emphasizes the cost of road traffic accidents and poisoning, where victims are mainly children and young adults.

In the United States in 2002, 12 900 older adults died as a result of falls. Slightly over 1.6 million older adults were treated in emergency departments (EDs) for fall related injuries and 388 000 (24%) were subsequently hospitalised. Ninety nine percent of these were unintentional injuries.[38] Comparing expenditure on falls with 18 other leading medical conditions for older adults, injuries and poisoning ranked seventh, after circulatory diseases, nervous system disorders, mental disorders, respiratory diseases, digestive diseases, and neoplasms.[38] A 1994 US study assessed national costs of fatal and non-fatal falls for people age 65 and over and reported that direct medical costs and productivity losses totalled $20.2 billion ($31 billion in year 2000 dollars). In 2000, nearly 10 300 fatal fall injuries incurred a cost of $179 million, with both incidence and medical costs increasing with age and were higher in women than men. Traumatic brain injuries and injuries of the lower extremities accounted for 78 percent of fatalities and 79 percent of costs.[38] Non-fatal injury rates, like fatality rates, increased with age for both men and women but rates in women exceeded those in men in each age group. An estimated 2.6 million non-fatal fall injuries cost an annual total of $19 billion. Fractures were the most frequent and most expensive type of injury, accounting for over a third of all non-fatal injuries and 61 percent of costs.[38] Of the direct medical costs for non-fatal injuries, almost two thirds were for injuries that required hospitalisation, a fifth for injuries treated in EDs, and an eighth for injuries treated in outpatient settings. These injuries accounted for 80 percent of hospitalisation costs, 27 percent of ED costs, and 32 percent of outpatient costs.[38]

Similar high expenditure on falls has been reported in other developed countries. A 1999 United Kingdom study reported that ED and hospital care for fall related injuries among people aged 60 and over cost almost £1 billion (US$1.9 billion). Most costs (66 percent) were attributed to falls in persons age 75 and over. Inpatient admissions accounted for 49 percent of the total cost for falls and long-term care cost accounted

for the second highest, 41 percent.[39] A Western Australian study estimated ED treated and hospitalised fall injuries among people age 65 and over cost the Australian healthcare system $ 86.4 million (US$ 66.1 million). There were 18 706 ED presentations and 6 222 hospital admissions for fall related injuries. Based on an assumption that the current rate of falls remains constant for age and gender, the projected health system costs of falls in older adults have been estimated to increase to $181 million in 2021 (expressed in 2001–2002 Australian dollars).[40] In the US, the cost of falls is expected to reach 43.8 billion (expressed in 2006 dollar terms) by 2020.[38]

Although the estimated economic impact of falls in older adults is substantial, direct medical costs do not reflect the financial burden of fall related injuries fully. Estimates of costs associated with lost wages for the injured or their informal caregivers, or for non-medical expenditures, e.g. home adaptation, insurance claims processing costs, reduced quality of life, and decreased functional capacity of many older adults who sustained fall related injuries are not usually included in cost estimates.[38] The economic burden that fall injuries in older adults impose on the health system is substantial and long-term strategic approaches are needed to prevent falls.[38, 40]

Interventions/best practices in falls prevention

Many risk factors for falls are correctable and prevention of falls is essential in instituting prevention of injury. No studies in Africa have assessed the effectiveness of interventions to prevent falls, unlike in developed countries. Falls intervention programs have two approaches: 1) A single intervention strategy, such as exercise, vitamin D and calcium, or withdrawal of offending drugs; and 2) multifactorial preventive programs, including reduction and correction of the predisposing and situational risk factors. The type of intervention instituted for an individual patient is dependent on clinical assessment.[12]

A randomised controlled trial in a sub-acute hospital showed that a targeted multiple intervention program led to a 30 percent reduction in the incidence of falls. The reduction was evident 45 days after the implementation of the intervention

program.[41] A systematic review and meta-analysis of randomised clinical trials on interventions for the prevention of falls in older adults showed a significant reduction in the risk of falling (risk ratio (RR) 0.83 (95 percent confidence interval (CI) 0.82 to 0.95)). A multifactorial falls risk assessment and management program had a statistically significant beneficial effect on both risk of falling (adjusted RR 0.82, 0.72 to 0.94) and monthly rate of falling (adjusted incidence rate ratio 0.63, 0.49 to 0.83). Components of multifactorial falls risk assessments were varied. The most commonly assessed risks were drugs, vision, environmental hazards and orthostatic blood pressure.[42]

As many interventions are labour intensive and expensive, they should be targeted at people most likely to benefit. People age 75 and over, or 70 and over if known to be at increased risk of falling, should be asked about falls and balance or gait difficulties, and observed getting into and out of a chair and walking. People with a history of two or more falls, or balance or gait difficulties should be assessed for predisposing and precipitating factors, followed by intervention suggested by results of the assessment. People without balance or gait related difficulties and a history of no more than one fall should be encouraged to participate in an exercise program that includes balance and strength training.[43]

Single intervention strategies include:

- **Strength and balance training**. Randomised trials, meta-analyses and systemic reviews confirm that strength and balance training for older adults living in the community can reduce the risk of falls by 15 percent. Strength and balance training improve muscle strength, flexibility, balance, co-ordination, proprioception, reaction time and gait. Past and current physical activity is protective against hip fracture, the risk reduction being 20–70 percent.[2, 44]

- **Vitamin D and calcium**. Vitamin D and calcium have an essential role in bone metabolism but vitamin D also contributes to improved muscle function. Supplementation of vitamin D in frail elderly patients for 12 weeks resulted in improvement in muscle strength and dynamic musculo-skeletal performance. In

addition, vitamin D supplementation was only effective in reducing the number of falls if taken with > 500 mg/day of calcium.[44]

- **Expedited cataract surgery**. Visual impairment, especially poor contrast sensitivity and poor depth perception, is a major risk factor for falling in elderly people. Expedited surgery for cataract reduced the rate of falling by 34 percent in an intervention group compared with controls awaiting surgery.[45]

- **Hip protectors**. The cause of a hip fracture in most cases is a sideways fall with direct impact on the greater trochanter. Hip protectors attenuate and divert the force and energy of the impact away from the greater trochanter. The use of hip protectors in high-risk groups is a useful adjunct to any falls and injury prevention program. The most common problem with hip protectors is user compliance and adherence requiring continuous education and motivation of frail elderly adults for their regular use.[44]

- **Home hazard assessment and modification**. A recent Cochrane review showed that home hazard assessment and modification that is professionally prescribed for elderly persons with a history of falling reduces the risk of falling by about 33 percent.[46]

An objective of multidimensional fall risk assessment is identification of risk factors and implementation of appropriate interventions to reduce risk of falling. Numerous randomised controlled trials have demonstrated the benefit of multiple intervention strategies in falls prevention in older adults. The content of multifaceted interventions has varied substantially, which prevents direct comparison.[46] The interventions have included effective single interventions such as strength, balance and gait training; mobility improvement with or without the use of aids; footwear improvement; investigation and management of untreated medical problems; medication review and adjustment; vision tests with appropriate referral; hip protectors; patient and staff education, post fall assessment, and environmental and home risk assessment.[46] Focused multidimensional fall risk assessment performed prior to implementation of multifaceted intervention include assessment of gait, balance, mobility and strength

by using tests such as the Timed Get-up and Go test and one leg standing balance test.[2]

Falls prevention policies and sustainability

Apart from South Africa, no other African countries provide guidelines for the prevention of falls in older persons.[47] However, South African's guidelines are based on a Western model, which may be less appropriate for implementation in African settings. Although booklets with the guidelines are freely available, the extent of their use by the community and health professionals is unknown.

Employment of the guidelines has merits if health professionals involved are knowledgeable about conditions in which the guidelines should be used. Very few health professionals in Africa are skilled in the management of diseases in old age. A skills deficiency will persist if their current rate of emigration to developed countries continues. African training institutions rarely include ageing in their curricula owing to the youthfulness of Africa's population. The incidence of falls in older persons will increase and falls prevention in older persons will become an increasingly important public health issue. The implementation of falls prevention programs and community and professional education and training are therefore required.

As falls lead to increased morbidity and mortality and diminish quality of life, and are costly and yet preventable,[48] community education about benefits of physical activity, awareness of medical and environmental risk factors for falls, exercise sessions to improve strength and balance, and home safety advice and modification as a low cost, effective and sustainable intervention is indicated.[49, 50] For a program to be sustainable, the maintenance of health benefits from the program, a sustainable organizational structure and capacity building in the targeted community are needed. This calls for continuous monitoring, integration of the program within the organization, and community access to knowledge, skills and resources. The availability of resources for health care will be critical to any program.[51]

Only a few studies, none in Africa, have assessed the cost effectiveness of fall prevention strategies. Costs per person for a falls prevention programme differ widely. The cost for different programs in randomised control trials conducted in Australia and New Zealand varied from NZ$ 1 519 to NZ$ 1 803 per fall prevented and NZ$ 3 404 (1997–1998 prices) per injurious fall prevented by supervised home based exercise. Home modification costs were the most expensive: Aus$ 3 980 (1998 prices) per injury prevented.[50] The costs cannot be transposed directly to another setting because of differing cost of materials and standard of housing especially between developed and developing nations.

Multifactorial prevention programs have been shown to work in some settings but not others. For example, acute hospital based prevention programmes have been unsuccessful because of a short stay common with inpatient treatment.[41] Falls prevention programs that are effective in residential care settings may not be effective in community settings; staff training has been shown to be more effective in residential settings than community settings.[53] The latter finding may be attributed to the long contact time between staff and residents in residential care. Falls prevention programs should be tailored to individuals as well as specific settings. There is no evidence to support use of restraints for falls prevention. Restraints have a major disadvantage in that they can contribute to serious injury.[12]

The development of effective community-based falls prevention programs will be of prime importance in Africa as institutionalization of the elderly is very uncommon; older persons are mainly cared for within family structures. Human and financial resources required for implementing, maintaining and monitoring falls prevention programs will be a challenge for Africa, but most components of falls prevention programmes are low cost. Increased research to inform policy, as well as political will and community involvement in the implementation of such programs will be crucial.

Conclusion

Falls in older persons and their consequences are a major global public health issue. The incidence rate of falls and fall injuries increases with advancing age. The rate in developing countries, including Africa, will be higher than that in developed countries due to the increasing number of older people in coming decades. Risk factors for falls in Africa are similar to those in developed countries but environmental risk factors, both inside and outside dwellings, are adverse for most older people due to poor housing, a poor environment and few amenities. An injury following a fall typically leads to increased disability due to a scarcity of health care resources. A lack of research on falls in older persons in the region is retarding education of the public and policy change. With increased education and training of health professionals and the public, falls management protocols, including falls prevention programs, may be set up with the involvement of government, learning institutions, communities and non-governmental organisations (NGOs). Some elements of multifactorial preventive strategies may be cost-effective in reducing falls and fall related injuries.

Recommendations

- The problem of falls in older persons and their consequences in Africa must be quantified through research.
- Learning institutions must recognise a disproportionate increase in the older population and include geriatrics and gerontology in curricula.
- Advocacy is needed to highlight the complex syndrome of falls in older persons and how it impacts the individual, his/her family and society.
- The use of protocols for the management of falls, especially in hospitals, clinics and nursing homes, must be encouraged in continuing medical education for health professionals.
- Research is needed in community based and nursing home populations to determine risk factors, incident rates and fall related injuries, to inform the design of appropriate falls prevention programs.

- Injury rates following a fall in older African populations must be established in hospital and community based studies.
- Health economics research on falls and falls prevention programs must be encouraged to provide evidence for decision support.
- Bridging Western medicine and traditional healing may help to find solutions for fostering falls prevention.

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