




UNIVERSITY OF TURKU

EPIDEMIOLOGY AND DEMOGRAPHY OF FALLS



Sirkka-Liisa Kivelä, MD, PhD
Professor and Chief Physician in
Family Medicine
University of Turku
Turku University Hospital and
Satakunta Central Hospital

BERZELIUS SYMPOSIUM 77
November 6-7, 2008, Stockholm, Sweden



CONTENTS

1. DEFINITIONS
2. RECORDING FALLS
3. INCIDENCES
4. TIMES
5. LOCATIONS
6. CONSEQUENCES
7. CONCLUSIONS



FALL - DEFINITION

"a subject's unintentionally coming to the ground or some lower level"

"not as a consequence of sustaining a violent blow, loss of consciousness, sudden onset of paralysis as in stroke or an epileptic seizure"

The Kellogg International Working Group, 1987



FALL - DEFINITION

- an unintentional change in position to a lower level without an overwhelming hazard
(Tinetti et al, 1988; Nevitt et al, 1989)
- any unintentional contact to the ground
(Campbell et al, 1989; Robbins et al, 1989; Downton et al, 1995; Lipsitz et al, 1991; Myers et al, 1991)
- loss of balance such that hands, arms, knees, bottom or body touch or hit the ground or floor
(Hornbook et al, 1994)



RECORDING FALLS

- no registers
- self-reports in retrospective studies
 - questionnaires, interviews
- self-reports in prospective studies in communities
 - falls calendars
 - regular telephone interviews
 - regular questionnaires
- falls record books by nursing staff in institutions or intermediate care facilities



HOW COMMON ARE FALLS?

INCIDENCES



Fall rate in the home-dwelling aged (retrospective population-based studies) (12 mo) 1/2

Author Year	Country	N	Age	Fallers %	Rec. fallers
Campbell et al. 1981	NZ	553	55-	35	
Prudham & Evans 1981	GB	969 m 1388 w	65-	19 34	8 (m+w)
Blake et al. 1988	GB	1042	65-	34	
Vetter & Ford 1988	GB	674	70-	28	
Wickham et al. 1989	GB	983	65-	31	
Winner et al. 1989	GB	221 m 335 w	70-	21 28	



Fall rate in the home-dwelling aged (retrospective population-based studies) (12 mo) 2/2

Author year	Country	N	Age	Fallers %	Rec. fallers
Cwikel et al. 1990	Isr	3494	65-	24	
Cumming et al. 1991	US	1358	65-	27	8
Downtown & Andrews 1991	GB	203	75-	42	
Svensson et al. 1991	Sw	244 m 488 w	84-85	38 42	
Dunn et al. 1992	US	4270	70-	23	12
Lord et al. 1994	Au	1762	60-	28	9



Fall rate in the home-dwelling aged (retrospective population-based studies) (12 mo) 3/2

Author year	Country	N	Age	Fallers %	Rec. fallers
Salva et al 2004	Spain	448	65-	25 M 37 F	4 M 11 F
Gill et al 2005	Au	2619	65-	30	
Halil et al 2006	Turkey	2322	65-	29	



Fall rate in the home-dwelling aged (prospective population-based studies) (12 mo)

Author year	Country	N	Age	Fallers %	Rec. fallers	Incidence/ 1000PY
Tinetti et al. 1988	US	336	75-	32	15	809
Campbell et al. 1990	NZ	296 m 465 w	70-	28 40	15 16	644 707
Lach et al., 1991	US	1358	65-	30		
Tinetti et al. 1992	US	1103	72-			452 16 mo
O'Loughlin et al. 1993	Ca	152 m 257w	65-	22 34	12 11	428 536
Hornbrook et al. 1994	US	1571	65-	44	20	699 23 mo
Lord et al., 1994	Au	341	65-	39	21	812
Luukinen et al. 1994	Fi	377 m 602 w	70-	26 m 34 w	6 m 14 w	368 611



Fall rate in the home-dwelling aged (prospective population-based studies) (12 mo)

Author year	Country	N	Age	Fallers %	Rec. fallers	Incidence /1000PY
Tinetti et al 1994	US	144	70 -	47		1 100
Studenski et al 1994		306	70 -	33		1 630
Chu et al 2005	China	1517	65 -	19	5	220 M 324 F
Lehtola et al 2006	Fi	555	85 -	74	47	755 M 1 127 M



INCIDENCE RATE OF FALLS BY SEX AND AGE IN HOME-DWELLERS

AGE	FALLS/1000 PY (95 % CI)	
	MEN (N=377)	WOMEN (N=602)
70-74	316 (241-408)	486 (400-585)
75-79	344 (236-483)	690 (577-819)
80-84	448 (299-647)	583 (444-740)
85-89	514 (229-971)	955 (678-1307)
90-	1500 (550-4024)	1000 (400-2057)
TOTAL	368 (307-437)	611 (540-669)

(Luukinen et al, 1994)



Proportion (%) of fallers in 1 year and risk to fall by N of falls in the home-dwelling aged

	One fall		Two or more falls	
	%	RR(95%CI)	%	RR(95%CI)
<i>All age groups</i>				
Men	19.4	Ref.	6.4	Ref.
Women	19.6	1.0 (0.8-1.3)	13.5	2.1 (1.4-3.3)
<i>70-79 years</i>				
Men	19.4	Ref.	4.8	Ref.
Women	18.9	1.0 (0.7-1.3)	13.2	2.7 (1.6-4.8)
<i>80 years or more</i>				
Men	19.3	Ref.	11.4	Ref.
Women	21.3	1.1 (0.7-1.9)	14.0	1.2 (0.6-2.5)



Proportion (%) of fallers in 1 year and risk to fall by N of falls in the home-dwelling aged

	One fall		Two or more falls	
	%	RR(95%CI)	%	RR(95%CI)
<i>Men</i>				
70-79 years	19.3	Ref.	4.8	Ref.
80 years or over	19.3	1.0 (0.6-1.6)	11.4	2.4 (1.1-5.1)
<i>Women</i>				
70-79 years	18.9	Ref.	13.2	Ref.
80 years or over	21.3	1.1 (0.8-1.6)	14.0	1.1 (0.7-1.7)



HIGH INCIDENCES IN SPECIFIC GROUPS

- the aged with cognitive impairments, stroke, Parkinson's disease, polyneuropathy, arthritis, diabetes

(Buchner et al, 1987; Luukinen et al, 1995; Ashburn et al, 2001; Jørgensen et al, 2002; Teasell et al, 2002; Stolze et al, 2004)

- frail older persons

(Speechley et al., 1991; Northridge et al, 1995, Luukinen et al, 1995))

- the aged having suffered a fall

(Nevitt et al, 1989, Luukinen et al, 1995))



INCIDENCE OF FALLS IN LONG-TERM INSTITUTIONS

Share of fallers 45 % - 61 %

(Gryfe et al 1977; Robbins et al 1989; Tinetti 1987; Luukinen et al 1994, Nurmi et al 2002)

Share of recurrent fallers 30 % - 57 %

(Tinetti 1987; Lipsitz et al 1991; Luukinen et al 1994, Nurmi et al 2002)

Demented persons have the highest incidence



INCIDENCE RATE OF FALLS BY SEX AND AGE (LONG-TERM INSTITUTIONS)

AGE	FALLS/1000 PY (95 % CI)	
	MEN (N=37)	WOMEN (N=106)
70-74	984 (361-2131)	1275 (738-2013)
75-79	1333 (689-2333)	1328 (923-1845)
80-84	3134 (2239-4254)	1403 (1045-1881)
85-89	2098 (1222-3333)	2235 (1588-3059)
90-	500 (10-2750)	867 (467-1467)
TOTAL	2021 (1606-2513)	1423 (1209-1665)

(Luukinen et al, 1994)



FALLS IN HOME-CARE PATIENTS AND IN THE AGED IN RESIDENTIAL CARE

Home-care patients (65 yrs.-)

25 % fell at least once during 12 months

10 % recurrent fallers (2 or more falls per year)

(Fletcher et al 2002)

Residential care facilities

incidence 2 236 / 1 000 PY, higher in women

63 % fell during 12 months; 16 % fell only once

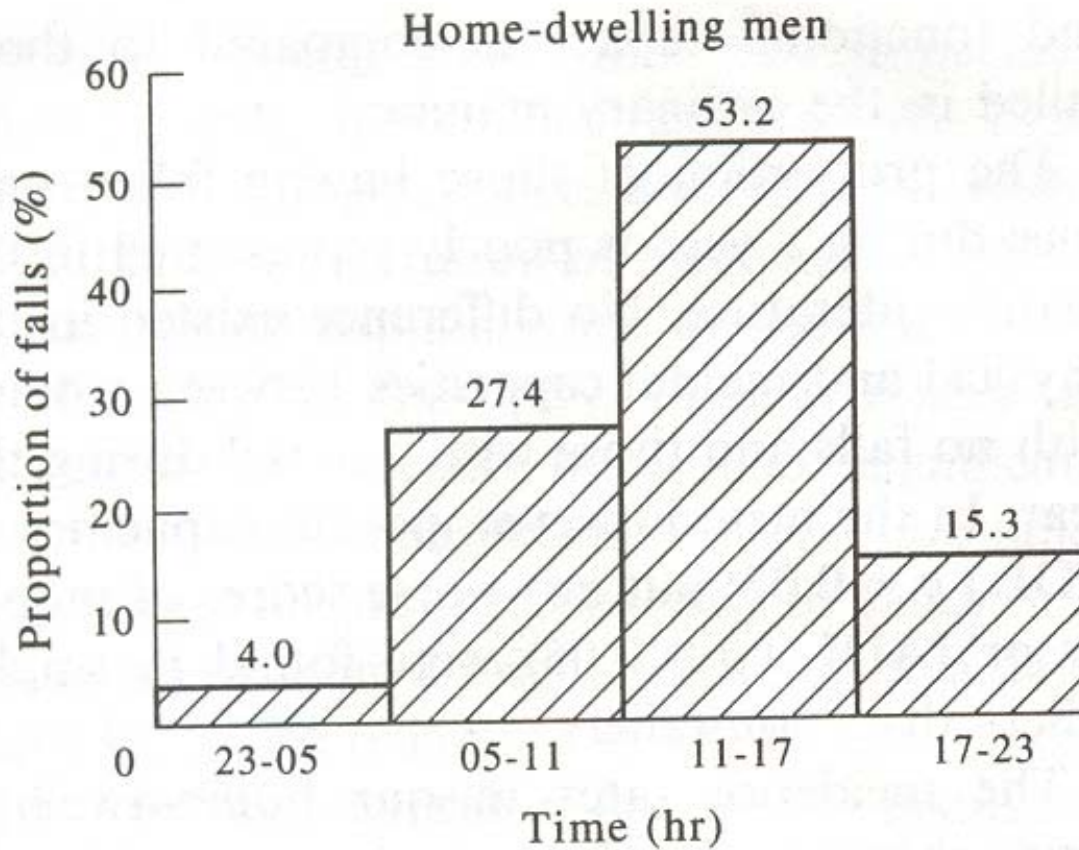
1 - 44 falls per 12 months (Jensen et al 2002)

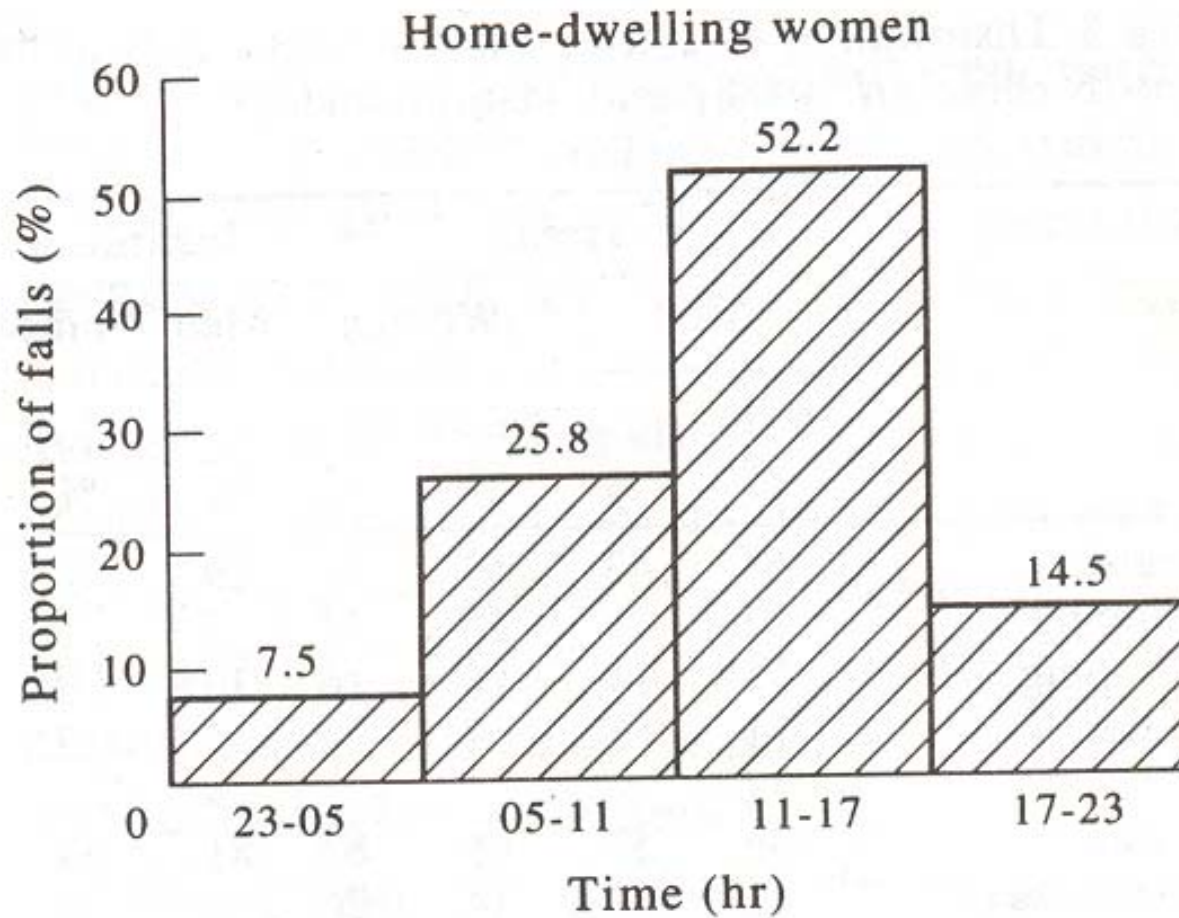


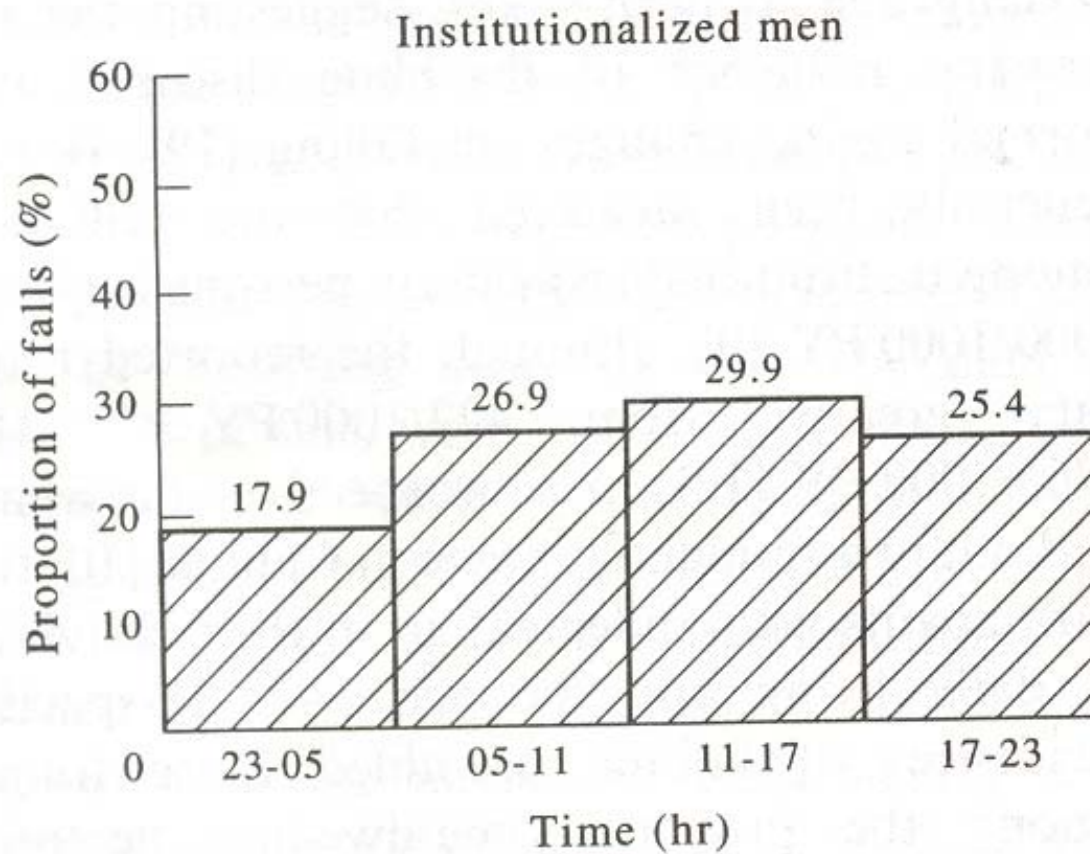
INCIDENCE OF FALLS IN HOSPITALIZED OLDER PATIENTS

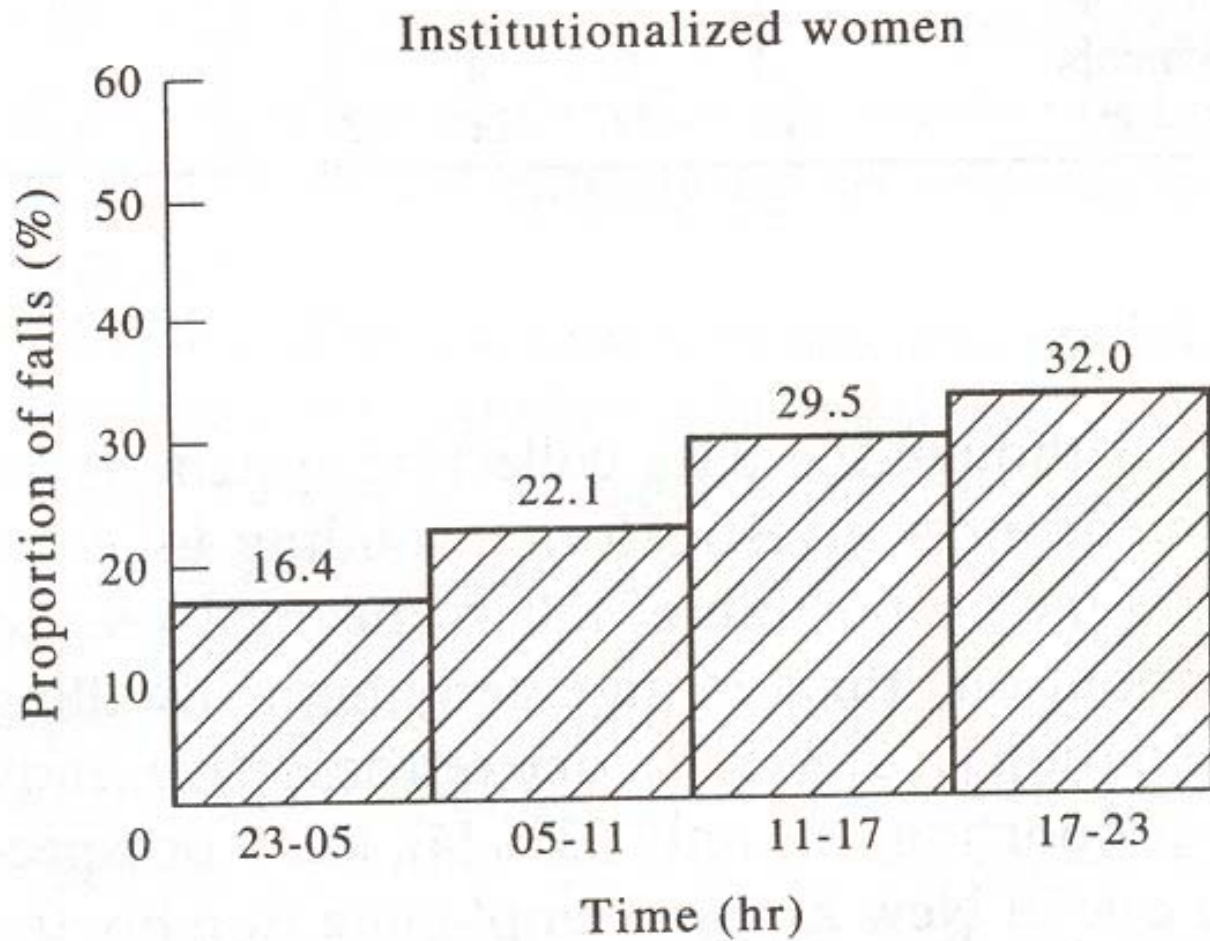
- 2-15% of inpatients experience at least one fall
- incidence rates vary from 0.3 to 19 for 1000 patient days in acute hospitals

(Sehested et al, 1977; Morse et al, 1989; 1995;
Aisen et al, 1994; Tutuarima et al, 1997;
Nyberg et al, 1997; Huda et al, 1998;
Halfon et al, 2001; Hitcho et al, 2004; Stenvall et al, 2006)









1.



Place of falls (%) in the home dwelling aged

	Home %	Other indoor %	Outside %
Men	27	16	57
Women	44	12	44
All	40	15	45



MOST COMMON CIRCUMSTANCES OF FALLS

	Home-dw	Inst.
walking	54 %	39 %
rising to stand up	5 %	13 %
sitting or trying to sit	7 %	17 %
running or jumping	4 %	

(Luukinen et al 1994)



CONSEQUENCES

1. Physical injuries
leading to
disabilities, use of acute treatments and long-term care,
deaths and causing costs to societies and individuals.
2. Fear of falling and activity restrictions
(Tinetti et al 1994, Vellas et al 1997)
3. "Long lie" (over 1 hour) after falling even
without injuries indicating weakness
and associated with a high mortality rate
(Wild et al, 1981, Rynnänen et al 1992)



SHARE OF INJURIOUS FALLS OF ALL FALLS IN COMMUNITY-DWELLERS (PROSPECTIVE STUDIES)

Author, year	Country	Age	All injuries %	Severe %
Tinetti et al 1988	US	75-		24
Cummings et al 1988	US	60-	59	
Campbell et al 1990	NZ	70-	m: 40 w: 52	
Speechley et al 1991	US	75-		6-22
Cumming et al 1991	US	65-	27	
Nevitt et al 1991	US	60-	61	
Hale et al 1992	US	65-	48	
O'Loughlin et al 1993	Ca	65-	46	
Luukinen et al 1994	Fi	70-	m: 34 w: 45	m: 15 w: 16
Tinetti et al 1995	US	72-		14



Share of injurious falls of all falls in the aged in long-term institutions (prospective studies)

Authors, year	Country	Age	All injuries %	Major %
Ashley et al., 1977	Ca	65-	45	
Gryfe et al., 1977	Ca	65-	46	
Sehested & Severin-Nilsen 1977	De	(65-)	25	
Blake & Morfitt, 1986	GB	60-	26	
Tinetti, 1987	US	60-		29
Viskum, 1992	De	65-	44	
Luukinen et al., 1994	Fi	70-	m: 22 w: 34	M:8 W:13



Share of injurious falls of all falls in the aged in long-term institutions (prospective studies)

Authors, year	Country	Age	All injuries %	Major %
Nurmi et al 2002	Fi	60 -	30	7 phys treat
Jensen et al 2002 (residential care)	Sw	54 -	28	8 sev/ mod

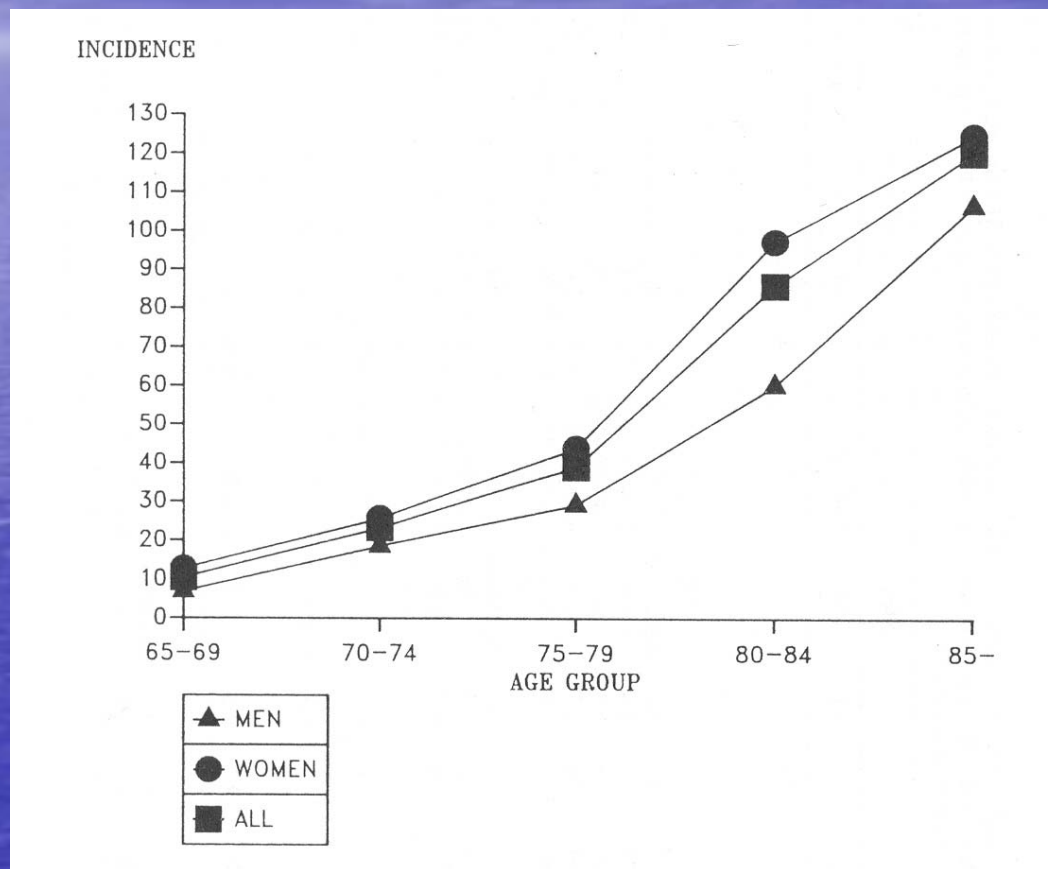


Incidence of falls leading to medical treatment (prospective studies)

Authors, year	Country	Age	Incidence /1000PY
Waller, 1978	US	60-	18.6
Fife et al., 1984	US	65-	35-77
Honkanen et al., 1985	Fi	65-	39.3
Doessing et al., 1989	De	65-	43.3
Sattin et al., 1990	US	65-	84.1
Grisso et al., 1990	US	65-	m: 19.6; w: 29
Ryynänen et al., 1991	Fi	65-	55



INCIDENCE OF FALLING INJURIES LEADING TO MEDICAL TREATMENT



Ryynänen et al, 1991



Falls account for 4 % of all hospital admissions

Falls account for 40 % injury related deaths
and 1 % of all deaths.

(Lord,2001)



COSTS OF FALLS

- Inpatient hospital costs 49% of total costs
 - Long-term costs 41% of total costs
 - Higher costs in the oldest age groups
 - Estimations in Great Britain
 - 60 – 64 yrs. 300 000 pounds per 10 000/year
 - 75 yrs - 1 500 000 pounds per 10 000/year
- (Scuffham et al 2003)



CONCLUSIONS

Every third person aged 65 – living at home falls at least once a year, and about 10 % is recurrent faller.

Nearly a half of home-dwellers falls inside the home, and a majority falls during active hours.

Falls in long-term institutions are quite evenly distributed between all hours.



Depending on the populations,
25-61 % of falls leads to an injury,
6- 29 % to a major injury and
2-5 % to a fracture.

Falls account for

4 % of hospital admissions

40 % of injury-related deaths

1 % of all deaths

in populations aged 65 years or over.

Costs of treatments are high.

Disabilities caused by falls are common.