

## Fall-related deaths in an enlarged European Union



### Objective

The objective of this monograph is to provide producers and users of death statistics with a practical tool to help study deaths related to falls.

### Methods

Mortality data produced by health authorities of 33 European countries<sup>1</sup> and compiled yearly by Eurostat<sup>2</sup> were used. Depending on their availability, data were used to describe time trends, geographical distributions and demographical risks.

By reviewing the literature, the international forum for mortality specialists<sup>3</sup>, the revision and update process of the International Classification of Diseases (ICD) and the answers of a questionnaire filled in by death statistics producers of 36 European countries<sup>4</sup> in the framework of the **ANAMORT** project<sup>5</sup>, it has been possible to:

- describe the limits of the observed differences
- elaborate recommendations for a better use of available data
- elaborate recommendations for a better production of future data

### Definition of deaths related to falls

Death from accidental fall was considered as any death reported to Eurostat with an underlying cause of death coded W00 to W19 (table 1) in the 10<sup>th</sup> revision of ICD (ICD-10).

Death from fall was considered as any death due to fall, whatever the intent was: in addition to death from accidental fall, it included death from suicide by fall, homicide by fall and fall from undetermined intent.

### Definition of indicators used

<sup>1</sup> Included the 25 Member States of the European Union before 2007, Albania, Bulgaria, Croatia, Iceland, Macedonia, Norway, Romania and Switzerland

<sup>2</sup> <http://epp.eurostat.ec.europa.eu>

<sup>3</sup> [http://www.nordclass.uu.se/index\\_e.htm](http://www.nordclass.uu.se/index_e.htm)

<sup>4</sup> 33 above mentioned countries, Bosnia Herzegovina, Serbia and Turkey

<sup>5</sup> <http://www.invs.sante.fr/surveillance/anamort>

The number of deaths for each group of underlying causes of death (UCoD) was the one transmitted by the countries' national authorities to Eurostat for a given year. Aggregation of the number of deaths for the European Union (EU) was made by Eurostat, using last available data for a given year. Crude death rate (CDR) was obtained by dividing the number of deaths by the last estimate of the population available in Eurostat (for a given age group if age specific crude death rate was computed). Age-standardised death rate (SDR) was computed by direct standardisation, using the 1976 European population. The potential years of life lost before 75 years-old (PYLL75) due to a given cause were calculated for each age group by multiplying the number of deaths related to this cause by the difference between age 75 and the mean age at death in each age group. Potential years of life lost were the sum of the products obtained for each age group. Proportions of PYLL75 were calculated by dividing the PYLL75 due to a given cause by the total amount of PYLL75 due to all causes of death. Indicators were produced at country level, for all countries of EU15<sup>6</sup> or EU25<sup>7</sup>. For other groups of countries, estimation of a given indicator was calculated as an average of this indicator at country level weighed by the proportion of its population among the group.

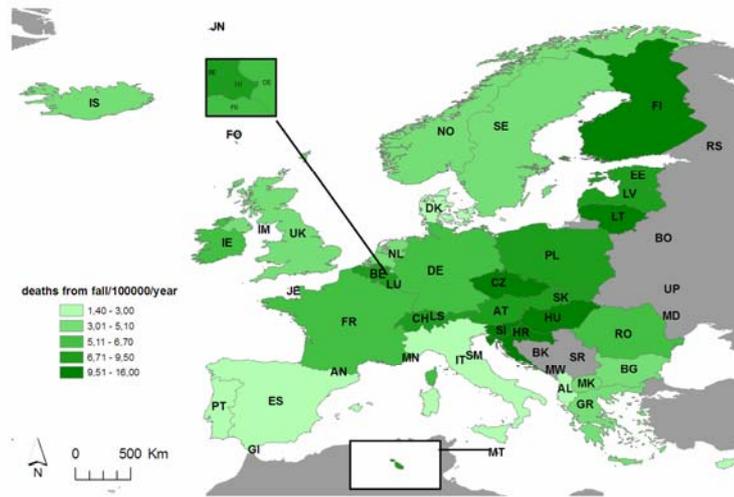
### Situation regarding deaths from accidental falls in Europe

The number of deaths from accidental fall in EU25 was 46,337 in 2005, which represents 20.2% of deaths due to external causes. SDR for accidental fall was 6.5 for 100,000 inhabitants in 2005, among the 25 countries of the European Union. Variations between 2.0 and 16.0 /100,000/year according to the countries were observed in Europe (Figure 1).

<sup>6</sup> EU15 comprised the following 15 countries: Austria, Belgium, Denmark, Finland, France, Germany, Greece, Ireland, Italy, Luxembourg, Netherlands, Portugal, Spain, Sweden, and the United Kingdom.

<sup>7</sup> EU25 comprised EU15 and the following 10 countries: Cyprus, Czech Republic, Estonia, Hungary, Latvia, Lithuania, Malta, Poland, Slovak Republic, and Slovenia.

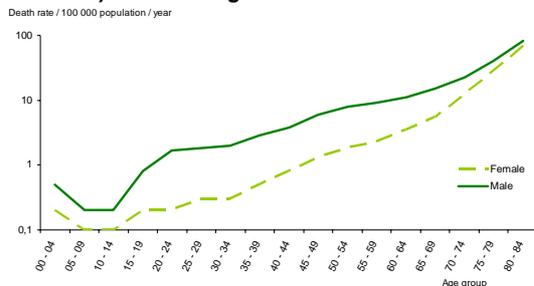
**Figure 1 Age-standardised mortality rate by accidental fall in Europe in 2005\***  
 \* Owing to missing data for 2005, the map included data for 2004 for Albania, 1998 for Belgium, 2001 for Denmark and 2003 for Italy.



A west-east gradient was observed, with the highest SDR by accidental fall observed in Croatia, Slovenia, Hungary, Lithuania, and Finland.

Regardless of age, the CDR by accidental fall for men were higher than for women (Figure 2). The risk of death by accidental fall was 2.4 times higher among men (average for all countries and year, varying from 0.3 to 26.0 according to country and year; 1<sup>st</sup> quartile 1.6; 3<sup>rd</sup> quartile 2.7). In 2005, among EU25 countries, victims were observed among the elderly (65 years-old and more) in 31% of the cases. CDR by accidental fall increased with age regardless of the gender (Figure 2): compared to 15-24 years-old, the risk of death of the elderly (65 years-old and more) was 60 times higher.

**Figure 2 Crude rates of mortality by accidental fall by gender and age group in the European Union (25 countries) in 2005 – logarithmic scale.**

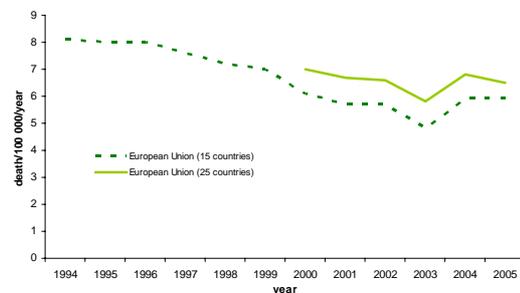


The SDR has decreased by 7% between 2000 and 2005 (from 7.0 to 6.5/100,000/year) in the European Union of 25 countries (Figure 3). This trend was also observed over a longer period in the European Union of 15 countries.

by accidental falls could be observed (Denmark 2000, France 2000, Germany 1998, Italy 2003, Netherlands 1998, Norway 2005, Spain 1999, Sweden 1997, Switzerland 1995). These sharp decreases were associated with the implementation of the 10th revision of ICD in six of these countries.

The ICD-10 code X59 (coding for “Exposure to unspecified factor”) which could correspond to elderly found dead with a fracture, represented more than 50% of accidental falls in four of these countries. The increase of SDR in 2004 was not confirmed in 2005. The 10 Member States, mostly in Eastern Europe, explained the increase in death rates by accidental fall in the European Union (EU25 versus EU15) was due to higher incidence rates in these countries (Figure 3).

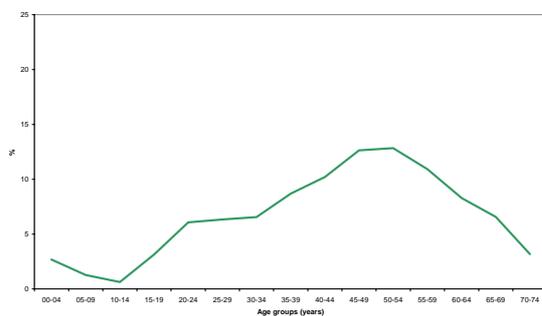
**Figure 3 Trends in age standardised deaths by accidental fall in the European Union (15 and 25 countries).**



In 22 countries<sup>8</sup>, it was possible to obtain statistics on “all falls” (whatever the intent was, see table 1) in 2005. Non accidental falls represented 0 to 31% of all falls (12% on average for all these countries). In 5 countries<sup>9</sup>, the proportion of “accidental falls” decreased among “all falls” after the introduction of the 10<sup>th</sup> revision of the ICD.

In EU25, deaths from accidental fall were responsible for 6% of the PYLL by external causes of death. The highest impact was among people between 40 and 59 years-old (Figure 4).

**Figure 4 Distribution of potential years of life lost by accidental fall in the European Union (25 countries) by age group**



## Interpretations and limits of observed differences in deaths by fall in Europe

Misclassifications of deaths from accidental fall due to inappropriate selection of underlying causes of death were described by 26 out of the 36 countries questioned during the Anamort project. Combined effects of these misclassifications were considered as conducting to underestimation of the magnitude of the deaths due to accidental falls in most of these countries.

Increasing age was considered as a risk factor for under declaration of deaths from accidental fall. This might be explained by the priority given by the certifiers to complex medical history among elderly.

Changes in codification rules between the 9<sup>th</sup> and 10<sup>th</sup> revision of the ICD classification for selecting UCoD might also explain sharp decreases in death rates observed in some countries (a person found dead with a femur fracture might have been coded in the group of

accidental falls with the ICD-9 and not in the ICD-10).

Less frequently, overestimation of deaths by accidental fall might be observed in case of non application of codification rules giving priority to osteoporosis or epilepsy seizure when associated to accidental fall.

## Analytical recommendations to improve comparability of time trends (for statistics users)

The potential impact on falls estimates due to the coding of death with X59 (Exposure to unspecified factor; causing fracture if X59.0) should be estimated in order to identify national correcting factors to better estimate trends according to the application of ICD coding rules.

A strategy on multiple cause of death analysis should be developed to describe deaths related to fall. This would allow balancing the changes in the ICD version by identifying the cases of fracture of the femur (coded S72) without identified external cause or associated to:

- a pathological fracture (e.g. M84.4, M90.7),
- an exposure to an unspecified force causing fracture (X59.0)
- or osteoporosis (M80).

The introduction of the automated coding system might help to eliminate the biases due to different applications of coding rules by coders. It could also contribute to take into account, with homogeneity and rapidly, the regular updates of the ICD classification. Indicators describing fall-related deaths, whatever the intent was, could be interesting to follow as prevention measures on accidental falls should have an impact on intentional falls also (homicide or suicide and undetermined intent).

## Recommendations to improve comparability of future data collected (for data producers)

Circumstances of the fall should be described in detail in the death certificate (Place, location and mechanism).

Various alternative or associated diagnoses should be envisioned by certifiers when a death appears to be related to a fall: suicide, homicide or family violence, epilepsy seizure, bone density disorders, alcohol intoxication.

Search of fall in the medical history of a patient who died in a surgical unit (orthopaedic ward) should be systematic.

<sup>8</sup> Austria, Croatia, Cyprus, Czech Republic, Estonia, Metropolitan France, Greece, Hungary, Iceland, Ireland, Latvia, Lithuania, Macedonia, the former Republic of Yugoslavia, Malta, Norway, Poland, Romania, Slovakia, Slovenia, Spain, Sweden, and Switzerland

<sup>9</sup> Austria, Metropolitan France, Portugal, Spain, and Sweden

Certifiers should be encouraged to write information on conditions contributing/initiating death if an "external cause of injury and poisoning" occurred in the past (e.g. falls, traffic accidents, etc.), and mention the time lag between the elements of the causal chain. Development of an ICD code and indicator to identify low-velocity falls should be necessary to better describe a potential increasing health problem related to population ageing.

Before using the place of injury code (4th digit) in the chapter of falls (W00-W19) for analysis, the appropriate use of this digit should be validated.

Additional and more detailed recommendations may be found on <http://invs.sante.fr/surveillance/anamort>.

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**Table 1 Correspondence table defining the group of falls and accidental falls according to revision number of International Classification of Diseases (ICD)**

	ICD-10	Label	ICD-9	ICD-8
Accidental falls	W00	Fall on same level involving ice and snow	E885	E885
	W01	Fall on same level from slipping, tripping and stumbling	E885	E885
	W02	Fall involving ice-skates, skis, roller-skates or skateboards	E885	E885
	W03	Other fall on same level due to collision with, or pushing by, another person	E886	E886
	W04	Fall while being carried or supported by other persons	E885	E885
	W05	Fall involving wheelchair	E884	E884
	W06	Fall involving bed	E884	E884
	W07	Fall involving chair	E884	E884
	W08	Fall involving other furniture	E884	E884
	W09	Fall involving playground equipment	E884	E884
	W10	Fall on and from stairs and steps	E880	E880
	W11	Fall on and from ladder	E881	E881
	W12	Fall on and from scaffolding	E881	E881
	W13	Fall from, out of or through building or structure	E882	E882
	W14	Fall from tree	E884	E884
	W15	Fall from cliff	E884	E884
	W16	Diving or jumping into water causing injury other than drowning or submersion	E883	E883
	W17	Other fall from one level to another	E884	E884
	W18	Other fall on same level	E888	E887
W19	Unspecified fall	E888	E887	
///////	Fracture, cause unspecified	E887	///////	
All falls	Y01	Assault by pushing from high place	E968.1	E967
	X80	Intentional self-harm by jumping from a high place	E957	E957
	Y30	Falling, jumping or pushed from a high place, undetermined intent	E987	E987
	///////	Late effects of accidental fall	E929.3	E943

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