

Accidental suffocation-related deaths in an enlarged European Union

Maladies chroniques
et traumatismes

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 **accidental suffocation**.

METHODS

Mortality data produced by health authorities of 33 European countries¹ and compiled yearly by Eurostat² 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 specialists³, 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 countries⁴ in the framework of the ANAMORT project⁵, 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 accidental suffocation

Death from accidental suffocation was considered as any unintentional death reported to Eurostat with an underlying cause of death coded W75 to W84 (table 1) in the 10th revision of ICD (ICD-10).

Definition of indicators used

The number of deaths for each group of underlying causes of death (UCoD) was the one transmitted by countries' national authorities to

Eurostat for a given year. Aggregation of 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. Due to partial availability of detailed data, indicators were produced for variable 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 SUFFOCATION IN EUROPE

The number of deaths from accidental suffocation was available in 26 European countries⁶. In these countries 8,747 deaths from accidental suffocation occurred in 2005, which represented 4.9% of deaths due to external causes. SDR for accidental suffocation was 2.0 for 100,000 inhabitants in 2005, among these 26 countries. Variations between 0.4 and 8.3/100,000/year according to the countries were observed (Figure 1).

There was no clear trend for SDR on accidental suffocation-related deaths although the highest rates were observed in the Baltic countries (Lithuania, Latvia and Estonia).

1. Included the 25 Member States of the European Union (EU) before 2007, Albania, Bulgaria, Croatia, Iceland, Macedonia (the former Yugoslav Republic of), Norway, Romania and Switzerland. EU15 comprised the following 15 countries: Austria, Belgium, Denmark, Finland, France, Germany, Greece, Ireland, Italy, Luxembourg, Netherlands, Portugal, Spain, Sweden, and the United Kingdom. EU25 comprised EU15 and the following 10 countries: Cyprus, Czech Republic, Estonia, Hungary, Latvia, Lithuania, Malta, Poland, Slovak Republic, and Slovenia.

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

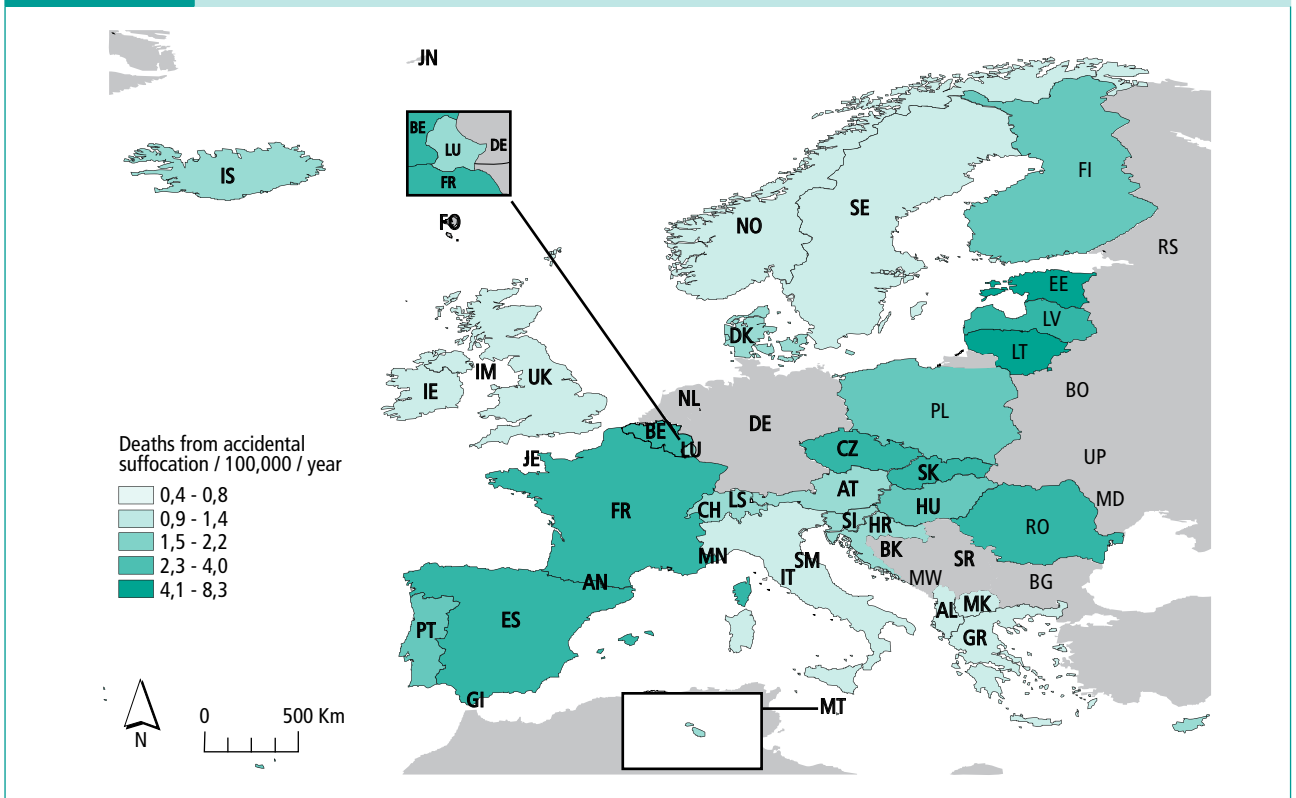
3. www.nordclass.uu.se/index_e.htm.

4. 33 above mentioned countries, Bosnia Herzegovina, Serbia and Turkey.

5. www.invs.sante.fr/surveillance/anamort.

6. Albania*; Austria; Croatia; Cyprus; Czech Republic; Estonia; Finland*; France; Greece; Hungary; Iceland; Ireland; Latvia; Lithuania; Macedonia (the former Yugoslav Republic of); Malta; Norway*; Poland; Portugal*; Romania; Slovak Republic; Slovenia; Spain; Sweden; Switzerland; United Kingdom* (* data for 2004).

FIGURE 1 AGE-STANDARDISED MORTALITY RATE BY ACCIDENTAL SUFFOCATION IN EUROPE IN 2005*



* Owing to missing data for 2005, the map included data for 2004 for Albania, Finland, Norway, Portugal, United Kingdom, 2003 data for Italy, 2001 data for Denmark, 1999 data for Luxembourg and 1998 data for Belgium.

Regardless of age, the CDRs by suffocation for men were higher than for women except in the youngest age groups (Figure 2). The risk of death by accidental suffocation was 1.5 times higher among men (average for the same 26 European countries in 2005). In 2005, victims were observed among the elderly (65 years-old and more) in 59% of the cases. The highest CDRs were observed among the elderly (over 80 years-old).

The SDR trend remained more or less still between 1994 and 2005 (from 2.1 to 1.9/100,000/year) in the group of 26 European countries (Figure 3). Due to small figures erratic variations were observed in most countries.

FIGURE 2 CRUDE RATES OF MORTALITY BY ACCIDENTAL SUFFOCATION BY GENDER AND AGE GROUP IN 26 EUROPEAN COUNTRIES IN 2005 – LOGARITHMIC SCALE

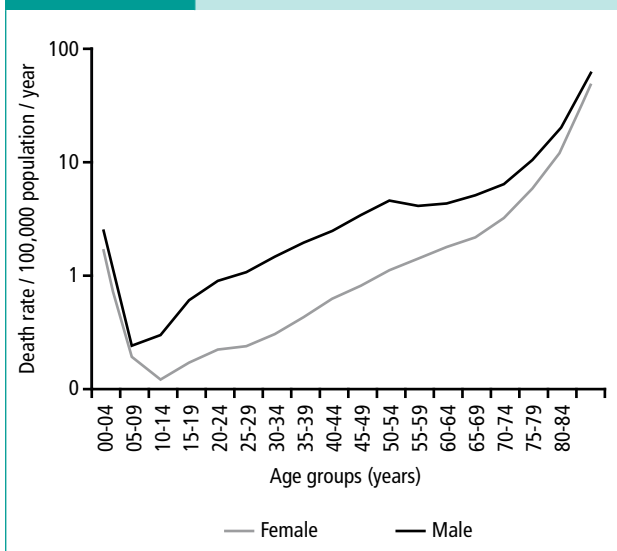
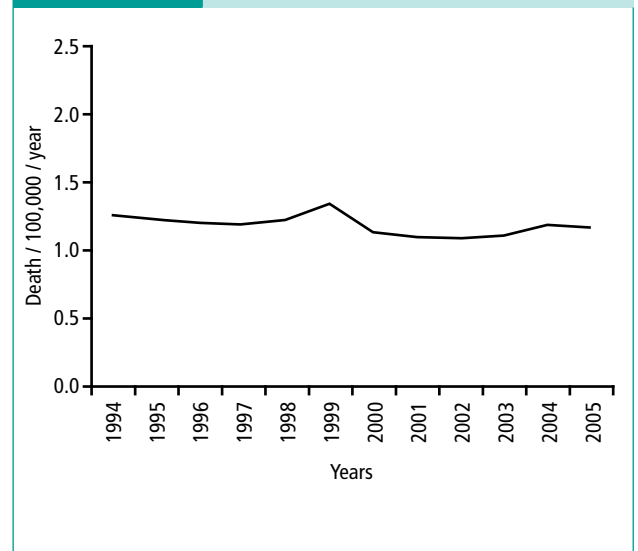
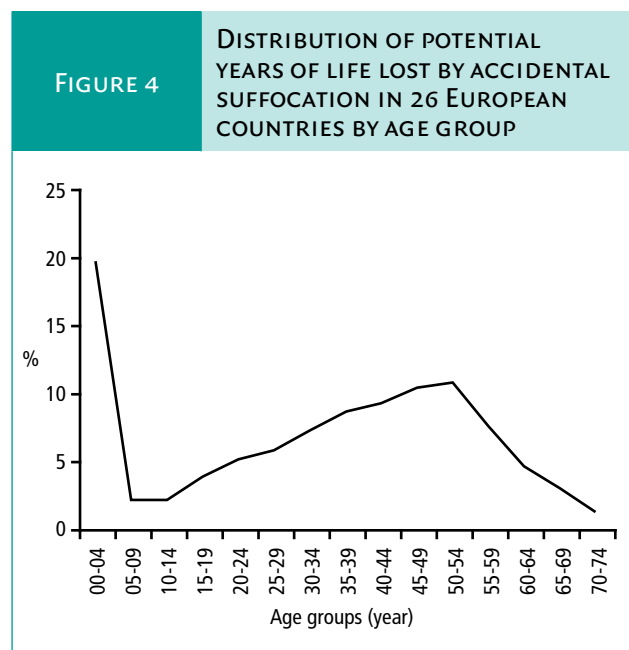


FIGURE 3 TRENDS IN AGE-STANDARDISED DEATHS BY ACCIDENTAL SUFFOCATION IN 26 EUROPEAN COUNTRIES



Deaths from accidental suffocation were responsible for 4% of the PYLL75 by external causes of death. The highest impact was among children aged less than 5 years: they represented nearly 20% of the PYLL75 by accidental suffocation (Figure 4).



INTERPRETATION AND LIMITS OF OBSERVED DIFFERENCES IN DEATHS BY ACCIDENTAL SUFFOCATION IN EUROPE

It was not possible to study the deaths from accidental suffocation in countries which do not transmit their data in ICD codes to Eurostat, even though such analysis could be performed at national level.

Heterogeneity for the selection of an underlying cause of death has been underlined by the Anamort questionnaire when accidental suffocation is associated to a disease affecting swallowing (e.g. Alzheimer disease). It was difficult to assess whether the combined effect of these misclassifications led to an under- or an overestimation of the magnitude of the deaths due to accidental suffocation.

Accidental suffocation-related deaths were reported to be likely hidden in "mental and behavioural disorders" and "unknown and unspecified causes". This might be due to the fact that suffocation is a symptom and not a diagnosis, which causes a lack of reporting in the death certificate. This bias could increase with age.

When suffocation occurs, and without information from forensic physicians, intent might sometimes be difficult to determine.

ANALYTICAL RECOMMENDATION TO IMPROVE COMPARABILITY OF TIME TRENDS (FOR STATISTICS USERS)

Transmission of national data to Eurostat should be done in ICD code in order to give the opportunity to facilitate research on specific topics not included in the Eurostat short list of CoD. The implementation of multiple cause analyses to quantify the importance of deaths for which suffocation was not identified as the underlying cause of death, such as mental disorders causes of death, would be highly recommended.

Due to probable misclassifications within this group of causes of death, it should be useful to analyse deaths due to suffocation considering all possible categories: accidental, suicides, homicides, and undetermined intent.

In addition, specific analyses should be conducted regarding the undetermined intent suffocation category, in order to assess whether these cases should be coded as suicide or in other categories.

RECOMMENDATIONS TO IMPROVE COMPARABILITY OF FUTURE DATA COLLECTED (FOR DATA PRODUCERS)

WHO guidelines on "highly improbable" sequences should be reinforced by including more examples (e.g. how to deal with suffocation due to dementia, stroke, head or spinal trauma or tumour, or neuromuscular diseases?).

Timeliness of transmission of information from forensic institute and police to certifier or statistical office may improve accuracy of ICD codes.

In case of a death due to suffocation, a foreign body should be suspected for young persons (under 10 years-old). On the opposite, for older ages (65 years-old and more), an underlying disease affecting swallowing should be suspected (i.e. mental disorder diseases, Alzheimer, stroke, head or spinal trauma or tumour, neuromuscular diseases, etc.).

Additional and more detailed recommendations may be found on www.invs.sante.fr/surveillance/anamort.

BIBLIOGRAPHIC REFERENCES

- Brock A, Griffiths C, Rooney C. The impact of introducing ICD-10 on analysis of respiratory mortality trends in England and Wales. *Health Stat Q.* 2006;9:17.
- Burney PG. The effect of death certification practice on recorded national asthma mortality rates. *Rev Epidemiol Santé Publique.* 1989;37:385-9.
- Burnley IH. Mortality from respiratory system cancer in New South Wales and Sydney. *Aust J Public Health.* 1992;16:251-61.
- Camilli AE, Robbins DR, Lebowitz MD. Death certificate reporting of confirmed airways obstructive disease. *Am J Epidemiol.* 1991;133:795-800.
- Cartwright K. Pneumococcal disease in western Europe: burden of disease, antibiotic resistance and management. *Eur J Pediatr.* 2002;161:188-95.
- Crowcroft NS, Cutts F, Zambon MC. Respiratory syncytial virus: an underestimated cause of respiratory infection, with prospects for a vaccine. *Commun. Dis Public Health.* 1999;2:234-41.
- Delendi M *et al.* Comparison of diagnoses of cancers of the respiratory system on death certificates and at autopsy. *IARC Sci.Publ.* 1991;55-62.
- Doherty MJ, Spence DP, Davies PD. Trends in mortality from tuberculosis in England and Wales: effect of age on deaths from non-respiratory disease. *Thorax.* 1995;50:976-9.
- Farebrother MJ, Kelson MC, Heller RF. Death certification of farmer's lung and chronic airway diseases in different countries of the EEC. *Br J Dis Chest.* 1985;79:352-60.

Gulsvik A. Mortality in and prevalence of chronic obstructive pulmonary disease in different parts of Europe. *Monaldi Arch Chest Dis.* 1999;54:160-2.

Kelson MC, Heller RF. The effect of death certification and coding practices on observed differences in respiratory disease mortality in 8 E.E.C. countries. *Rev Epidemiol Santé Publique.* 1983;31:423-32.

Leveque B *et al.* Child victims of house fires in France. Mortality, morbidity, prevention. *Bull Acad Natl Med.* 1993;177:1233-9.

Mannino DM, Etzel RA, Parrish RG. Pulmonary fibrosis deaths in the United States, 1979-1991. An analysis of multiple-cause mortality data. *Am J Respir Crit Care Med.* 1996;153:1548-52.

McCoy L *et al.* A multiple cause-of-death analysis of asthma mortality in the United States, 1990-2001. *J Asthma.* 2005;42:757-63.

Model D. Preventable factors and death certification in death due to asthma. *Respir Med.* 1995;89:21-5.

Neukirch F *et al.* Validity of mortality data in respiratory diseases in France and 7 other countries of the E.E.C. *Rev Mal Respir.* 1984;1:361-7.

Nixon JW *et al.* Suffocation, choking, and strangulation in childhood in England and Wales: epidemiology and prevention. *Arch Dis Child.* 1995;72:6-10.

Reid DW *et al.* Age-dependent inaccuracy of asthma death certification in Northern England, 1991-1992. *Eur Respir J.* 1998;12:1079-83.

Sears MR *et al.* Accuracy of certification of deaths due to asthma. A national study. *Am J Epidemiol.* 1986;124:1004-11.

Siarakas S, Damas E, Murrell WG. Is cardiorespiratory failure induced by bacterial toxins the cause of sudden infant death syndrome? Studies with an animal model (the rabbit). *Toxicol.* 1995;33:635-49.

Smyth ET *et al.* Death from airways obstruction: accuracy of certification in Northern Ireland. *Thorax.* 1996;51:293-7.

Wright SC *et al.* Asthma mortality and death certification in Northern Ireland. *Thorax.* 1994;49:141-3.

TABLE 1		CORRESPONDENCE TABLE DEFINING THE GROUP OF ACCIDENTAL SUFFOCATION ACCORDING TO REVISION NUMBER OF INTERNATIONAL CLASSIFICATION OF DISEASES (ICD)		
		ICD-10	Label	ICD-9 ICD-8
All suffocations and other threats to breathing	Accidental suffocation	W75	Accidental suffocation and strangulation in bed	E913.0
		W76	Other accidental hanging and strangulation	
		W77	Threat to breathing due to cave-in, falling earth and other substances	E913.9
		W78	Inhalation of gastric contents	
		W79	Inhalation and ingestion of food causing obstruction of respiratory tract	E911
		W80	Inhalation and ingestion of other objects causing obstruction of respiratory tract	E912
		W81	Confined to or trapped in a low-oxygen environment	
		W83	Other specified threats to breathing	E913.9
	W84	Unspecified threat to breathing		
		X70	Intentional self-harm by hanging, strangulation and suffocation	E953
		X91	Assault by hanging, strangulation and suffocation	E963
	Y20	Hanging, strangulation and suffocation, undetermined intent	E983	

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