Maladies chroniques et traumatismes

Poisoning-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 accidental poisonings.**

Methods

Mortality data produced by health authorities of 33 European countries [1] and compiled yearly by Eurostat [2] 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 [3], 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 [4] in the framework of the **Anamort** project [5], 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 poisoning

Death from accidental poisoning was considered as any death reported to Eurostat, with an underlying cause of death coded X40 to X49 (table 1) in the 10th revision of ICD (ICD-10).

Death from poisoning was considered as any death due to poisoning, whatever the intent was; in addition to death from accidental poisoning, it included suicide by poisoning, homicide by poisoning, poisoning from undetermined intent, and death from contact with venomous animals and plants.

Definition of indicators used

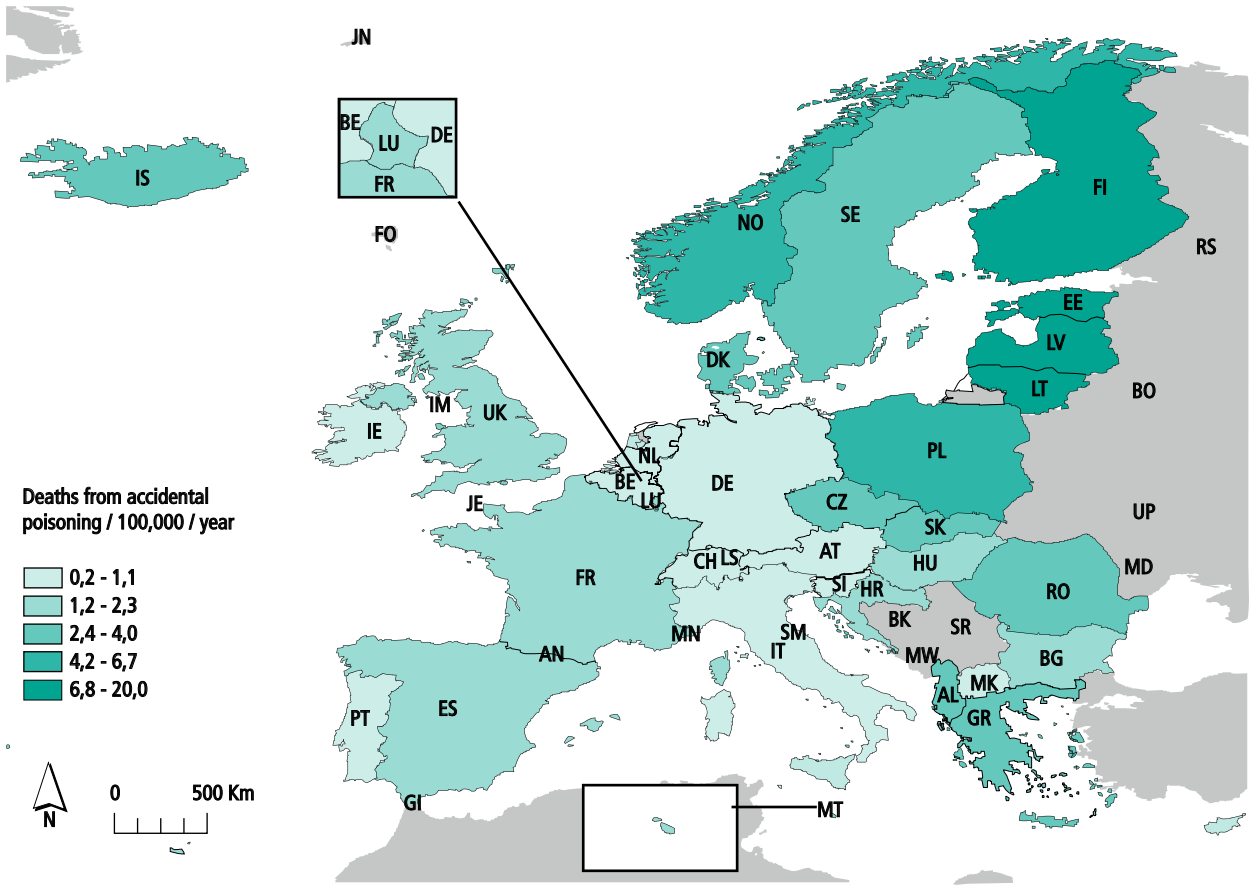
The number of deaths for each group of underlying causes of death (UCoD) was the one transmitted by the countries' national authorities to Eurostat for a given year. Aggregation of the number of deaths for the European Union (EU) was made by Eurostat, using the last available data for a given year. Crude 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 [6] or EU25 [7]. 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 poisoning in Europe

The number of deaths from accidental poisoning in EU25 was 10,194 in 2005, which represents 4.4% of deaths due to external causes. SDR for accidental poisoning was 2.1 for 100,000 inhabitants in 2005, among the 25 countries of the European Union. Variations between 0.2 and 20.0/100,000/year according to the countries were observed in Europe (Figure 1).

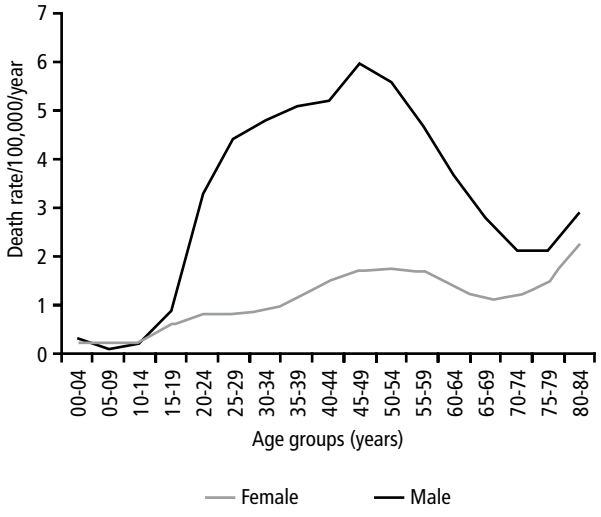
1. *Included the 25 Member States of the European Union before 2007, Albania, Bulgaria, Croatia, Iceland, Macedonia, Norway, Romania and Switzerland.*
2. *epp.eurostat.ec.europa.eu.*
3. *www.nordclass.uu.se/index_e.htm.*
4. *33 above mentioned countries, Bosnia Herzegovina, Serbia and Turkey.*
5. *www.invs.sante.fr/surveillance/anamort.*
6. *EU15 comprised the following 15 countries: Austria, Belgium, Denmark, Finland, France, Germany, Greece, Ireland, Italy, Luxembourg, the Netherlands, Portugal, Spain, Sweden, and the United Kingdom.*
7. *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 poisoning 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.*

Figure 2 Crude rates of mortality by accidental poisoning by gender and age group in the European Union (25 countries) in 2005



The highest risks of death from accidental poisoning were observed in north-eastern countries (Lithuania, Estonia, Latvia, Finland, Norway and Poland).

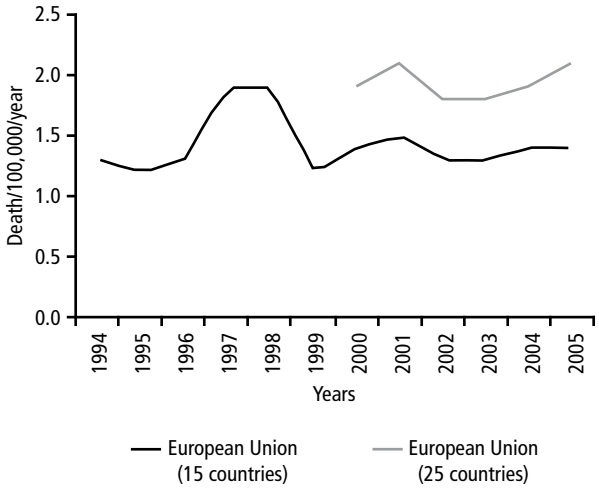
The risk of death by accidental poisoning was 3.1 times higher among men (average for EU25 in 2005). This difference was particularly important between ages 20 and 69 years (Figure 2). In 2005 among EU25 countries, victims were observed among the elderly (65 years-old and more) in 24% of the cases. The highest CDRs were observed among people between 30 and 59 years-old (maximum for the 45-49 years-old age group with 3.8/100,000 in 2005).

There was no clear trend regarding the SDR between 2000 and 2005 in the EU25 and between 1994 and 2005 in the EU15 (Figure 3). In certain countries, a sharp decrease in SDR by accidental poisoning could be observed (Switzerland 1995, Greece 1995) or inversely, a noticeable increase (+44% in France in 2000,+190% in Norway in 2003). Some of these decreases or increases were associated with the implementation of the 10th revision of ICD as in France and Switzerland. The 10 new Member States, mostly in Eastern Europe, explained the increase in death rates by accidental poisoning in the European Union (EU25 versus EU15) was due to higher incidence rates in these countries (Figure 3).

In 22 countries[8], it was possible to obtain statistics on "all poisonings" (whatever the intent was, see table 1) in 2005. Non-accidental poisonings represented 0 to 92% of all poisonings (40% on average for all these countries).

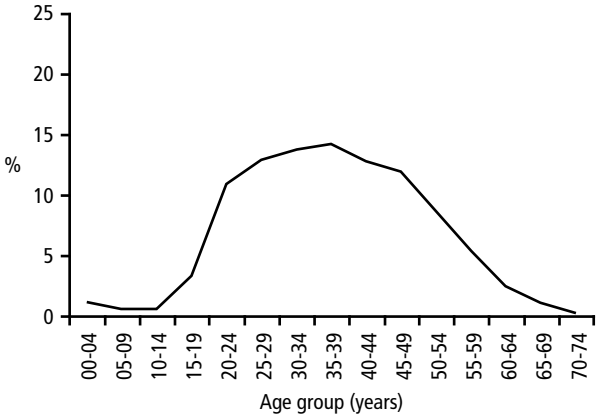
8. *Austria, Croatia, Cyprus, Czech Republic, Estonia, Metropolitan France, Greece, Hungary, Iceland, Ireland, Latvia, Lithuania, Macedonia (the former Republic of Yugoslav) Malta, Norway, Poland, Romania, Slovakia, Slovenia, Spain, Sweden, and Switzerland.*

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



In EU25, deaths from accidental poisoning were responsible for 6% of the PYLL by external causes of death. The highest impact was among people between 20 and 49 years of age (Figure 4).

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



Interpretation and limitations of observed differences in deaths by poisoning in Europe

Increased rates of death related to accidental poisoning in northern and eastern European countries had been attributed to acute poisoning by alcohol.

Misclassifications of deaths from accidental poisoning due to inappropriate selection of underlying causes of death were described by 22 out of the 36 countries questioned during the Anamort project. The combined effect of these misclassifications was considered to lead to underestimation of the magnitude of the deaths due to accidental poisonings in most of these countries.

Lack of investigation and low rates of autopsy can have an impact on underestimation of cases of accidental poisoning. These cases would therefore be coded as mental and behavioural disorders due to psychoactive substance use (ICD-10 codes: F10-F19), suicides or poisoning with undetermined intent.

On the opposite, overestimation of deaths by accidental poisoning might be observed when the intent is not clearly reported.

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

Time trends regarding deaths coded X40-X49 (Accidental poisoning) and F10-F19 (Mental and behavioural disorders due to psychoactive substance use) should be monitored in order to study misclassifications between these two groups.

In order to have an overview of mortality related to poisoning, it would be interesting to analyse deaths due to overdose considering all possible categories: accidental, suicides, homicides, undetermined intent also including the F codes related to drugs in the analyses.

To better identify poisoning-related cases, other tools could be used such as:
- multiple cause of death analyses in order to identify drug use including in particular some T and F codes
- textual analyses in order to identify specific illegal substances.

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

Coders should always request the results of toxicological analyses for deaths due to poisoning if data on agents/substances are not provided.

Cases of overdose-related deaths should be coded both with the underlying cause of death (i.e. X or Y codes) as well as with T codes identifying the drugs involved (i.e. X42 and T40).

Deaths coded as cardiac arrest or unspecified cause of death in younger age groups (below 45) should be specifically analysed because there could be some external causes of death, and more particularly accidental poisoning cases.

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

Bibliographic references

Centers for Disease Control and Prevention (CDC). Unintentional and undetermined poisoning deaths - 11 states, 1990-2001. MMWR Morb Mortal Wkly Rep. 2004;26;53(11):233-8. MMWR Morb.Mortal.Wkly Rep 2004;53:233-8.

Agren G, Jakobsson SW. Validation of diagnoses on death certificates for male alcoholics in Stockholm. Forensic Sci Int. 1987;33:231-41.

Bekkedal M *et al.* Evaluation of five data sources for inclusion in a statewide tracking system for accidental carbon monoxide poisonings. WMJ. 2006;105:36-40.

Bell G, Cremona A. Alcohol and death certification: a survey of current practice and attitudes. Br Med J (Clin.Res Ed) 1987;295:95.

Breakwell C *et al.* Trends and geographical variations in alcohol-related deaths in the United Kingdom, 1991-2004. Health Stat Q. 2007;6-24.

Christophersen O, Rooney C, Kelly S. Drug-related mortality: methods and trends. Popul Trends. 1998;29-37.

Donaldson AE *et al.* Classifying undetermined poisoning deaths. Inj Prev. 2006;12:338-43.

Flanagan RJ, Rooney C, Griffiths C. Fatal poisoning in childhood, England & Wales 1968-2000. Forensic Sci Int. 2005;148:121-9.

Griffiths C, Rooney C. The effect of the introduction of ICD-10 on trends in mortality from injury and poisoning in England and Wales. Health Statistics Quarterly. 2003;19:10-21.

Griffiths C, Wright O, Rooney C. Trends in injury and poisoning mortality using the ICE on injury statistics matrix, England and Wales, 1979-2004. Health Stat Q. 2006;5-18.

Hanzlick R. Death certificates, natural death, and alcohol. The problem of underreporting. Am J Forensic Med Pathol. 1988;9:149-50.

Hempstead K. Manner of death and circumstances in fatal poisonings: evidence from New Jersey. Inj Prev. 2006;12 Suppl 2:ii44-ii48.

Hoppe-Roberts JM, Lloyd LM, Chyka PA. Poisoning mortality in the United States: comparison of national mortality statistics and poison control center reports. Ann Emerg Med. 2000;35:440-8.

Karhunen PJ, Penttila A. Validity of post-mortem alcohol reports. Alcohol Alcohol. 1990;25:25-32.

Kemp I, Carstairs V. The reliability of death certification as a measure of the level of alcohol problems. Community Med. 1987;9:146-51.

Nordrum I, Eide TJ, Jorgensen L. Alcohol in a series of medico-legally autopsied deaths in northern Norway 1973-1992. Forensic Science International. 2000;110:127-37.

Oyefeso A *et al.* Fatal injuries while under the influence of psychoactive drugs: a cross-sectional exploratory study in England. BMC Public Health. 2006;6:148.

Pollock DA *et al.* Underreporting of alcohol-related mortality on death certificates of young US Army veterans. Jama. 1987;258:345-8.

Shah R *et al.* Trends in deaths from drug overdose and poisoning in England and Wales 1993-1998. J Public Health Med. 2001;23:242-6.

Soslow AR, Woolf AD. Reliability of data sources for poisoning deaths in Massachusetts. Am J Emerg Med. 1992;10:124-7.

Van NP *et al.* The influence of alcohol abuse as a hidden contributor to mortality. Alcohol. 1985;2:535-9.

Vougiouklakis T, Boumba VA, Mitselou A. Fatal poisoning in the region of Epirus, Greece, during the period 1998-2004. J Clin Forensic Med. 2006;13:321-5.

Wysowski DK *et al.* Mortality attributed to misuse of psychoactive drugs, 1979-88. Public Health Rep. 1993;108:565-70.

Young TW, Pollock DA. Misclassification of deaths caused by cocaine. An assessment by survey. Am J Forensic Med Pathol. 1993;14:43-7.

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

		ICD-10	Label	ICD-9	ICD-8
All poisonings	Accidental poisonings	X40	Accidental poisoning by and exposure to nonopioid analgesics, antipyretics and antirheumatics	E850-E858	E850-E859
		X41	Accidental poisoning by and exposure to antiepileptic, sedative-hypnotic, antiparkinsonism and psychotropic drugs, not elsewhere classified		
		X42	Accidental poisoning by and exposure to narcotics and psychodysleptics [hallucinogens], not elsewhere classified		
		X43	Accidental poisoning by and exposure to other drugs acting on the autonomic nervous system		
		X44	Accidental poisoning by and exposure to other and unspecified drugs, medicaments and biological substances		
		X45	Accidental poisoning by and exposure to alcohol	E860-E869	E860-E877
		X46	Accidental poisoning by and exposure to organic solvents and halogenated hydrocarbons and their vapours		
		X47	Accidental poisoning by and exposure to other gases and vapours		
		X48	Accidental poisoning by and exposure to pesticides		
		X49	Accidental poisoning by and exposure to other and unspecified chemicals and noxious substances		
		X20-X29	Contact with venomous animals and plants	E905	E905
		X60-X69	Intentional self-poisoning by and exposure to chemicals and noxious substances	E950-E952	E950-E952
		X85-X90	Assault by chemical or noxious substance	E962	E962
		Y10-Y19	Poisoning by and exposure to chemicals and noxious substances, undetermined intent	E980-E982	E980-E982
		////////*	Late effects of accidental poisoning	E929.2	E942

** Can not be identified within the code Y87.2 which contains late effects of all undetermined intent events.*

Acknowledgements

The Anamort project team:

Belanger F, Ung A-B, Falzon A, Institut de veille sanitaire, Unité Traumatismes- DMCT, France

Members of the the Anamort project Steering Committee:

Bene M, Hungarian Central Statistical Office, Population, Health and Welfare Statistics Department, Hungary. Bruzzone S, Istat - National Institute of Statistics - Division for Statistics and Surveys on Social Institutions - Health and Care Section, Italy Denissov G, The statistical office of Estonia, Estonia. England K, Department of Health Information, Malta. Frimodt-Møller B, National Institute of Public Health, Denmark. Gjertsen F, Norwegian Institute of Public Health, Division of Epidemiology, Norway. Jougla E, Inserm-CépiDC, SC8 Inserm, France. Nectoux M, PSYTEL, France. Steiner M, Kuratorium für Verkehrssicherheit (KfV) Bereich Heim, Freizeit & Sport, Austria. Thélot B, InVS-Institut de veille sanitaire, France.

Support:

European Commission, DG Sanco (partial financial support) and Eurostat (technical support).

Citation :

F. Belanger, A-B Ung *et al.* Poisoning-related deaths in an enlarged European Union - Institut de veille sanitaire - Saint-Maurice, 2008, 4p. Disponible sur www.invs.sante.fr

Institut de veille sanitaire, 12 rue du Val D'Osne 94 415 Saint-Maurice Cedex France - Tél. : 33 (0)1 41 79 67 00 - Fax : 33 (0)1 41 79 67 67
www.invs.sante.fr - **ISSN** : 1956-6964 - **ISBN-NET** : 978-2-11-097886-8 - **Réalisation** : DIADEIS - Paris - **Imprimé par** : France Repro - Maisons-Alfort - **Tirage** : 50 Exemplaires - **Dépôt légal** : août 2008