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Drug-related Deaths in Belgium, 1987-1997

by

Jossels G[1], Sartor F[1]

Abstract

Objective: *To gain insight in the characteristics of drug-related mortality in Belgium at national level.*

Method: *The EMCDDA "Selection B" is applied to the general mortality registers of 1987 through 1997, retrieving 890 drug-related deaths. Univariate and multivariate methods (Poisson regression) are used to analyse these data.*

Results: *The analyses reveal a sudden rise in drug-related mortality in 1993. This rise could be partly due to an improvement of the death certification quality. Almost three out of four drug-related deaths occur among men. In more than 90% of the cases where the substances involved are mentioned on the death certificate, opiates are involved. Among people aged 65 years or older, a lot of drug-related deaths are observed (mostly women) with "nondependent abuse of drugs – other, mixed or unspecified" mentioned as the cause of death. This suggests that the corresponding "Selection B"-code might extract deaths that are not due to illicit substances. The difference between the regions is*

[1] Scientific Institute of Public Health, Brussels, Belgium

Correspondence address: Guido Jossels, IPH - Unit of Epidemiology, J. Wytsmanstraat 14, 1050 Brussel, Belgium. E-mail: guido.jossels@iph.fgov.be

remarkable: the Walloon Region accounts for the most drug-related deaths. However, additional analyses put this difference into perspective. The determinants of drug-related deaths are found to be gender, age and the region of residence.

Conclusion: *The reason for the sudden increase of drug-related mortality remains unclear, although an increase of certification quality can be suggested. The lack of recent data at national level remains a major problem for public health policies.*

Keywords: mortality, illegal drugs, regions.

Introduction

Although their use is not as wide-spread as their legal counterparts, illegal drugs are still reported to be used by a high number of people. For instance, 0.5-7% of the European population reports to have used amphetamine-type stimulants, LSD or other synthetic drugs at least once in their lifetime, and problem drug use is estimated at 2 to 10 per 1000 of the population aged 15-64 years old (1). Since the morbidity and mortality associated with drug dependence affects a sizeable number of European citizens, the health-related harm associated with drug dependence constitutes a major problem for public health (2). Moreover, drug overdose is a major cause of deaths among young people in Europe (the 15 "older" Member States): over 8,000 such deaths are recorded each year. Drug overdose is currently the leading cause of death among drug injectors (3). A clear understanding of the drug problem is therefore necessary for adequate responses. Knowing more about prevalence, incidence, and risk factors is important for the development of rational preventive and therapeutic programmes (4). Policy makers have recognised this issue. The reduction of drug-related health and social damage in general as well as damage specifically due to drug-related deaths has become an important objective in the European strategy targeting the drug problem (2, 5). The Belgian federal drug policy note of 2001 aims at reducing these negative consequences too (6).

In 2002, the European Monitoring Centre for Drugs and Drug Addiction (EMCDDA) finished the third version of the "Drug-related Death (DRD) Standard" (7). This standard is a protocol for the EU member states[1] to report data on drug-related deaths. On a yearly basis, these

[1] Although not an EU member state, Norway is included among the countries involved in the work of the EMCDDA.

data are reported to the monitoring centre using a standardised form, allowing for comparison between the EU member states. The amount of data on these forms is limited however. Therefore, this report aims to conduct a more profound exploratory study of the mortality data registered in Belgium during the period 1987-1997 by means of univariate and multivariate analyses. The EMCDDA "DRD Standard" is used as criterium for case selection.

Methods

The general mortality register provided the necessary data. The special police register, POLIS, was not used due to its unrepresentativeness and unreliability for the purpose of the paper (8). The general mortality register data are centralised at Statistics Belgium (formerly National Institute of Statistics (NIS)). Unfortunately, due to technical problems at the level of the administration of the French-speaking Community, the NIS could not deliver national data more recent than 1997. All data up to this point are coded according to the ICD-9 (9).

Drug-related deaths used in the present study are extracted from the NIS database using the criteria of the EMCDDA DRD-Standard "Selection B". According to this standard, a drug-related death is defined as follows:

– "when their underlying cause of death was drugs psychoses, drug dependence, nondependent drug abuse, accidental poisoning, suicide and self-inflicted poisoning, or poisoning with undetermined intent"; furthermore,

– "cases will be included when the death was due to a standard list of specific drugs: opiates, cocaine, amphetamines and derivatives, cannabis, and hallucinogens" (7).

The corresponding ICD-9 codes are presented in Table 1.

The list comprises a series of underlying causes of death. The N-codes further specify the causes by providing the "nature of injury". This selection is broader compared to the also existing "Selection A" since suicide, self-inflicted poisoning and poisoning with undetermined intent are included. On the other hand, it is narrower than the "Selection C" since it does not include deaths caused by psychopharmaceutical drugs.

Data for 11 years are collected: from 1987 through 1997, the last year for which data are available at national level. Univariate and

TABLE 1
Selected drug-related deaths and their matching ICD-9 codes

Category of drug-related death	Selected ICD-9 code(s)
Drug psychoses	292
Drug dependence	304.0, 304.2-9
Nondependent drug abuse	305.2-3, 305.5-7, 305.9
Accidental drug poisoning	E850.0, E850.8(*), E854.1-2, E855.2, and E858.8(*)
Suicide and self-inflicted drug poisoning	E950.0(*), E950.4(*)
Drug poisoning undetermined intent	E980.0(*), E980.4(*)

(*) In combination with N-codes (N965.0, and/or N968.5, and/or N969.6, and/or N969.7) which specify the nature of injury. EMCCDA DRD-Standard, version 3 (7).

multivariate analyses (Poisson regression) are performed on the resulting database. The multivariate analyses aimed at finding interactions between the studied variables as well as constructing a fitting statistical model with the variables. Note that when performing analyses involving the variable “region of residence”, 17 cases were omitted because the region was not known.

Analyses were performed using SAS 8.

Results

Univariate descriptive analyses

890 cases of drug-related deaths are extracted from the NIS database for the period 1987-1997.

The number of drug-related deaths rises between 1987 and 1992 (Figure 1). A different trend is observed from 1993 onwards: the number of deaths remains almost stable, although higher than before 1993 (respectively 64 and 123 cases in 1992 and 1993).

Each year, more men than woman die of drug-related causes, although the sex ratio varies throughout the years between 21.1% and 45.5%. For 1997 the number of men that died of drug-related causes was 97 as opposed to 26 women.

The distribution of the number of drug-related deceases by five-year age categories is given in Figure 2.

Most drug-related deaths (62.5%) occur in people aged between 20 and 34 years old (Figure 2). For the period 1987-1997, the mean age at death is 35.5 years old.

Figure 1. Number of drug-related deaths by year, Belgium, 1987-1997 (n=890).

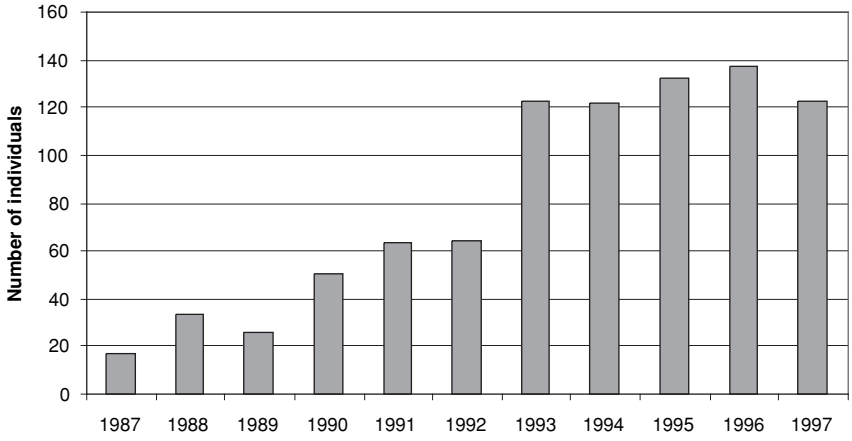
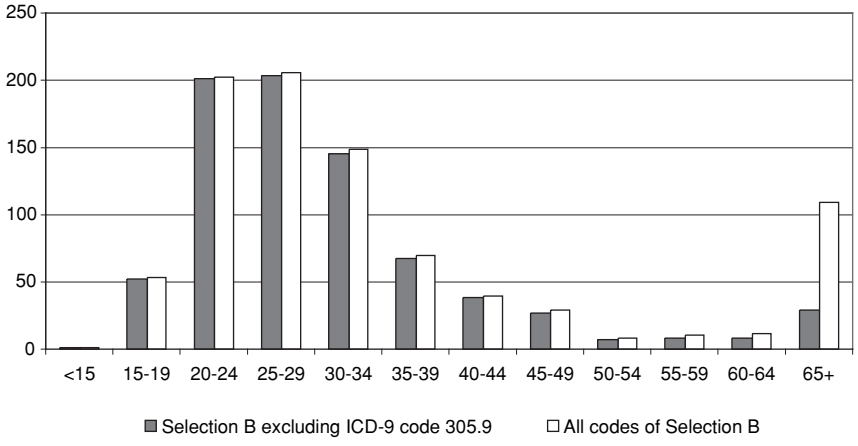


Figure 2. Age distribution of the number of drug-related deaths before (n=890) and after excluding EMCDDA DRD code 19, Belgium, 1987-1997 (n=788)

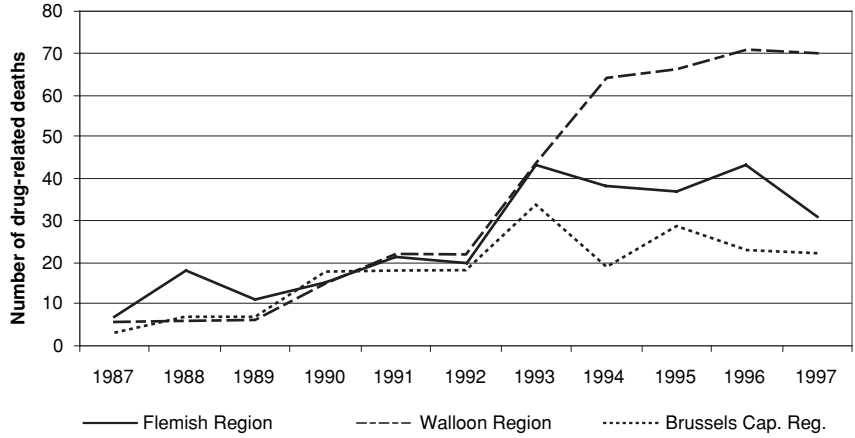


A high number of cases in the age group of people of 65 years or older can be observed. The number of deaths in this group seems disproportionate, considering the fact that the definition of drug-related deaths used in this study implies the involvement of illicit substances. It can be noticed that most of the deceased individuals of 65 years or older were females, and that 75 (81.5%) of them died because of "non-dependent abuse of drugs – other, mixed or unspecified[2]".

[2] In this case "other" means any drug, excluding alcohol, tobacco, cannabis, hallucinogens, barbiturates (and tranquillisers), morphine type drugs, cocaine type drugs, amphetamine type drugs and antidepressants.

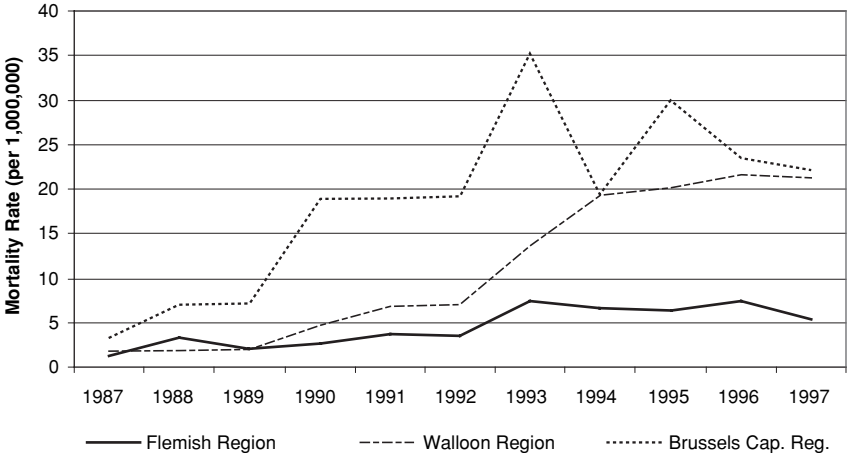
Up to 1992 the number of drug-related deaths rises equally among all three regions.

Figure 3. Number of drug-related deaths by region, 1987-1997 (n=873)



Around 1993 the number of drug-related deaths reached their highest level in the Flemish Region and the Brussels Capital Region. Drug-related mortality continues to rise in the Walloon Region. From 1993 onwards, the number of deaths in the Walloon Region becomes more important, claiming a larger share of the total number of drug-related deaths in Belgium. In 1990 around 30% of the drug-related deaths occurred in people of the Walloon Region, as opposed to 56.9% in 1997.

Figure 4. Age- and gender-adjusted mortality rates by region per 1,000,000 persons, 1987-1997 (n=873)



The age- and gender-adjusted drug-related mortality rate is highest in the Brussels Capital Region during all studied years (22.05 per 1,000,000), followed by the Walloon Region (21.18 per 1,000,000) and the Flemish Region (5.26 per 1,000,000). Note that the Brussels Capital Region has the smallest population and thus is more susceptible to erratic changes in mortality rates even due to relatively small changes in the actual number of drug-related deaths. These calculations are based upon figures of the midyear population.

The substance(s) involved in the decease is (are) known in 702 cases (78.9%)[3]. These deaths will be referred to as drug-related deaths "with a known toxicology". In the other cases, the drug(s) used is (are) either unknown or unspecified. Opiates are involved in (at least) 663 deaths (94.4%) among the aforementioned 702. The second most mentioned substance is cocaine, with 18 cases.

The causes of death can be divided roughly into five categories: drug dependence, nondependent abuse of drugs, accidental poisoning, suicide and self-inflicted poisoning and finally poisoning with undetermined intent. Until 1992 drug dependence accounts for 30-40% of the drug-related deaths. However, in 1993 drug dependence only accounted for 10% anymore. From 1993 onwards, accidental poisoning is the main cause of death, attributed to half of the drug-related deaths.

Multivariate analyses

The explanatory analyses are restricted to drug-related deaths observed in the age group 15-49 years old in order to eliminate the bias due to an unexpected high number of drug-related deaths observed among older women, by leaving out age categories with a too low or suspiciously high number of deaths (n=141) and cases with missing variables (n=17). Herefore, 732 drug-related deaths are analyzed.

For these analyses, the following variables are used: year, gender, age (group), region of residence, number of drug-related deaths, number of ill-defined cases and finally the population number (used as offset).

[3] Actually, to be even more correct, one should say "cases where the substances involved are known AND mentioned on the death certificate". For instance, when a physician concludes that a person has died of nondependent abuse of a mixture of e.g. cocaine and amphetamine type stimulants, the ICD-9 code on the death certificate would read 305.9 meaning "Nondependent abuse of drugs – other, mixed or unspecified". Drug-related deaths like these however cannot be counted as cases "with a known toxicology", simply because *we* cannot be sure that the physician actually identified the substance(s) involved in the decease, although he very well might have.

Using the Poisson regression (10), we construct a model describing the variation in the number of drug-related deaths. The final model found is:

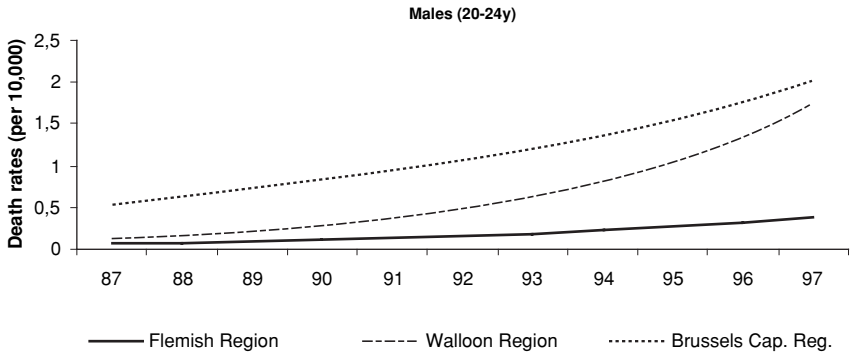
log(death rate) = year + gender + age group + region of residence + interaction (year * region of residence)

Almost every variable value contributes a significant effect to the number of drug-related deaths. The risk to die of a drug-related cause is five times lower in females than in males (0.21; 95% confidence interval 0.17-0.25) after removing the effect of the other significant variables. The age categories between 20 and 34 years old show a risk that is more than 4 times higher than the reference age group of 45-49 year olds. The relative risk is 6.41 for the age group 20-24 years old (95% CI 4.34-9.47), 5.93 (95% CI 4.02-8.75) for the age group 25-29 and 4.13 (95% CI 2.77-6.15) for the age group 30-34. The relative risks for the different regions are more complex due to the interaction in the secular trend. Taking 1987 as a reference year, on average the rate of yearly change is higher in the Walloon Region (factor of 1.30) than in both other regions (for the Flemish Region 1.20; for the Brussels Capital Region 1.14).

The impact of the region of residence on the number of drug-related deaths is also illustrated in figure 5 which shows the rates of drug-related deaths that are expected in each of the three regions, based upon the preceding Poisson regression model within the age group 20-24 years old. Among women the trend is similar, but with death rates about five times lower.

All expected rates of increase in drug-related deaths become higher throughout the years. However, the expected rate rises more quickly in

Figure 5. Expected values for males and females by region (per 10,000 people)



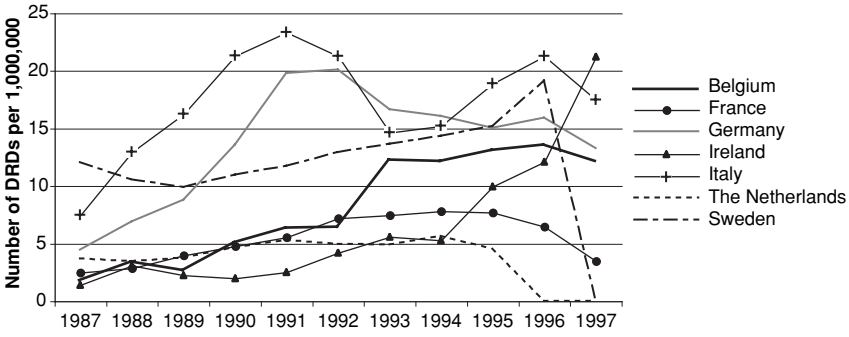
the Walloon Region. The Flemish Region and the Brussels Capital Region show a more steady rise.

Discussion

Comparison with other EU countries

Figure 6 provides a comparison of the Belgian data to the data of other EU countries. The data concerning these countries[4] were extracted using the EMCDDA's "Selection B" as well in order to ensure a comparibility as high as possible.

Figure 6. Comparison of the drug-related deaths rate among neighbouring EU countries by year (per 1,000,000 persons)



When comparing the relative number of drug-related deaths with other countries, we observe that Belgium mainly has similar rates as its neighbouring countries France and The Netherlands until 1992. The sudden rise that occurs in 1993 cannot be observed elsewhere: neither neighbouring nor the other presented EU countries show a similar rise in that year, suggesting the influence of factors specific to Belgium.

With most drug-related deaths occurring in people in their late twenties or thirties, the mean age of death is comparable to other EU countries (1).

Opiates are involved in the majority of drug-related deaths recorded in Belgium. Other substances included in the Selection B have only rarely been mentioned on the death certificates. This predominance of opiates is common throughout the EU, however in most countries to a lesser extent (1). Although the data are not particularly recent, the

[4] Source: data acquired from the REITOX network, through the EMCDDA.

absence of deaths through use of ecstasy or other amphetamine-type stimulants (MDMA, MDA, etc…) is noteworthy. This is among others due to the fact that Belgium is regarded as an important producer of these substances. Attention is also regularly drawn to the danger of these drugs by the Early Warning System (11), sending out alerts when especially dangerous and highly dosed samples are seized. In 2004, 15 warnings were sent, of which 12 concerned highly dosed MDMA tablets and one detection of 4-MTA[5]. Deaths due to ecstasy do happen however, as is confirmed by data of other countries, especially the UK, where ecstasy was found post mortem in 23% of traumatic accident deaths (12,13). It is possible that opiate-related deaths dominate the drug-related deaths data because the involvement of these substances in the deceased is more easily detected. The discrepancy with Belgian data suggests that the detection of involved substances could improve.

Nondependent abuse of drugs – other, mixed or unspecified

The definition of a "drug-related death" used in this report is based on the EMCDDA's "Selection B". However the code "nondependent abuse of drugs – other, mixed or unspecified" elicits some comments.

78.4% of all cases in this category (80 cases) concerns people aged 65 years or older. This type of drug-related death causes the disproportionate amount of drug-related deaths in the age category. Secondly, it seems that enough room for interpretation remains to use this code for deaths that do not concern illegal substances, but rather prescribed or nonprescribed medicines. The fact that this category of death applies mostly to people of 65 years or older in our database, only strenghtens this suspicion. It might be useful to examine if in other countries the same distribution of this type of drug-related death can be observed. If so, it could be recommended to exclude this code from the "Selection B" and move it to the broader "Selection C", since the latter does include pharmaceutical drugs, improving the validity of the instrument.

Quality of data

Throughout the years, the number of drug-related deaths seems to have increased, especially in the Walloon Region. However, the fact that the numbers increase does not necessarily mean that there are more drug-related deaths. An increase in the quality of data is possible as well (8). A range of ICD-9 codes could provide an indication of the efficiency or quality of certification: ICD-9 codes 780 through 799

[5] Source: data obtained from the Scientific Institute of Public Health.

represent “symptoms, signs and ill-defined conditions” (which will simply be referred to as “ill-defined cases”).

Generally speaking, in the years where more drug-related deaths took place, less ill-defined cases were reported. The rise in the number of drug-related deaths (+92%) occurring between 1992 and 1993 coincides with the largest decline in number of ill-defined cases (-38.5%). This could indicate an increase in certification quality.

This link between drug-related deaths and ill-defined cases seems to be the strongest for the Walloon Region. However, when the number of drug-related deaths that are “hidden” within the category of ill-defined cases (deaths that should have been coded as drug-related, though for some reason ended up as being coded as one of the ill-defined causes[6]) was estimated, we notice that the different trends between the regions disappear: the number of drug-related deaths remains higher in the Walloon Region, but the evolution is more homogenous in the three regions and changes less distinctly. Nevertheless, the question remains how a possible sudden rise in registration quality can be explained. This issue should be examined more thoroughly. Changes in coding practices could significantly affect the observed trends in mortality.

Conclusion

The sudden increase in the mortality rate from 1993 onwards is puzzling. One possible explanation, an improvement of the quality of death certification, raises the question how to explain the improvement in death certification quality. It might also be interesting to see if the data of 1998 onwards display the same trend or not, since they will be coded according to the ICD-10. Further research into these questions could prove insightful for the study of this matter.

It is regrettable that no other databases on drug-related deaths (at national level) are available. Additional, representative special registers could be useful to validate the general mortality register and possibly provide insight in coding practices. By trying to match the drug-related deaths from both types of registers, a better estimate could be made of the number of drug-related deaths that escape detection or are attributed a different cause in the general mortality register. This could shed more light on the quality of certification, and establish a data source with possibly more available variables like for instance risk behaviour and previous encounters with the judicial system (14). Cohort studies could also

[6] Numbers result from regression analyses.

provide more information on other influencing factors, like imprisonment or substitution treatment (15,16). Since such cohort studies span a certain time period, they could give a more dynamic view of the matter studied. Every year great effort is done to prevent and treat drug problems. Information on drug-related deaths is important to help direct prevention and treatment actions and draw attention to risk factors and trends.

Finally, it would be a real improvement if more recent data were available at national level. At the moment of writing, the NIS data delivery is six years behind due to problems at the level of the French-speaking Community. If research wants to support public policy, it should make sure that its results presented are based upon data as recent as possible.

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