overview

Drug-related deaths in Ireland, 1990–2002

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Jean Long and Ena Lynn, Health Research Board

Joseph Keating, Central Statistics Office

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Copies can be obtained from:

Administrative Assistant
Drug Misuse Research Division
Health Research Board
Holbrook House, Holles Street
Dublin 2
t (01) 6761176 ext 127
f (01) 6618567
e dmrd@hrb.ie

An electronic copy is available at: www.hrb.ie/ndc

Copies are retained in:
National Documentation Centre on Drug Use
Health Research Board
Holbrook House, Holles Street
Dublin 2
t (01) 6761176 ext 175
e ndc@hrb.ie

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The Overview series

This publication series from the Drug Misuse Research Division of the Health Research Board provides a comprehensive review of specific drug-related issues in Ireland. Each issue in the series will examine, in an objective and reliable manner, an aspect of the drugs phenomenon. It is envisaged that each issue will be used as a resource document by policy makers, service providers, researchers, community groups and others interested in the drugs area.

Drug Misuse Research Division

The Drug Misuse Research Division is a multi-disciplinary team of researchers and information specialists who provide objective, reliable and comparable information on the drug situation, its consequence and responses in Ireland. The Division maintains two national drug-related surveillance systems and is the national focal point for the European Monitoring Centre for Drugs and Drug Addiction. The Division also manages the National Documentation Centre on Drug Use. The Division disseminates research findings, information and news through its quarterly newsletter, Drugnet Ireland, and other publications. Through its activities, the Division aims to inform policy and practice in relation to drug use.

Health Research Board

The Health Research Board is a statutory body with a mission to improve health through research and information. The Board is responsible for promoting, commissioning and conducting medical, epidemiological and health services research in Ireland. The Health Research Board carries out these roles, and adds value, through competitive funding of health research, participation in health research and maintaining national research databases on disability, mental health and drug misuse.

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Acknowledgements

The authors would like to express sincere thanks to all those who contribute to the work of the Drug Misuse Research Divison. Without the ongoing support of staff at the General Mortality Register, the Central Statistics Office and Dublin City and County Coroners it would not be possible to collate this information. Their co-operation is very much appreciated and valued. We thank Dr Joe Barry, Dr Shane Butler, Dr Brian Farrell and Dr Hamish Sinclair for their helpful comments on earlier drafts of this paper. We would also like to thank Ms Joan Moore for editing the work.

This paper is dedicated to the late Mr Ray Byrne who completed an extensive review of opiate-related deaths using the Dublin City and County Coroners' records.

Table and figures

Abbreviations

CSO	Central Statistics Office
DMRD	Drug Misuse Research Division
DOHC	Department of Health and Children
EMCDDA	European Monitoring Centre for Drugs and Drug Addiction
GMR	General Mortality Register
HIPE scheme	Hospital In-Patient Enquiry scheme
HPSC	Health Protection Surveillance Centre
HRB	Health Research Board

Glossary

Incidence is a term used to describe the number of new cases of disease or events that develop among a population during a specified time interval. For example, in 2001, ten opiate users living in a specific county sought treatment for the first time. The incidence is the number of opiate cases divided by the population living in the county (say 31,182 persons in this example) expressed per given number of the population, i.e., per 100, per 1,000, per 10,000, etc.

> The calculation in this case is as follows: (10/31,182) x 10,000, which gives an incidence rate of 3.2 per 10,000 of the specific county population in 2001.

A **confidence interval** is the range of values (for example, proportions) in which the true value is likely to be found. By convention, a 95 per cent confidence interval is usually calculated, that is, the range of values will include the true value 95 per cent of the time.

Summary

Drug-related deaths in Ireland, 1990–2002

Summary

The data presented in this paper describe what is known about trends in drug-related deaths and deaths among drug users in Ireland between 1990 and 2002.

The current and potential sources of data in Ireland on drug-related deaths and deaths among drug users are described.

The analysis presented in this paper is based on data reported to the General Mortality Register (GMR) and on studies that extracted data from the coroners' records, the Central Treatment List, and the AIDS surveillance system, and on an epidemic investigation.

This paper will assist policy makers, service planners and public health practitioners to develop appropriate responses to the consequences of problem drug use.

The main findings and their implications are:

- Between 1990 and 1994, there was a small but steady increase in the number of drug-related deaths, from 7 to 19, reported by the GMR in Ireland. Between 1995 and 2000, there was a substantial increase in the number of drug-related deaths, from 43 to 119, and in 2001 there was a considerable decline (to 88) in the number of deaths. In 2002, the number of drug-related deaths increased marginally (to 91) when compared to 2001.

- According to data from the GMR, almost all drug-related deaths between 1991 and 1994 occurred in Dublin. Between 1995 and 2000, there was a substantial increase in drug-related deaths in Dublin, from 39 to 90; and there was a steady increase in drug-related deaths outside the Dublin area, from 4 to 29. In 2001, there was a sharp decrease in the number of drug-related deaths in Dublin (to 55)

and a continued increase in drug-related deaths outside Dublin (to 33 in 2001 and 35 in 2002). These data follow trends in treated problem opiate use.

- From 1998 to 2001, the annual numbers of opiate-related deaths extracted by Byrne (2001) from the Dublin coroners' records were consistently higher than those reported by the GMR. These variations may be related to differences in the definition of opiate-related deaths applied in each case. The GMR considers opiate-related deaths to be those occurring as a direct result of opiate use, while Byrne investigated all the coroners' cases that tested positive for opiate use and so included a broader range of opiate-related deaths.

- Following a review of the Dublin coroners' cases, Byrne reported that 13 per cent of drug-related deaths were associated with imprisonment or recent release from prison.

- According to both the GMR and Byrne's review of coroners' data, those who died as a result of drug use were older than their counterparts in treatment, indicating an increased risk with age. As expected, more men than women died.

- Opiate-related deaths account for the largest proportion of deaths among drug users in Ireland. The review of coroners' cases found that polysubstance use was common among drug users who had died.

- Injecting drug use was associated with infection and subsequent death.

- The number of drug-related deaths extracted from the GMR using the national definition differed slightly from those extracted using the EMCDDA definition (Selection B), but the trends over time were similar.

- Deaths as an indirect result of drug use are not systematically documented and have been assessed only in small-scale studies in

Dublin city and county. The findings of these studies indicate an underestimate in opiate-related deaths but provide little information on deaths as a result of other drugs. A system is required to document drug-related deaths and deaths among drug users.

- The document *Building on Experience: National Drugs Strategy 2001–2008* (Tourism, Sport and Recreation 2001: 118) identifies two actions necessary to estimate the excess mortality among those who misuse licit and illicit drugs. These actions are: first, to improve the quality and quantity of data collected at the time of death so as to increase the accuracy of the attributed cause of death; and second, to develop an accurate mechanism for recording the number of drug-related deaths in Ireland. This mechanism will include both drug-related deaths and deaths among drug users.

- Over the past number of years, the Department of Justice, Equality and Law Reform, the Department of Health and Children, the National Drugs Strategy Team and the Health Research Board (HRB), in conjunction with the Central Statistics Office (CSO) and the Coroner Service, have endeavoured to make this action a reality.

- In February 2005, the Department of Health and Children and the Department of Justice, Equality and Law Reform requested the Drug Misuse Research Division (DMRD) of the HRB to host a National Drug-Related Deaths Index.

Introduction

Drug-related deaths in Ireland, 1990–2002

Introduction

Problem drug use can lead to premature death. Deaths can occur as a result of overdose (both intentional and unintentional), actions taken under the influence of drugs, medical consequences and incidental causes. Drug-related deaths and deaths among drug users are indicators of the consequences of problem drug use in Ireland. Mortality trends allow us to monitor the impact of prevention, harm reduction, treatment and rehabilitation responses.

The European Monitoring Centre for Drugs and Drug Addiction (EMCDDA) identifies drug-related deaths and deaths among drug users as one of the five key indicators of drugs misuse in Europe. In each member state there is a focal point for the collation of indicator data; the focal point in Ireland is the Drug Misuse Research Division (DMRD) of the Health Research Board (HRB).

In the strategy document *Building on Experience: National Drugs Strategy 2001–2008* (Tourism, Sport and Recreation 2001: 118) the aspiration to make this indicator a reality in Ireland is contained in Action 67: 'To develop an accurate mechanism for recording the number of drug-related deaths in Ireland'. Over the past number of years, the Department of Justice, Equality and Law Reform, the Department of Health and Children and the HRB, in conjunction with the Central Statistics Office (CSO) and the Coroner Service, have endeavoured to put this action into effect.

At present it is difficult to ascertain the exact number of deaths among drug users in Ireland. The best estimate for Dublin ranges between 60 and 90 deaths per annum. However, the Family Support Network at Citywide has indicated to the National Drugs Strategy Team that these figures underestimate the extent of the problem.

Data sources

Drug-related deaths in Ireland, 1990–2002

Data sources

The current and potential data sources in Ireland on drug-related deaths and deaths among drug users are described below.

Central Statistics Office

Situation to date

In Ireland, the CSO collates data on drug-related deaths extracted from the General Mortality Register (GMR). The Registrar of Births, Deaths and Marriages formally records all notified deaths in each jurisdiction. Depending on the circumstances, deaths are notified by the Coroner Service, hospitals or general practitioners. In addition, if the Gardai are investigating a death on behalf of the Coroner Service, they provide supplementary information related to the death to the CSO. Using data from the GMR, the CSO then categorises the cause of each death using the World Health Organization (WHO) diagnostic coding manual on the international classification of diseases (known as ICD categories). The ninth revision of the ICD manual continues to be used in this country. In Ireland, the annual number of drug-related deaths is taken to be the aggregate total number of deaths recorded under the ICD–9 category 304, which relates to 'a death by drug dependence', plus those recorded under ICD 9 code 965.0, which refers to 'poisoning by opiates and related narcotics'. Using these definitions, the CSO extracts the numbers of drug-related deaths (along with demographic information) and provides them to the DMRD at the HRB. Staff at the DMRD analyse and report mortality data to the EMCDDA in a predetermined format. The current national definition of drug-related death differs from that recommended by the EMCDDA.

Situation recommended by the EMCDDA

At the European level, the EMCDDA (2002a) has developed a standardised method for extracting drug-related deaths from the GMRs in all member states. This standardised method selects certain drug-related death categories and is known as 'Selection B'. The broad diagnostic categories and codes included in 'Selection B' are: drug psychoses (292), drug dependence (304.0, 304.2-9), non-dependent drug abuse (305.2-3, 305.5-7, 305.9), accidental poisoning (E850.0, E850.8-9, E854.1-2, E855.2, E855.9, E853.2, E851, E852, and E858.8-9), suicide and self-inflicted poisoning (E950.0-5), and poisoning with intent undetermined (E980.0-5). The substances causing death must be specified. For GMRs using ICD-9, the number of poisoning deaths (E-codes) must be extracted in combination with nature of injury codes (N-codes). The EMCDDA recommends that its standardised method be introduced in Ireland from the publication of this paper onwards.

The GMR is one source of data on drug-related deaths. This paper presents a comparison between the numbers of, and trends in, drug-related deaths using Ireland's national definition and the EMCDDA's 'Selection B' method.

Coroner Service

The primary objective of the Coroner Service in Ireland is to establish, following public investigation, the cause of death (including how the person died) in cases of sudden or unexpected death (Working Group 2000). The coroners do not establish criminal or civil liability. A coroner must be either a registered medical practitioner (or be entitled to register as such) or a practising solicitor or barrister. All appointees must have five years' experience in their respective professions. In Ireland, a coroner has the same absolute privileges as a judge.

According to the review of the Coroner Service (2000), there are approximately 32,000 deaths in Ireland annually; of these, approximately 7,250 (23%) become coroners' cases, of which some 3,000 require post-mortems.

The coroner is informed of all reportable deaths. Reportable deaths are sudden and unexpected deaths. Homicides, suicides, deaths from unknown causes, and deaths during an operation are all examples of reportable deaths.

Once a death has been reported to the coroner, a cycle commences from which an exit can be made at different stages. The coroner makes an inquiry from which he can establish whether the cause of death and its circumstances were natural or inexplicable. If the cause is deemed natural, then the coroner issues a certificate to the Registrar of Births, Deaths and Marriages, who in turn issues the death certificate.

If the death is inexplicable, the coroner may order a post-mortem (autopsy) to establish the cause of death. A pathologist examines the body internally and externally to help determine the cause of death. Samples of body fluids are sent for toxicological examination and tissues or complete organs are sent for histological examination. This process can take a number of months. If, after post-mortem, the cause is deemed natural, then the coroner issues a certificate to the Registrar of Births, Deaths and Marriages, who in turn issues the death certificate. A temporary certificate can be issued in the interim.

If the death remains inexplicable following post-mortem, the coroner may order an inquest to establish the cause of death. An inquest must be held in the case of all deaths that occur in a violent or unnatural manner, or 'suddenly and from unknown causes'. The inquest is concerned with establishing the facts of the death, namely, when, where and how the death occurred. An inquest resembles a traditional court but its function is to establish the facts rather than to determine innocence or guilt. The

inquest delivers a verdict on the cause of death; among the options are: accidental, misadventure, suicide, open verdict, natural causes and unlawful killing. Following the verdict, the coroner issues a certificate to the Registrar of Births, Deaths and Marriages, who in turn issues the death certificate.

A number of authors (Ramsbottom and Harbison 1994; Keating *et al.* 1999; Byrne 2001; Ward and Barry 2001; Byrne 2002) examined the records of individuals who had a post-mortem showing a positive toxicological analysis of body fluids, and who died in the Dublin city and county area during a number of separate time periods. These studies identified all cases with a positive toxicological analysis of body fluids, whether or not this was the primary cause of death. The Coroner Service is an important source of data on drug-related deaths and deaths among drug users. This paper presents an overview of studies using data from the Coroner Service.

Central Treatment List

The Central Treatment List was established under Statutory Instrument No. 225 (Minister for Health and Children 1998) following the *Report of the Methadone Treatment Services Review Group 1998.* This list is administered by the Drug Treatment Centre Board on behalf of the Health Service Executive and is a complete register of all patients receiving methadone (for treatment of opiate misuse) in Ireland. When a person is considered suitable for methadone detoxification or maintenance, the prescribing doctor applies to the Central Treatment List for a place on the list and a unique number is allocated to each client. Therefore, each client can receive their methadone from one source only. Each client's' name, address, date of birth, gender, date commenced on methadone, type of methadone treatment, prescribing doctor and dispensing pharmacist are recorded on the Central Treatment List. The Central Treatment List is considered complete with respect to the number of clients who start or recommence methadone because practitioners have a statutory obligation

to report the initiation of treatment and, also, they are paid per client in treatment. Once on the list, there are transfer and exit forms for the Central Treatment List to track each client's current treatment status. One of the outcomes on the exit form is death; therefore, it is possible to use the Central Treatment List as a source to identify drug-related deaths and deaths among drug users. The number of exits from and transfers within the Central Treatment List has never been validated. As already mentioned, each client has a unique identifier so duplicates or transfers between treatment providers can be easily identified, but it is possible that a proportion of exits are not reported promptly, in particular those who drop out of treatment or die. For example, Cullen and colleagues (2001) were unable to locate 17 per cent of cases registered as attending methadone maintenance treatment in selected general practices in Dublin and on the Central Treatment List. More recently, nurses in the East Coast Health Authority area reported that, following an audit of their charts, their actual numbers in treatment between 2001 and 2003 were ten per cent less than the numbers on the Central Treatment List (A Tierney, personal communication, 2004). A retrospective cohort study of people who started methadone treatment between January 1994 and December 1997 was conducted to estimate the incidence of deaths among drug users (EMCDDA 2002b). This is a source of data on drug-related deaths and deaths among drug users. This paper presents an overview of the main findings from this study.

AIDS surveillance system

AIDS reporting in Ireland is a voluntary system. When an individual develops AIDS, the clinician completes an anonymised AIDS surveillance form. The form is then sent to the regional AIDS co-ordinator in the relevant Health Service Executice Area, who, in the past, forwarded this to the national AIDS co-ordinator in the Department of Health and Children (DOHC). Every six months, a summary of AIDS surveillance information was published nationally and was notified to the European Centre for the Epidemiological Surveillance of AIDS. In November 2000, the Health

Protection Surveillance Centre (HPSC) assumed responsibility for national AIDS surveillance from the DOHC. This is a source of data on drug-related deaths and deaths among drug users. Data on the incidence of AIDS and deaths among those with AIDS are published every six months, but the number of drug users who died has not been consistently reported since 1999. This paper presents an overview of published data (O'Donnell *et al.* 2000; National Disease Surveillance Centre 2001, 2002, 2003).

Epidemic investigation

In Ireland an unexpected rise in the number of, or an unusual occurrence of, new cases of an infectious disease are investigated routinely by the relevant public health department in collaboration with the HPSC. Mullen *et al*. (2002) published a case-control study that investigated an outbreak of *Clostridium Novyi* (an anaerobic organism) among heroin users living in Dublin.

Hospital In-Patient Enquiry (HIPE) scheme

The Economic and Social Research Institute manages the Hospital In-Patient Enquiry (HIPE) scheme in Ireland. The scheme is a computer-based health information system designed to collect clinical and administrative data on discharges and deaths from acute public hospitals. Each HIPE discharge record represents one episode of care; patients may be admitted to hospital(s) more than once with the same or different diagnoses. The records therefore facilitate analyses of hospital activity rather than incidence of disease. All discharges from acute hospitals are coded using ICD–9 classification (WHO 1977). Over 60 acute public hospitals participate in the scheme. Casualty and outpatient data are not collected. The estimated coverage of all cases discharged from acute hospitals in the HIPE scheme was approximately 95 per cent between 1996 and 2000. Those who died with a history of drug dependence could be abstracted from this database. This is a source of data on drug-related deaths and deaths among drug users. This data source has never been used to

examine the incidence of drug-related deaths or deaths among drug users in acute hospitals.

Analysis of data and information

Drug-related deaths in Ireland, 1990–2002

Analysis of data and information

The analysis presented in this paper is based on data reported to the GMR and studies that extracted data from the Coroner Service, the Central Treatment List and the AIDS surveillance system, and on an epidemic investigation.

Direct drug-related deaths

In Ireland, the CSO compiles the GMR's official statistics on direct drug-related deaths each year.

The CSO categorises the cause of each death using the World Health Organization (WHO) diagnostic coding manual on the international classification of diseases (known as ICD categories). The ninth revision of this manual continues to be used in this country.

In Ireland, the national definition for drug-related deaths consists of categories 304 (0-9) and 965.0 (see Data sources). At the European level, the EMCDDA (2002a) has developed a standardised method that selects a number of diagnostic categories and is known as 'Selection B' (see Data sources).

Table 1 presents the number of direct drug-related deaths, by cause of death, in Ireland from 1990 to 2002, using the national (Ireland) and European (EMCDDA Selection B) definitions. The differences between the total numbers of drug-related deaths extracted using the European definition compared to total numbers extracted using the national definition are due to a number of factors. Using the European definition, the numbers of cases each year in the drug dependence category are lower than the numbers extracted using the national definition; this is explained by the exclusion of barbiturate-type drugs from the European definition. For the European definition, the poisoning categories include a larger number of codes to extract cases than the number of codes used to

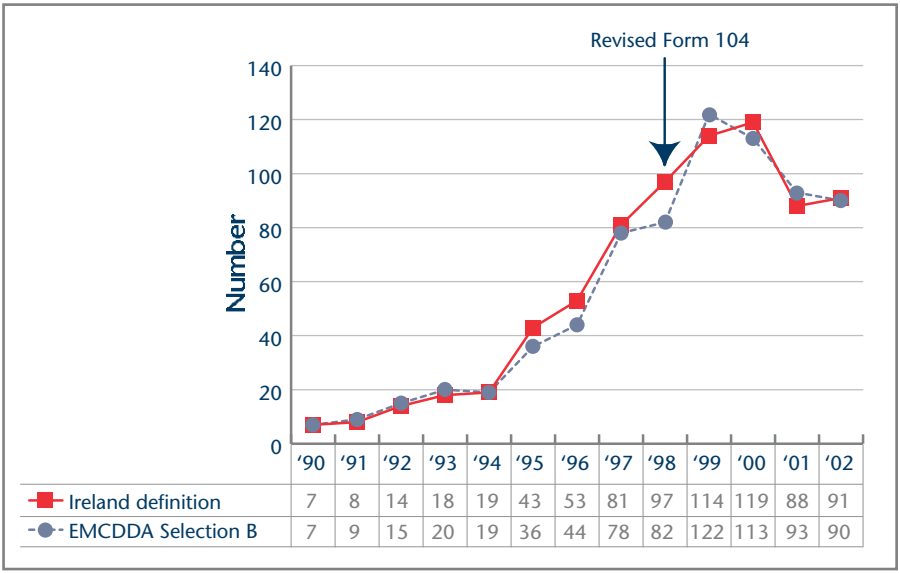
Table 1 Number of direct drug-related deaths in Ireland, by cause of death by national and by European definition, reported by the CSO, 1990 to 2002 (unpublished data from the vital statistics)

Definition	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002
Ireland													
Drug dependence*	4	5	13	13	15	38	42	69	91	99	102	72	67
Poisoning by opiates and related narcotics	3	3	1	5	4	5	11	12	6	15	17	16	24
Total	7	8	14	18	19	43	53	81	97	114	119	88	91
EMCDDA Selection B													
Drug psychosis	0	0	0	1	0	0	0	0	0	0	0	0	0
Drug dependence†	4	5	13	12	15	28	30	58	75	98	90	62	54
Non- dependent abuse of drugs	0	0	0	1	0	0	0	1	0	3	5	12	9
Accidental poisoning	2	4	2	5	3	8	12	18	5	12	9	11	20
Suicide and self-inflicted poisoning	1	0	0	1	1	0	2	1	2	9	9	8	7
Total	7	9	15	20	19	36	44	78	82	122	113	93	90

* Includes barbiturate-type drugs
† Excludes barbiturate-type drugs

extract cases for the national definition and, therefore, the numbers of cases extracted under the poisoning categories are higher when using the European definition than when using the national definition. Non-dependent abuse of drugs and drug psychosis are additional categories included in the European definition, which are not included in the national definition.

Figure 1 presents the number of direct drug-related deaths in Ireland from 1990 to 2002 by national and European definitions. When the numbers extracted using the European definition were compared to those extracted using the national definition, the numbers of drug-related deaths were lower using the European criteria between 1995 and 1998, while the numbers were higher in 1999 and 2001, but the differences were small and the trend over time was the same. Between 1990 and 1994, there was



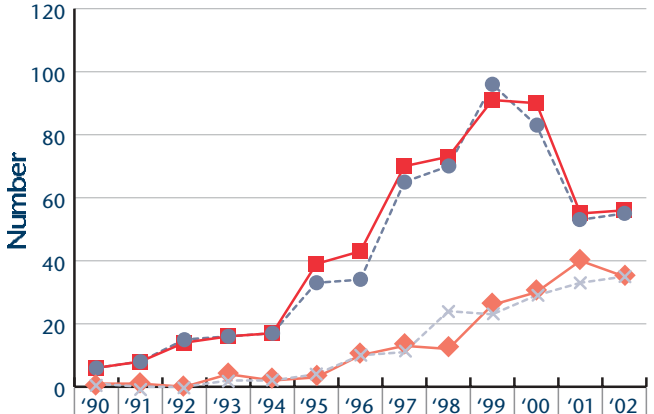
	'90	'91	'92	'93	'94	'95	'96	'97	'98	'99	'00	'01	'02
Ireland definition	7	8	14	18	19	43	53	81	97	114	119	88	91
EMCDDA Selection B	7	9	15	20	19	36	44	78	82	122	113	93	90

Figure 1 Number of direct drug-related deaths in Ireland, by national and by European definition, reported by the CSO, 1990 to 2002 (unpublished data from the vital statistics)

a small but steady increase in the number of drug-related deaths. Between 1995 and 2000, there was a substantial increase in the number of drug-related deaths and in 2001 there was a considerable decline in the number of deaths. In 2002, the number of drug-related deaths increased marginally when compared to 2001.

It has been reported that improved coding was one factor that accounted for the increase in drug-related deaths recorded between 1992 and 2000, but further investigation of the situation would not support this view. The main recording change was the introduction of a revised version of Form 104 in 1998. In the ideal situation, the coroner's verdict includes a medical diagnosis and the circumstances under which the death occurred. A small number of coroners outside the Dublin area do not currently include details of the circumstances under which the death occurred (B Farrell, personal communication, 2005). According to the Coroner Service, the data primarily affected by this omission related to suicide. In order to address this problem, in 1998 Form 104 was revised by the CSO for completion by the Garda Síochána after the inquest. This was done to supplement a coroner's conclusion when it included a medical diagnosis but did not record details of the circumstances under which the death occurred. Officials at the Coroner Service reported that this would have had little effect on the total number of drug-related deaths (B Farrell, personal communication, 2005). Data presenting trends in treated problem drug use (in particular treated problem opiate use), which are an indirect indicator of problem drug use in the wider community, demonstrate that the trend in drug-related deaths observed in Ireland follows that of new opiate cases seeking treatment for problem drug use, which is an indirect indicator of problem drug use in a community.

Figure 2 presents the number of direct drug-related deaths in Dublin and the rest of Ireland from 1990 to 2002 by national and European definitions. According to data from the GMR, almost all drug-related deaths between 1991 and 1994 occurred in Dublin. Between 1995 and 2000, there was a substantial increase in drug-related deaths in Dublin,

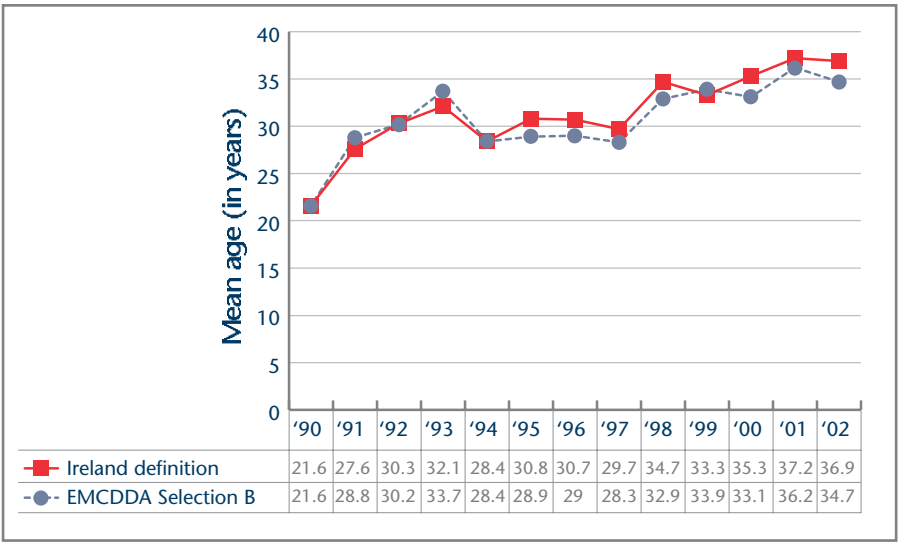


	'90	'91	'92	'93	'94	'95	'96	'97	'98	'99	'00	'01	'02
Dublin – Ireland definition	6	8	14	16	17	39	43	70	73	91	90	55	56
Dublin – EMCDDA Selection B	6	8	15	16	17	33	34	65	70	96	83	53	55
Outside Dublin – Ireland definition	1	0	0	2	2	4	10	11	24	23	29	33	35
Outside Dublin – EMCDDA Selection B	1	1	0	4	2	3	10	13	12	26	30	40	35

Figure 2 Number of direct drug-related deaths in Ireland, by national and by European definition and by place of death, reported by the CSO, 1990 to 2002 (unpublished data from the vital statistics)

from 39 to 90; and there was a steady increase in drug-related deaths outside the Dublin area, from 4 to 29. In 2001, there was a sharp decrease in the number of drug-related deaths in Dublin (to 55) and a continued increase in drug-related deaths outside Dublin (to 33 in 2001 and 35 in 2002). These data follow trends in treated problem opiate use.

Figure 3 presents the average age of cases of direct drug-related death between 1990 and 2002, by national and by European definition. When the average age of death for those who died as a result of a direct drug-related incident using the European definition was compared to the

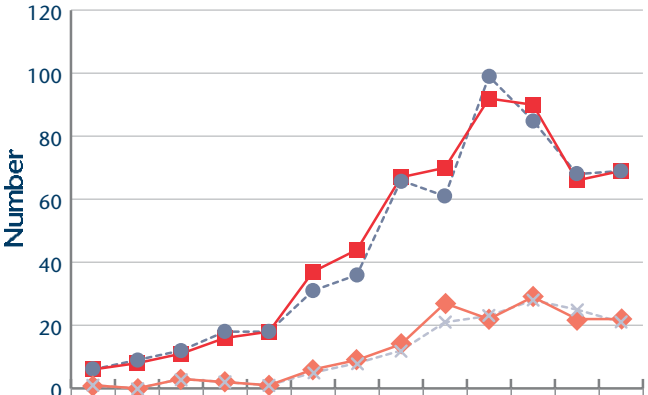


	'90	'91	'92	'93	'94	'95	'96	'97	'98	'99	'00	'01	'02
Ireland definition	21.6	27.6	30.3	32.1	28.4	30.8	30.7	29.7	34.7	33.3	35.3	37.2	36.9
EMCDDA Selection B	21.6	28.8	30.2	33.7	28.4	28.9	29	28.3	32.9	33.9	33.1	36.2	34.7

Figure 3 Average age of cases of direct drug-related death in Ireland, by national and by European definition, reported by the CSO, 1990 to 2002 (unpublished data from the vital statistics)

average age using the national definition, the average at death was lower using the European definition between 1994 and 2002, but the trend over time was the same. Between 1990 and 2001, the average age of cases who died as a result of a direct drug-related incident increased steadily, from just under 22 years to around 37 years. This was higher than the average age of those treated for problem drug use and indicates a higher risk of death among older drug users.

Figure 4 presents the number of direct drug-related deaths, by gender, reported from 1990 to 2002 using national and European definitions. When the numbers of males extracted using the European definition were compared to those extracted using the national definition, the numbers of drug-related deaths among men were lower using the European definition in 1996 and 1997, while the numbers were higher in 1999 and 2001, but the differences were small. When the numbers of females extracted using

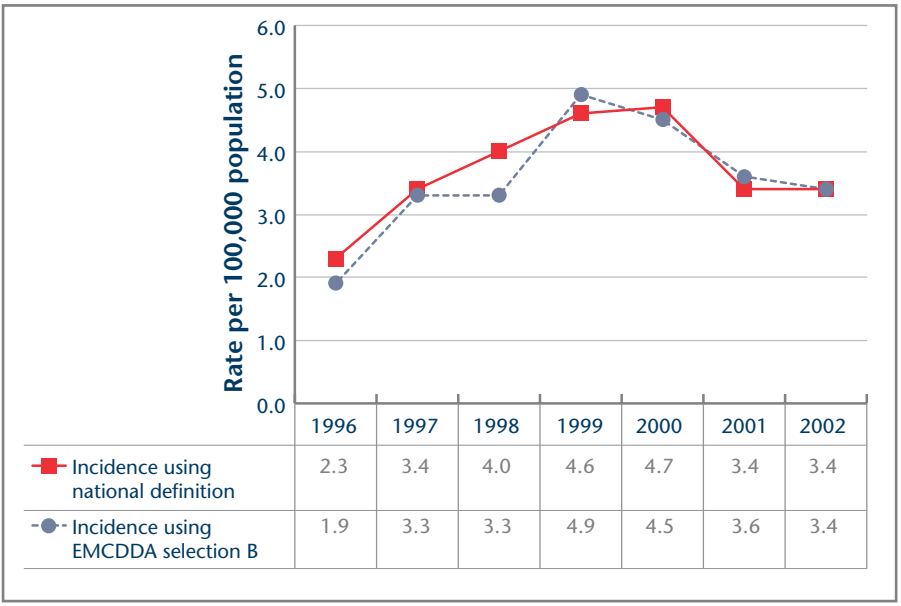


	'90	'91	'92	'93	'94	'95	'96	'97	'98	'99	'00	'01	'02
Male – Ireland definition	6	8	11	16	18	37	44	67	70	92	90	66	69
Male – EMCDDA Selection B	6	9	12	18	18	31	36	66	61	99	85	68	69
Female – Ireland definition	1	0	3	2	1	6	9	14	27	22	29	22	22
Female – EMCDDA definition	1	0	3	2	1	5	8	12	21	23	28	25	21

Figure 4 Gender of direct drug-related deaths in Ireland, by national and by European definition, reported by the CSO, 1990 to 2002 (unpublished data from the vital statistics)

the European definition were compared to those extracted using the national definition, the numbers of drug-related deaths among women were similar, except in 1998, when the number extracted using the European definition was lower. The vast majority of drug-related deaths occur in men, which is not surprising since the vast majority of drug users are men. Of note, there was a steady increase in the number of drug-related deaths in women between 1994 and 2000 and a levelling off in 2001 and 2002. The number of drug-related deaths in males increased steadily between 1990 and 1993, and more dramatically between 1994 and 1999; and between 2000 and 2001 there was a sharp decrease in the number of men who died.

Figure 5 presents the incidence of direct drug-related deaths between 1996 and 2002 per 100,000 population aged between 15 and 64 years, using the national and European definitions. Though the incidence by each definition varies slightly each year, the incidence curve follows a similar trend. The incidence of drug-related deaths per 100,000 of the population aged between 15 and 64 years doubled between 1996 and 2000, but decreased sharply in 2001 and in 2002 remained similar to 2001.



	1996	1997	1998	1999	2000	2001	2002
Incidence using national definition	2.3	3.4	4.0	4.6	4.7	3.4	3.4
Incidence using EMCDDA selection B	1.9	3.3	3.3	4.9	4.5	3.6	3.4

Figure 5 Incidence of direct drug-related deaths in Ireland per 100,000 population aged between 15 and 64 years, by national and by European definition, 1996 to 2002 (CSO 2002)

Findings of ad hoc studies on direct and indirect drug-related deaths

This section presents the findings of a number of independent studies examining drug-related deaths and deaths among drug users.

Coroner Service

Deaths as a direct result of drug use are systematically documented by the GMR, but this has limitations. Deaths as an indirect result of drug use are not systematically documented and have been assessed only in small scale-studies in Dublin city and county.

In the mid to late nineties, Dublin was the epicentre of the opiate epidemic in Ireland and the number of cases who tested positive for opiates investigated by the Dublin City and County Coroners increased from 77 in 1998 to 91 in 2000, and decreased in 2001 to 78.

Ramsbottom and Harbison (1994) examined the records of individuals who had a post-mortem showing a positive toxicological analysis of body fluids and who died between January 1992 and December 1992 in the Dublin city and county area. In total, there were 68 cases that fulfilled the criteria, 32 per cent of whom were known drug users. Of the 68 deaths, three (4%) died from incidental causes; 49 (72%) as a result of intoxication; 15 (22%) had committed suicide; and one (1.5%) was accidental. In the case of the 65 who died directly as a result of their drug consumption, tranquillisers (48, 74%) and alcohol (28, 43%) were the most common detected drugs during toxicological analysis. The authors reported that tricyclic antidepressants and morphine were also common, but did not provide any data to support this statement.

Using the same methods, Keating *et al.* (1999) examined the records of individuals who died between January 1997 and December 1997 in the Dublin city and county area. In total, 120 cases had a positive toxicological analysis of body fluids. Of the 120 cases, 75 per cent were men. The

average age of the men was 30 years; that of the women was 42 years. Of all cases investigated, 54 per cent were known habitual drug users. Habitual drug users were younger than non-habitual drug users. For example, the mean age at death for male habitual drug users was 26 years and for male non-habitual drug users was 36 years. Overall, the results indicate that polydrug use was common, 50 cases tested positive for two or three drugs. Of the 120 cases reviewed, 27 tested positive for heroin, of whom all tested positive for benzodiazepines and 15 (56%) tested positive for alcohol.

Between January 1998 and December 2001, the Dublin City and County Coroners' Office investigated 332 opiate-related deaths in Dublin (Figure 6). Byrne (2002) collated and analysed this data. Over the four years, more than two-thirds (65%, 224/342) of those who died were between 15 and 34 years old and the majority (87%) were men. Fifty-six per cent were alone when they died. Over half died in their homes and 16 per cent died in a public space. Thirty-two (13%) of those who died were either in prison (6) or had just been released from prison (26), denoting a high-risk period (Byrne 2001).

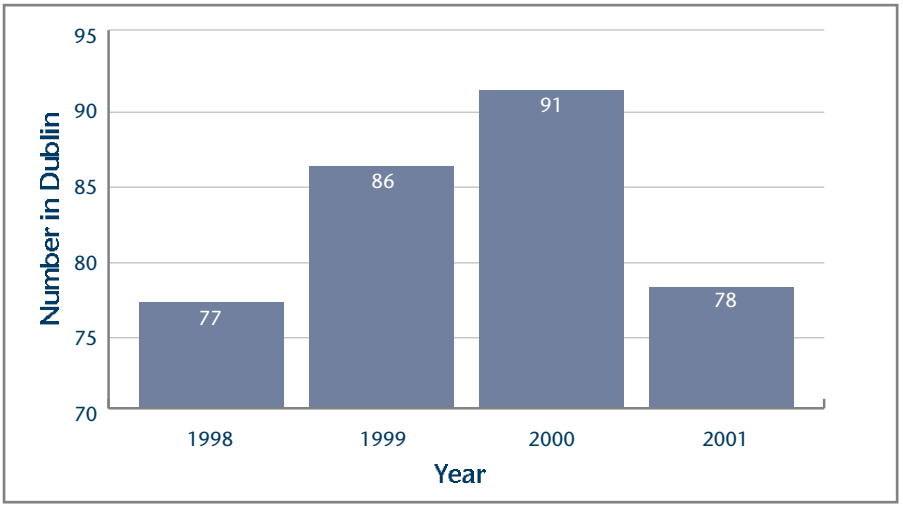


Figure 6 Numbers of opiate-related deaths recorded by the Dublin coroners, 1998 to 2001 (adapted from Byrne 2002)

Between 1998 and 2001, just over 90 per cent (300/332) of the coroners' cases resided in the local drugs task force areas. Opiate-related death rates were calculated using the 2002 census population for each task force area (Figure 7). The Ballymun, Ballyfermot, and Canal Communities task force areas had the higher rates of opiate-related deaths for the reporting period, approximately 16 times the rate experienced in areas of Dublin not designated as task force areas. Both the North and South Inner City had opiate-related death rates over seven times the rate experienced in areas of

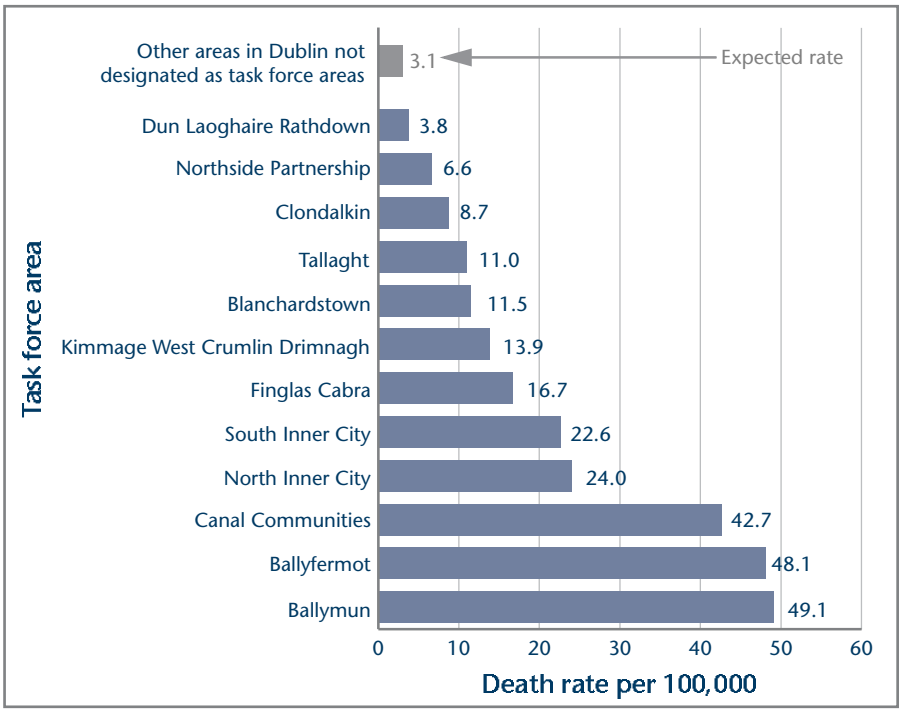
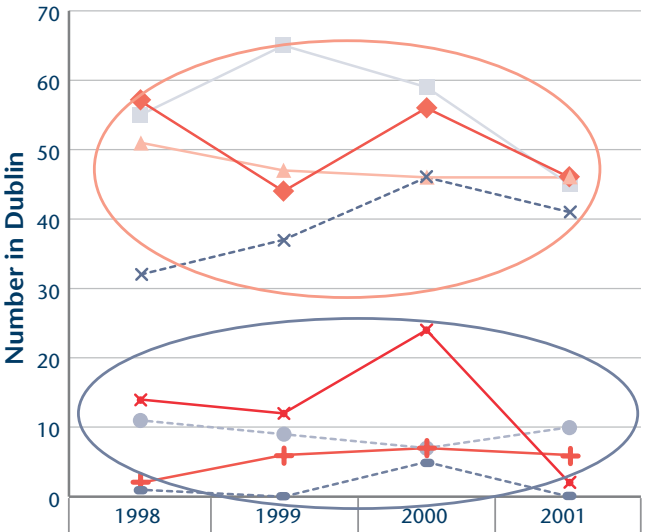


Figure 7 Average annual rate of opiate-related deaths in each Dublin-based local drugs task force area compared to other areas of Dublin, per 100,000 of the 15 to 64-year-old population using Dublin coroners' records, 1998 to 2001 (numerators adapted from Byrne 2002; denominators from Census 2002, Volume 1)

Dublin not designated as task force areas. Dun Laoghaire–Rathdown had an opiate-related death rate approximating the rate experienced in areas of Dublin not designated as task force areas.



	1998	1999	2000	2001
Heroin	57	44	56	48
Benzodiazepines	55	65	59	45
Methadone	51	47	46	46
Alcohol	32	37	46	41
Cannabis	14	12	24	0
Antidepressants	11	9	7	10
Cocaine	2	6	7	6
Ecstasy	1	0	5	2

Figure 8 Drugs (including opiates) implicated in opiate-related deaths recorded by the Dublin coroners, 1998 to 2001 (adapted from Byrne 2001)

Two-thirds of the opiate users who died tested positive for three or more drugs, while just over 11 per cent tested positive for one drug (Byrne

2001). The drugs most frequently detected were benzodiazepines (68%) heroin (62%), methadone (57%), alcohol (47%) cannabis (20%) antidepressants (11%) and cocaine (6%) (Figure 8). Among the eight drugs most commonly implicated in drug-related deaths, two distinct patterns were observed: benzodiazepines, opiates (heroin and methadone), and alcohol were by far the most common substances implicated in these deaths, while cannabis, antidepressants, and stimulants (ecstasy and cocaine) were less commonly implicated.

Using the same source as Byrne, Ward and Barry (2001) determined that there were 84 opiate-related deaths in 1999 and that 45 (54%) were methadone-related deaths. Of the methadone-related deaths, 15 (33%) were receiving methadone according to prescribed guidelines.

Agreement between the CSO and Dublin City and County Coroners' Office

From 1998 to 2001, the annual numbers of opiate-related deaths extracted by Byrne (2001) from the Dublin Coroners' records were consistently higher than those reported by the GMR. These variations may be related to differences in the definition of opiate-related deaths applied in each case. The GMR considers opiate-related deaths to be those occurring as a direct result of opiate use, while Byrne investigated all the coroners' cases that tested positive for opiate use and so included a broader range of opiate-related deaths.

Kelly *et al.* (2002) estimated the number of opiate users in Ireland in 2000 using a capture–recapture study methodology involving subjects contained in three national databases. The authors reported that there was an estimated 12,456 (95% confidence interval 11,519 to 13,711) opiate users in Dublin in 2001. Using these estimates and data from Dublin City and County Coroners' Office, the estimated opiate-related death rate among the opiate-using population was 64 per 10,000 (95% confidence interval 58 to 69) in 2001.

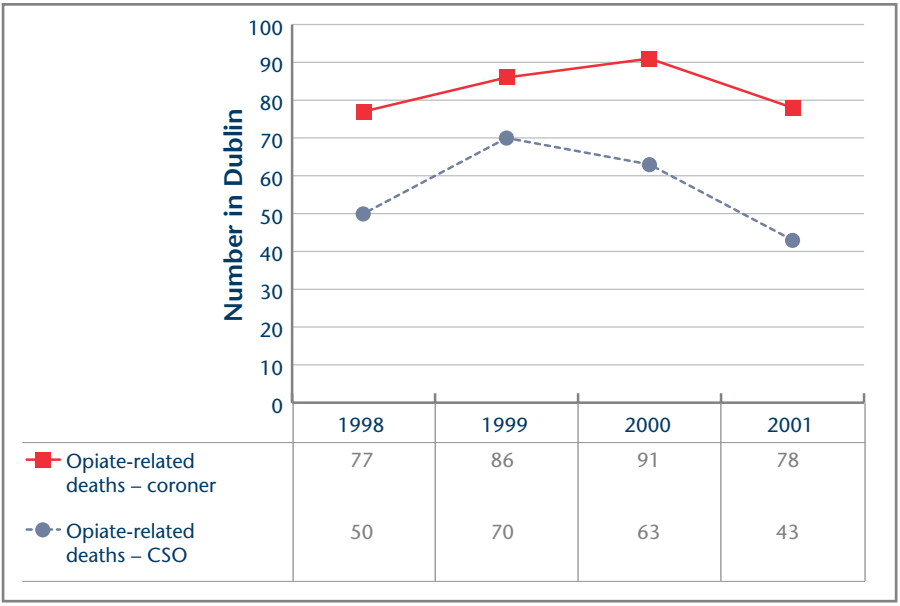


Figure 9 Numbers of opiate-related deaths reported to the Dublin coroners (adapted from Byrne 2001; Byrne 2002) and to the CSO (unpublished data from the vital statistics), 1998 to 2001

Central Treatment List

A retrospective longitudinal cohort study of people who started methadone treatment between January 1994 and December 1997 was conducted to estimate mortality among drug users (EMCDDA 2002b). The Central Treatment List was the data source used for this study. During the recruitment period, 5,283 individuals commenced methadone treatment and were recruited to participate in the study. Of these, 3,909 (74%) were alive at the end of 1997; 113 (2%) had died between recruitment and the end of 1997. At the end of the study, 1,261 (24%) could not be located; this high loss to follow-up could bias the results. The overall death rate was 13.9 per 1,000 person years, and was higher in males (15.8) than in

females (9.4). The death rate, expressed per 1,000 person years, was 11.0 in 1994, 13.2 in 1995 (J Vincente, personal communication, 2003), 16.1 in 1996 and 9.6 in 1997. As the incidence measure is person years rather than a cumulative rate over a period of time, it is not possible to compare the findings of this study with other studies in Ireland. Data were not presented on cause of death but further analysis is pending (J Barry, personal communication, 2004).

Deaths as a result of infectious diseases

Of the 729 AIDS cases between 1983 and 2001, 373 died (O'Donnell *et al.* 2000; National Disease Surveillance Centre 2001, 2002, 2003). Of the 292 cases who had injecting drug use as a risk factor between 1983 and 1999, 166 (57%) died. The proportion of injecting drug users diagnosed with AIDS who died was higher than both the proportion of heterosexuals (38%) and the proportion of men who have sex with men (49%). This indicates a probable lower survival rate among injecting drug users with HIV compared to counterparts with other risk practices. The data on deaths by risk group have not been updated since 1999.

Mullen *et al.* (2002) investigated an outbreak of *Clostridium Novyi* (an anaerobic organism) among heroin users living in Dublin using a case-control study design. Between 29 April and 26 June 2000 there were 22 cases, of whom eight (36%) died. The illness was characterised by soft tissue inflammation at the injection site, low blood pressure and circulatory collapse. After controlling for confounding factors, it was found that drug users who injected into the muscle were 27 times more likely to develop symptomatic illness than those who injected via another route (such as, intravenous or subcutaneous). Injecting into the muscle is usually done when venous access is difficult because of scarring of veins from repeated use. The authors caution that if bacterial spores are contained in the heroin, then needle-exchange programmes cannot prevent such infections.

Conclusions

Drug-related deaths in Ireland, 1990–2002

Conclusions

In Ireland, the number of direct drug-related deaths increased substantially between 1994 and 2000 and decreased in 2001. Most of these deaths occurred in Dublin but there was a steady increase in the number of deaths outside Dublin. Those who died as a result of drug use were older than their counterparts in treatment. As expected, more men than women died. Opiate-related deaths accounted for the largest proportion of deaths among drug users. Polysubstance use was associated with deaths among drug users. Injecting drug use was associated with infection and subsequent death. Following a review of coroners' cases, Byrne reported that 13 per cent of drug-related deaths occurred in prison or within a short time after release from prison. Overdose prevention interventions using international and national experience and evidence are required.

The number of drug-related deaths extracted using the national definition and the EMCDDA definition (Selection B) differed slightly but the trends over time were similar.

Deaths as an indirect result of drug use are not systematically documented and have been assessed only in small-scale studies in Dublin city and county. The findings of these studies indicate an underestimate in opiate-related deaths but provide little information on other drug-related deaths. A system is required to document drug-related deaths and deaths among drug users.

The document *Building on Experience: National Drugs Strategy 2001–2008* (Tourism, Sport and Recreation 2001: 118) identifies two actions necessary to estimate the excess mortality among those who misuse licit and illicit drugs. These actions are: first, to improve the quality and quantity of data collected at the time of death so as to increase the accuracy of the attributed cause of death; and second, to develop an accurate mechanism for recording the number of drug-related deaths in Ireland.

This mechanism will include both drug-related deaths and deaths among drug users. Over the past number of years, the Department of Justice, Equality and Law Reform, the Department of Health and Children, the National Drugs Strategy Team and the HRB, in conjunction with the CSO and the Coroner Service, have endeavoured to make this action a reality. In February 2005, the Department of Health and Children and the Department of Justice, Equality and Law Reform requested the DMRD of the HRB to host a National Drug-Related Deaths Index.

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Authors' contact details

Jean Long
Senior Researcher
Drug Misuse Research Division
Health Research Board
Holbrook House
Holles Street
Dublin 2
t (01) 6761176 ext 127
f (01) 6618567
e jlong@hrb.ie

Ena Lynn
Research Officer
Drug Misuse Research Division
Health Research Board
Holbrook House
Holles Street
Dublin 2
t (01) 6761176 ext 127
f (01) 6618567
e elynn@hrb.ie

Joseph Keating
Vital Statistics
Central Statistics Office
Skehard Road
Cork
t (021) 453 5046
f (021) 453 5555