

Drug-related deaths – a problematic definition

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June 1-2, 2006

A problematic definition

Drug Related Deaths (DRD)

An important public health problem

- The deaths mainly affects young people
- DRD is a leading cause of death among young age groups in many countries
- The deaths are "unnecessary" and preventable
- The number of DRD is regarded as the best estimator of the magnitude of the illicit drug problem in a society

Which drugs are included in DRD?

- Various opinions about what to include – e.g. dextropropoxyfen, methadone, bensodiazepines or anabolic steroids
- In the studies presented here only illicit drugs as heroin, amphetamine, cocaine, cannabis, LSD and some synthetic analogues are included

Definition of drug-related deaths

- Deaths which should not occurred if the subject was not under influence of illicit drugs or a long term misuser
- Both sudden deaths in connection with injection and intoxication, accidents, suicides and HIV and other infections in connection with drug use were included

How is the information obtained about DRD in Europe?

- A cause-of-death investigation is made, and a death certificate is issued – the extent of the investigation varies among the European countries
- A death certificate is sent to the national authority in charge of cause-of-death statistics
- The information on causes of death is coded according to the ICD-rules (International classification of diseases); each case gets one or more ICD-codes
 - There are great variations between European countries regarding what information is possible to obtain when the cause of death is coded

Where is it possible to find information about DRD?

- All European countries have **General Mortality Registers** (GMR) which cover 90-99% of all deaths
 - EMCDDA (European Monitoring Centre for Drugs and Drug Addiction) provides a selection of ICD-codes which classify a death as drug-related. There are also national classifications.
- In some countries there are **Special registers** on drug-related deaths based on forensic medical investigations

Special register based on forensic medical investigations

- In Sweden and Finland all acute drug related deaths undergo forensic medical investigation, which includes an examination of the dead body, a toxicological investigation and a description of the circumstances around the death
- The toxicological investigation includes illicit drugs, prescribed drugs and alcohol
- The frequency of forensic investigations varies among European countries. In the Netherlands this type of investigation is only performed when a crime is suspected, in Sweden and Finland it is made in most cases of unnatural death

Which type of register gives the most relevant information?

- **Special registers** based on forensic medical data often give better information about the single cases of death
- This information can be used a tool for prevention
- The information can be obtained soon after the death

- **General mortality registers** which cover the whole country often give better information on drug-related mortality trends
- However, there is little information about the single deaths. It is difficult to distinguish between legally prescribed drugs and illicit drugs and the precision is low

Is it possible to investigate all drug related deaths?

- It is difficult to do this as a routine procedure
- There are a number of different substances which are related to death in various ways
- Special registers do not cover deaths with a considerable time lag i.e. AIDS and Hepatitis
- A total investigation of drug related deaths can probably only be made as a research project during a limited time period and geographical area

Study 1

Causes of death in relation to different illicit drugs

The Stockholm register

- an attempt to make a total investigation
- All known drug-related deaths in the Stockholm area 1985-1996 were investigated
- Objectives:
 - Increase the knowledge of risk situation and causes of death in relation to different drugs
 - Study the trends drug-related mortality and causes of death over time
 - Evaluate the Swedish GMR by studying how many of the deaths got a diagnose related to drug-related causes in the official statistics
 - Estimate the total number of drug-related deaths in the region

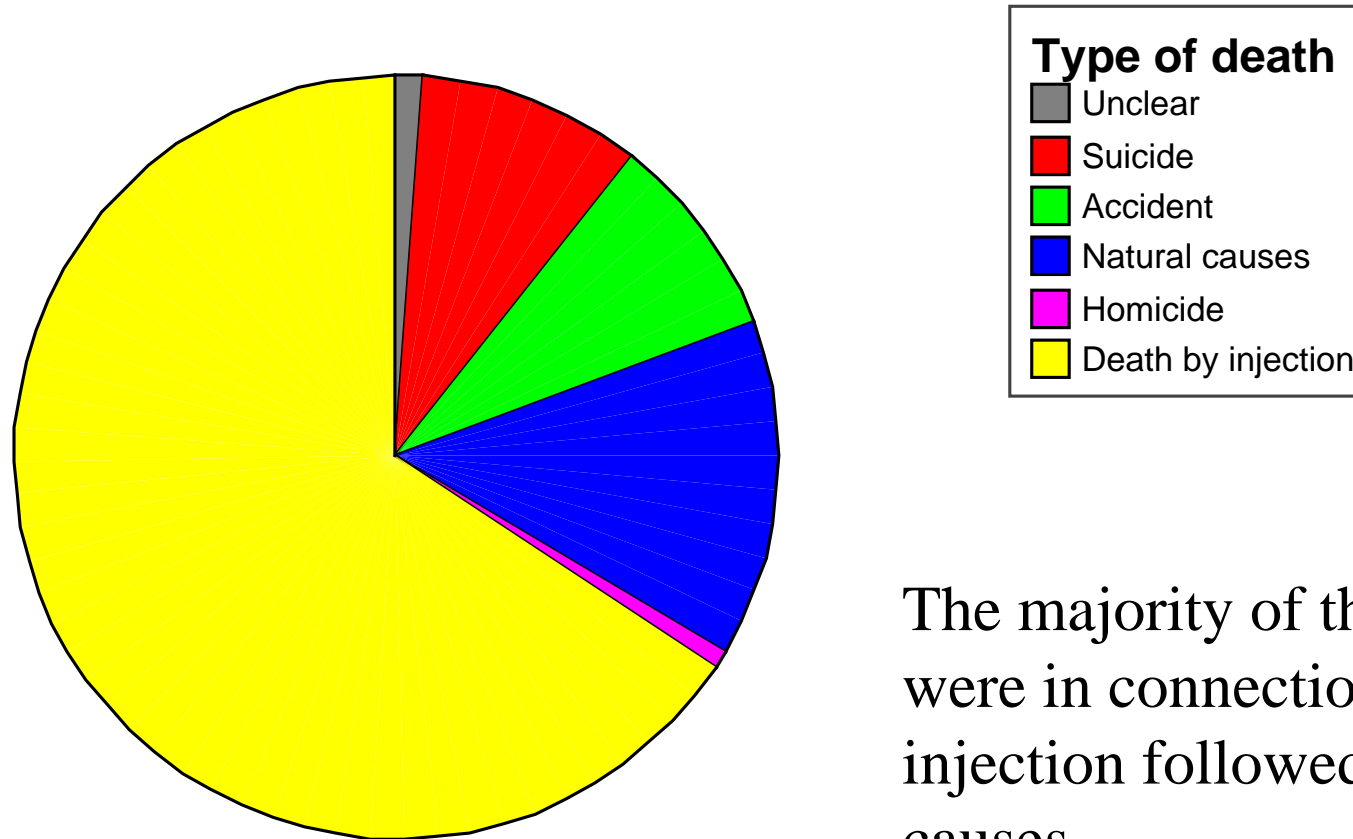
Which deaths were classified as drug-related in the Stockholm register?

- Medico-legally investigated deaths with presence of illicit drugs in the dead body or history of drug abuse in the catchment area of the Stockholm department of forensic medicine
- All known deaths among HIV-positive persons who were i.v. drug addicts in all clinics for infectious diseases in the Stockholm region
- All deaths which occurred in hospitals in the Stockholm region with a drug-related cause of death in the GMR

Classification according to main type of illicit drug

- If heroin (morphine) was present, the death was classified as heroin-related
- If heroin was absent but amphetamine was present, the death was amphetamine-related
- Cocaine and other substances were classified accordingly (not further described due to few cases)
- If only THC (a cannabis residual) but no other illicit drugs were present, the death was classified as cannabis-related

Heroin(morphine)



The majority of the deaths were in connection with the injection followed by natural causes

Risks in connection with heroin

- Heroin and morphine are highly toxic and therefore often involved in acute intoxications
- Are mostly injected – risk for bacterial and viral infections
- But no damage of other bodily organs even after long-term use
- No main influence on mental functions after long-term use

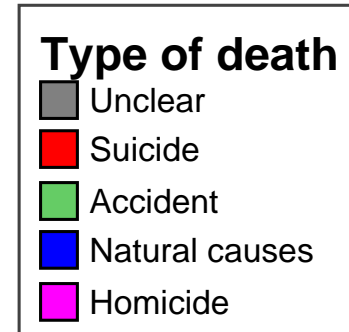
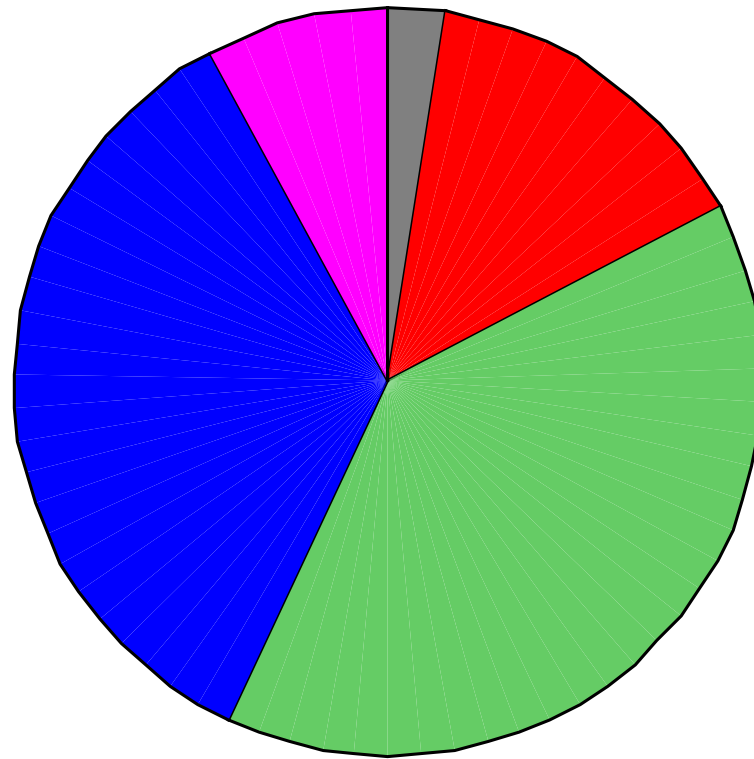
Heroin intoxications – so called “overdoses”

- The concentration of morphine (the main heroin metabolite) after death is often low
- Very often there is a combination with alcohol, prescribed drugs or other illicit drugs
- Also snorting and smoking heroin may cause fatal intoxications
- There is a risk for aspiration – often with fatal outcome

When is the risk for a fatal heroin intoxication increased?

- Beginners in connection with their first injection
- Alcohol-intoxicated persons who try to inject heroin
- After involuntary intermissions in heroin use e.g. after incarceration
- After voluntary intermissions
- Relapses among rehabilitated addicts
- Amphetamine or other drug users who take the “wrong” drug

Amphetamine



The majority of deaths were accidents under the influence of amphetamine and death due to natural causes

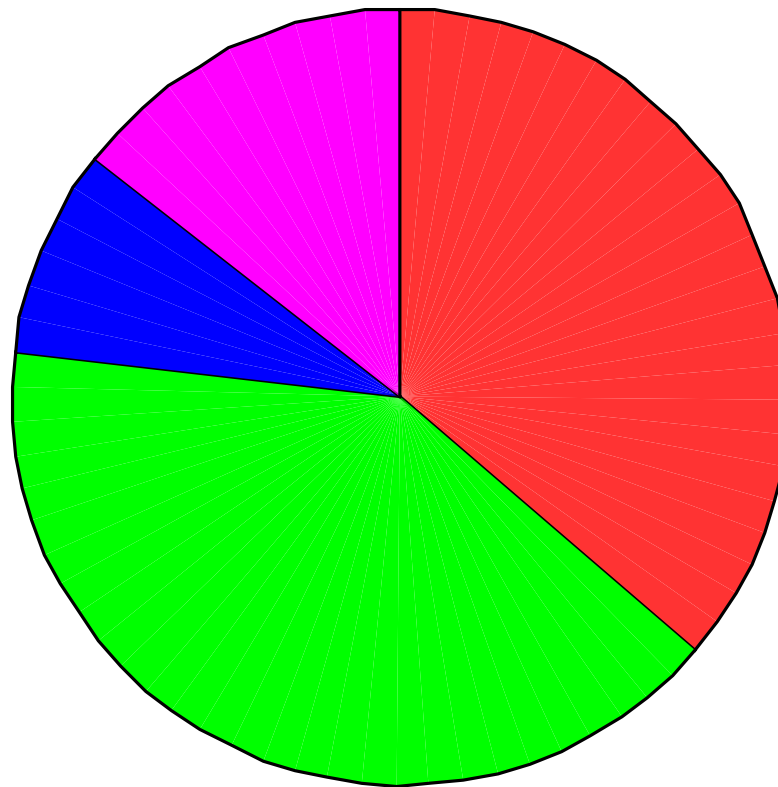
Amphetamine

- In Sweden amphetamine users are the oldest drug addicts – many have used the drug for more than 30 years
- The highest rate of natural deaths – infections and cardio-vascular deaths are common
- Many deaths are related to a criminal life-style or to psychotic episodes
- Fatal traffic accidents are common in this group

Risks in connection with amphetamine

- Causes organ damage during long term use
i.e. cardio-vascular lesions
- Influences mental functions, causes
behavioral disturbance and drug-related
psychoses, often with paranoid ideas
- Amphetamine alone seldom causes fatal
intoxications

Cannabis



Type of death

- Suicide
- Accident
- Natural causes
- Homicide

The majority of cases were suicides under influence of THC. The majority of accidents were probably alcohol-related

Cannabis

- Some very violent and impulsive suicides and homicides were found in this group
- Some of the suicides were in connection with relapse into a psychosis triggered off by drug use
- Other suicides were in connection with depression and chronic cannabis use
- Fatal traffic accidents occurred in connection with a deluded reality perception

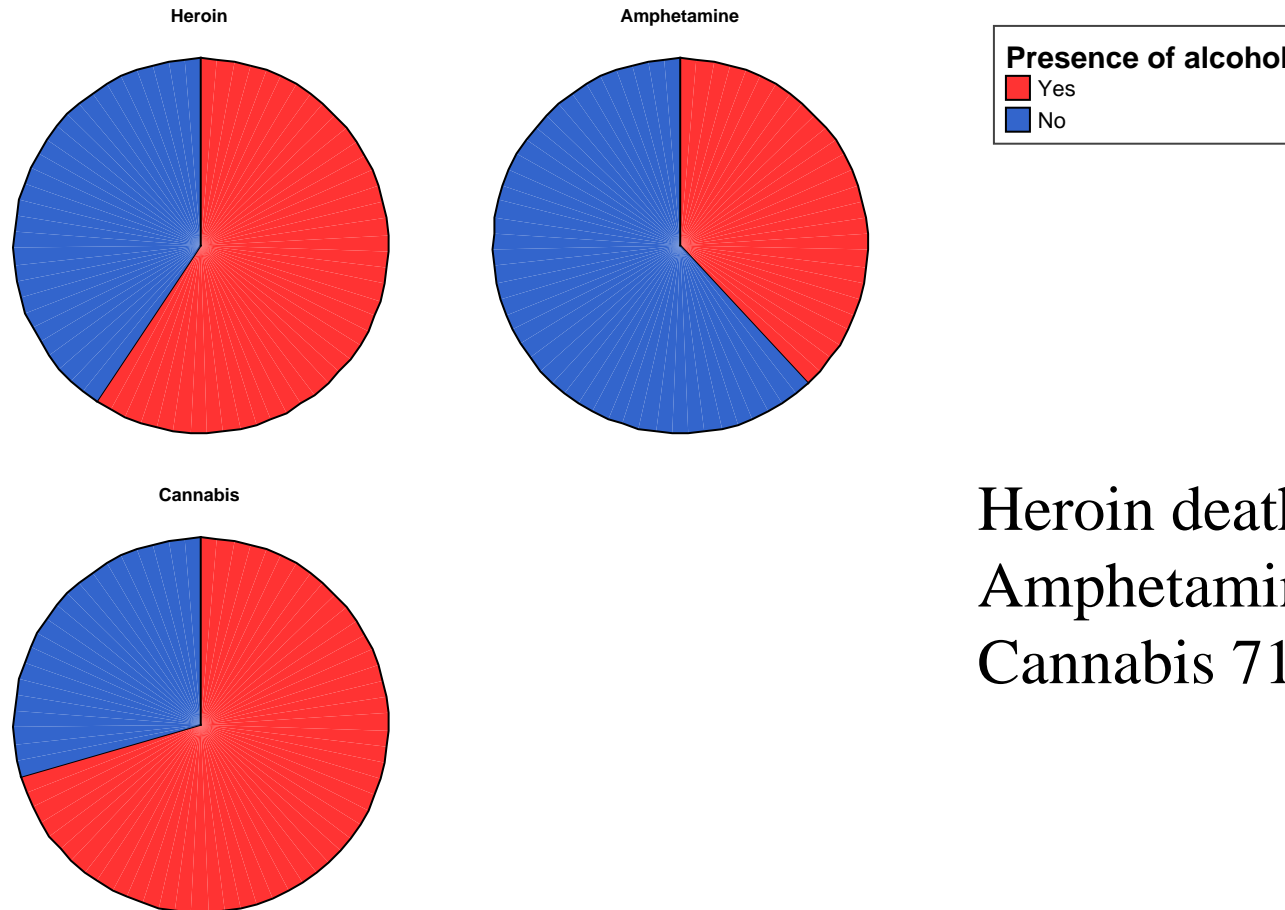
Risks in connection with cannabis

- Strong influence on mental functions. Risk for cognitive disturbances and psychoses. Relation between cannabis use and schizophrenia
- Generally no organ damage with the exception of an increased risk for lung cancer
- No serious acute intoxications

Infections transmitted in connection with heroin and amphetamine injection

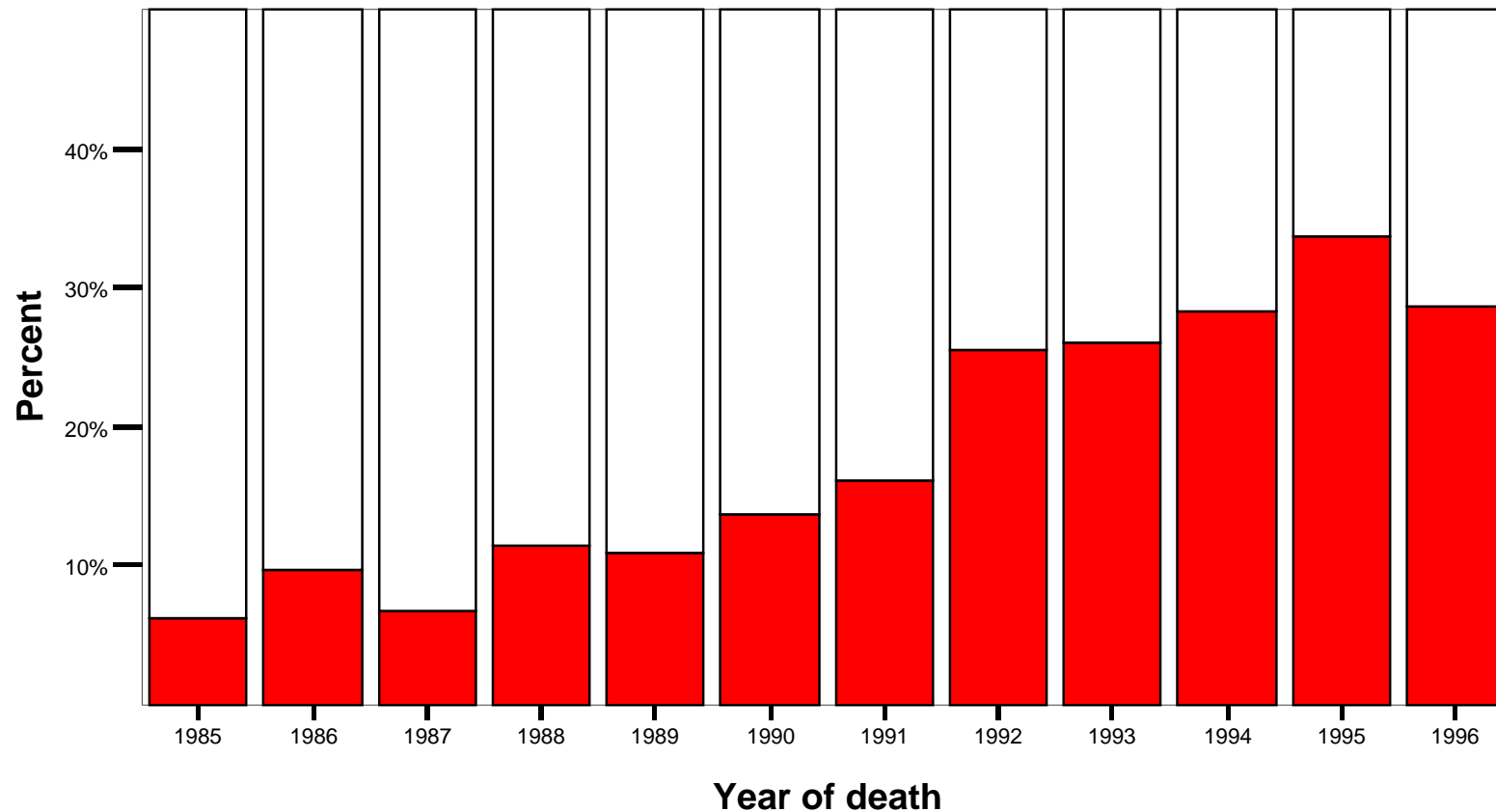
- Very few new cases of HIV among Swedish i.v. drug addicts after 1985 (ambitious testing programmes a possible reason)
- Hepatitis C very common among i.v. drug users – increased risk for cirrhosis and liver cancer
- Some cases of bacterial infections with damage of cardiac valves

Presence of alcohol in different drug groups



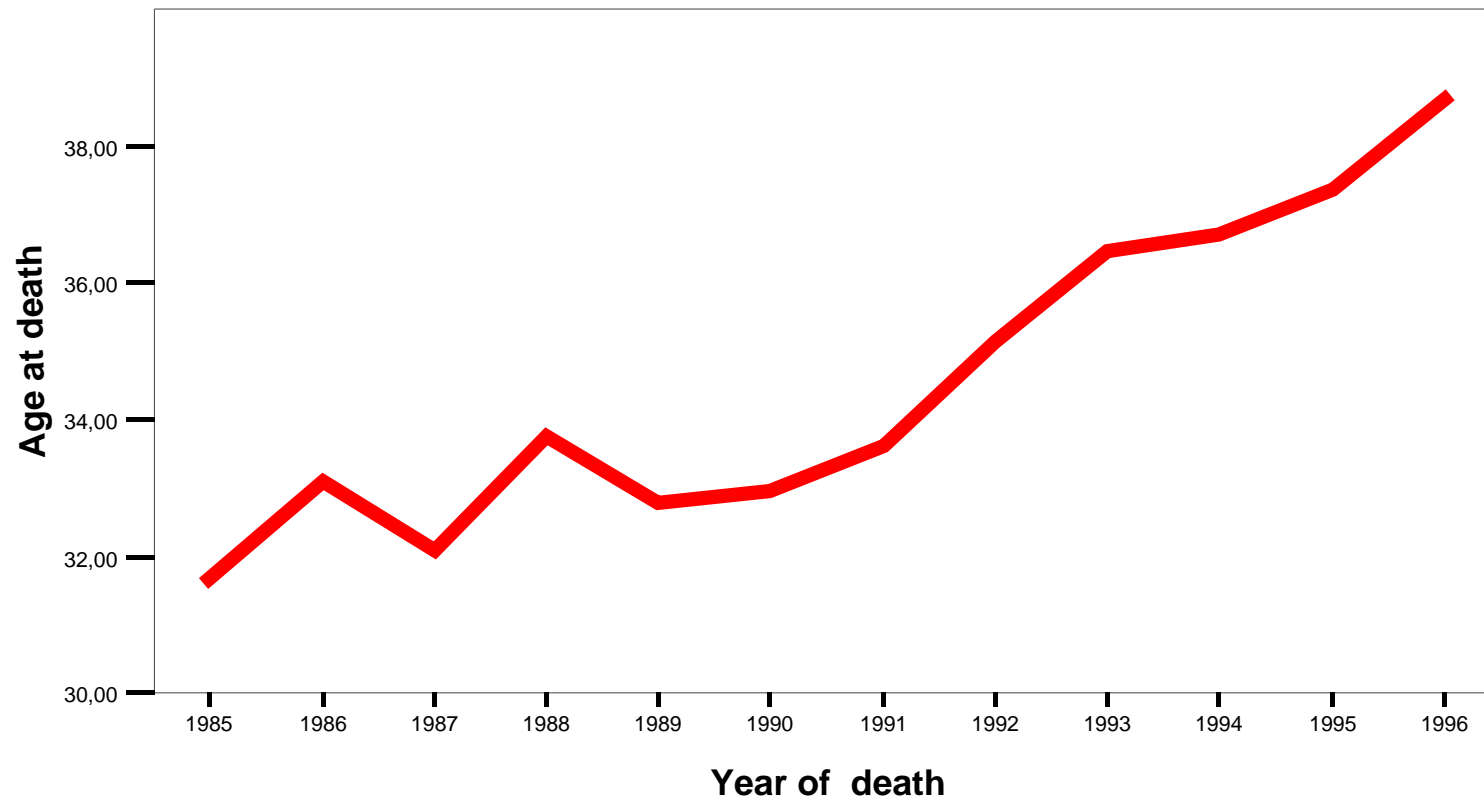
Heroin deaths 59 % alcohol
Amphetamine 38 % alcohol
Cannabis 71 % alcohol

Percentage of natural deaths - Stockholm register



Deaths from natural causes increased over time

Average age among drug-related deaths the Stockholm register



The average age increased over the study period

Study 2

Deaths with presence of illicit drugs
in Sweden 1994-2005

Background

- The Swedish official cause-of-death register covers 99 % of all deaths
- However, a significant drawback is that there is a 2 year delay in publishing the statistics
- 20 % of the DRD in the register are not related to illicit drugs – many occur among persons without any history of drug abuse e.g. suicides among elderly people using legally prescribed morphine

Objective

- To establish a new register,
 - that is not based on assessment and coding of death certificates
 - where the information is available after a short time period
 - that covers the whole country

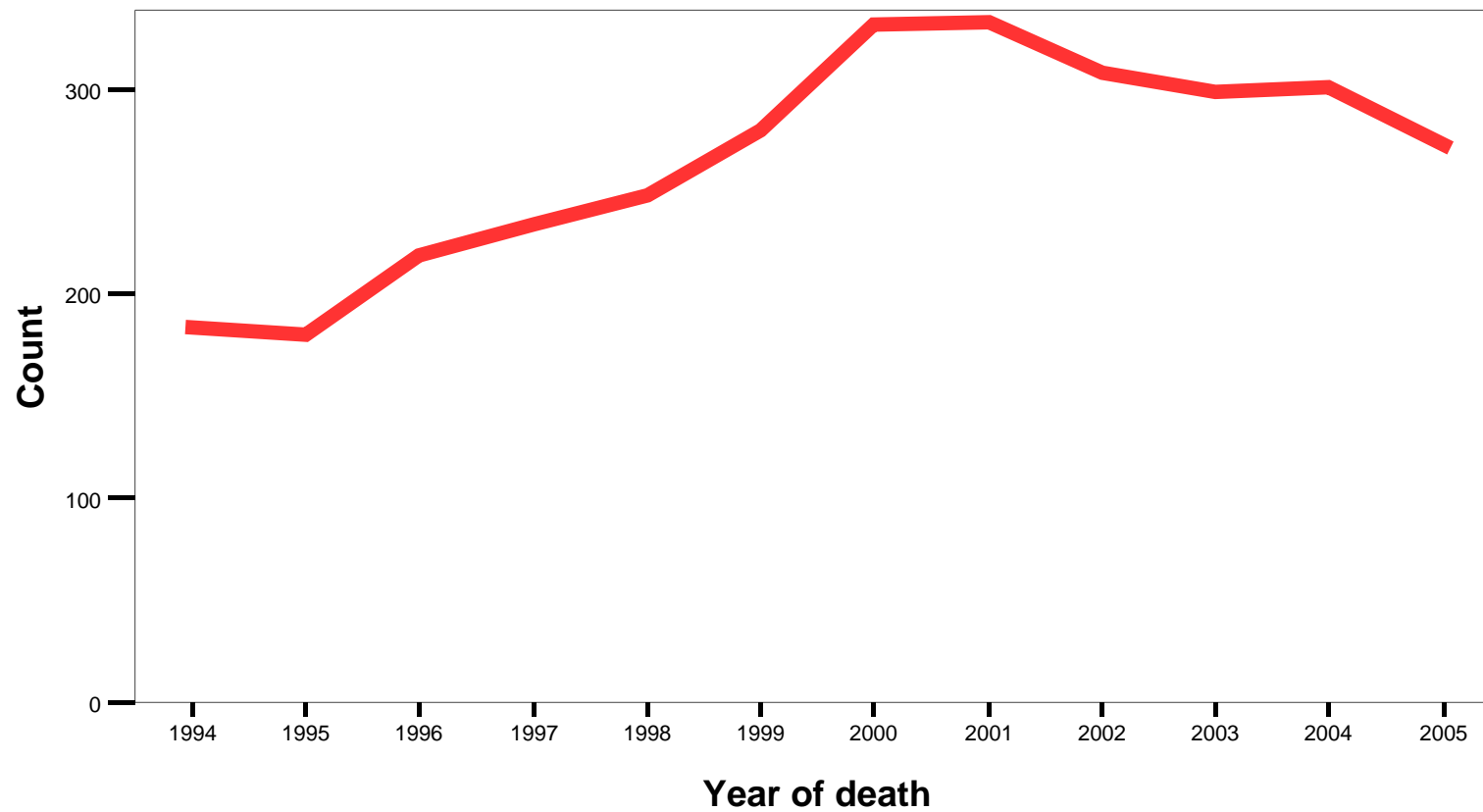
Data from forensic medical examinations

- In Sweden, 93 % of violent deaths and intoxications are subject to forensic medical examinations
- A toxicological investigation is made in a majority of the cases
- Illicit drugs are examined in all cases where the presence of such drugs is suspected or cannot be excluded
- The information is available in a national data base

Method

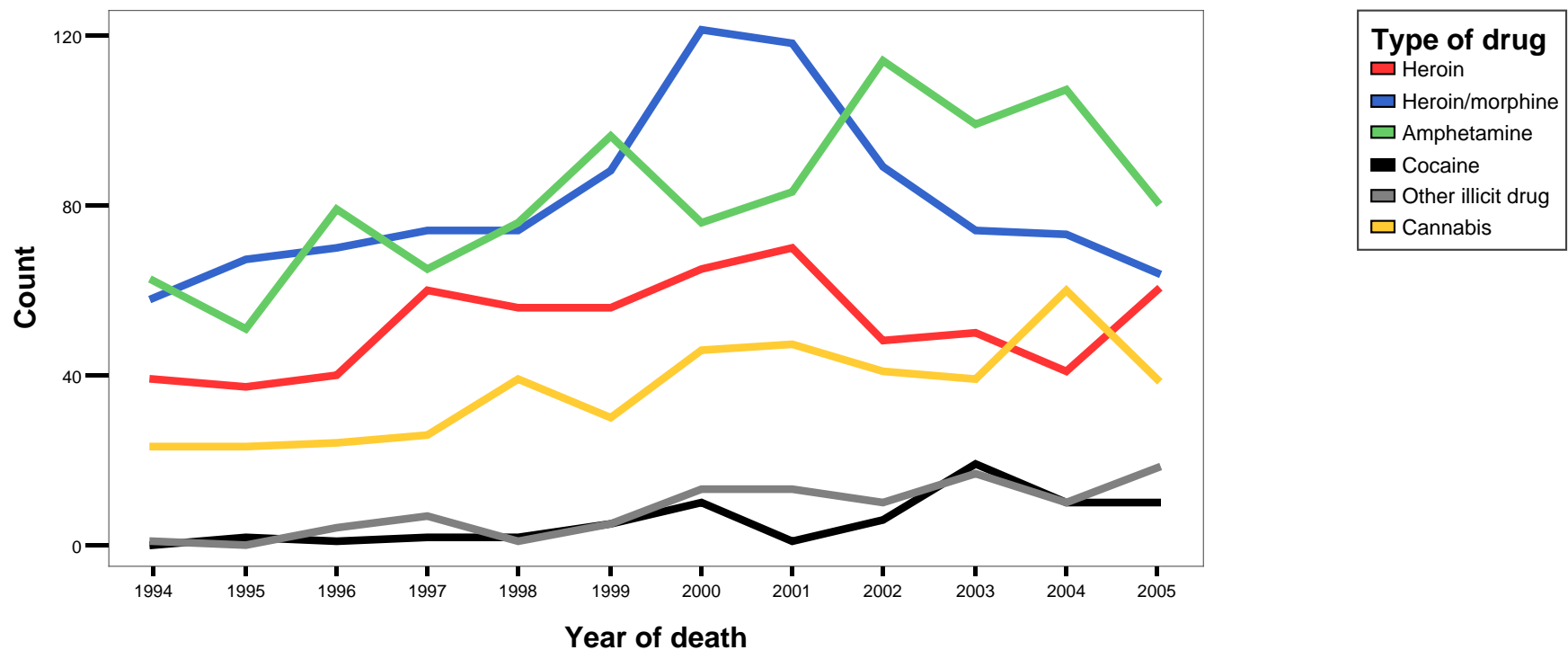
- All deaths, with presence of illegal drugs were collected from the toxicological database at the central board of forensic medicine
- The deaths were classified according to the dominating drug in the following order:
 - Morphine
 - Amphetamine
 - Cocaine
 - Other defined illicit drugs
 - THC
- The heroin/morphine cases were classified into acute heroin deaths and morphine/heroine deaths depending on the presence of 6-acetylmorphine

Annual number of drug-related deaths



The overall trend shows a slight decrease after the year 2000

Annual number of drug-related deaths - types of drugs

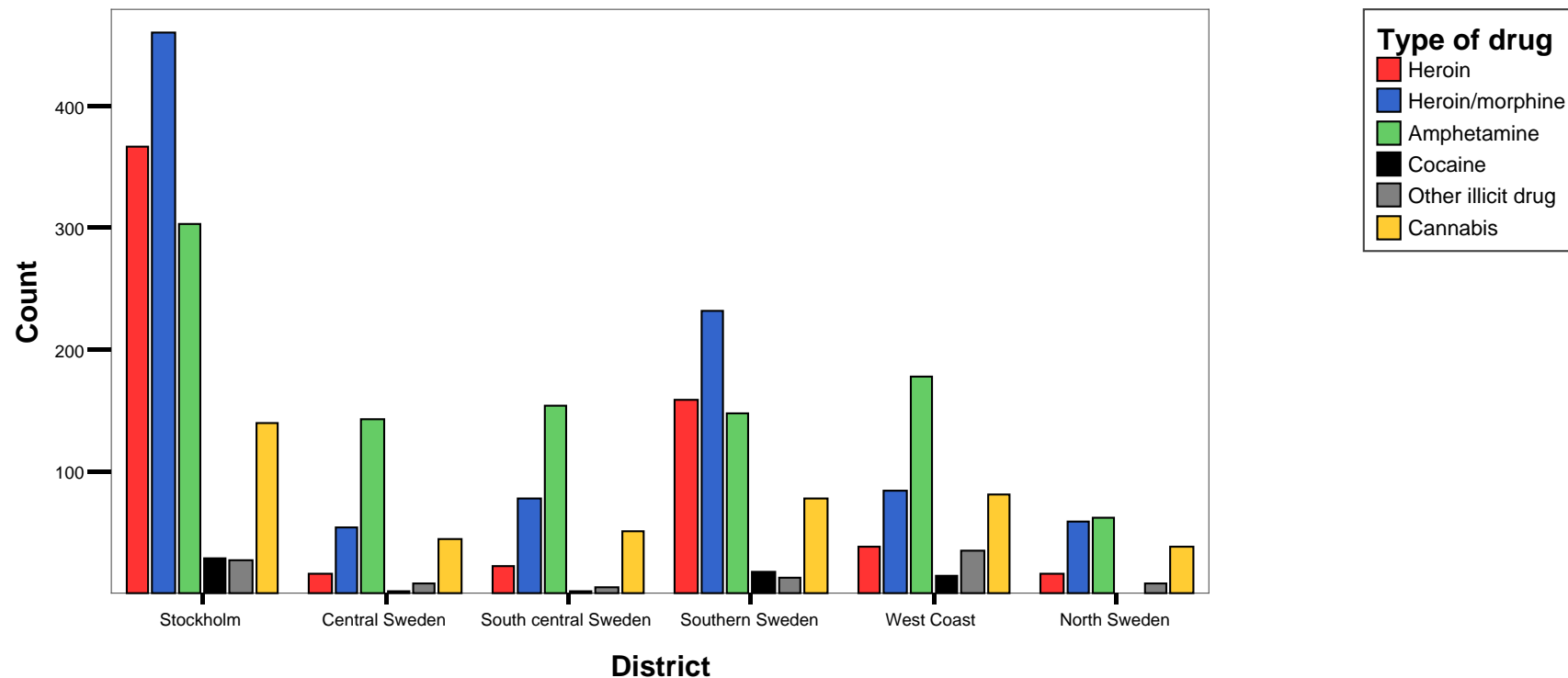


Splitting into different main drugs the figure gives more information on trends

How to interpret the trends?

- The heroin group probably covers all acute overdos deaths in Sweden and trend reliable
- The amphetamine deaths are probably underestimated. Many amphetamine users die from natural causes and therefore not included in a register based on forensic data
- Cannabis is probably overestimated and shows an increased use in society. Many of these deaths are probably alcoholrelated

Main type of drug drug-related deaths different parts of Sweden



Two metropolitan areas (Stockholm and Malmö) are dominated by heroin deaths

In the rest of Sweden, including Gothenburg, amphetamine deaths

Conclusions

Difficult to predict mortality from drugs

- Drug-related deaths is a very broad concept and includes several types of drugs which can be fatal in many different ways
- The same drug may cause immediate fatal intoxications and contribute to chronic infections which may lead to death after many years
- The present pattern of drug use is a rather new phenomenon and there is a lack of knowledge about the long term effects

Various patterns of death

- The main causes of death, related to illicit drug are changing over time
- In New York heroin-related deaths was replaced by cocaine-related death in the 1990's. Today heroin is back
- In Spain AIDS was the major cause of death among drug addicts in the late 90's. Today cocaine is an increasing problem
- In Sweden more amphetamine users die from chronic disease after decades of drug abuse

Heroin use is problematic

- Heroin often causes unexpected fatal intoxications which are difficult to prevent
- Even drug-free treatment may increase the risk for fatalities in connection with relapses as a result of lowered tolerance
- Methadone may cause fatalities because of its toxicity
 - A number of deaths have occurred when methadone has been sold at the black market instead of being used in treatment
 - Many countries have suffered from large problems because of methadone deaths

Cannabis

- Cannabis has not been regarded as a dangerous drug but may cause drug-related psychoses and confusions
- A number of deaths have been related to such events.
- Cannabis-related psychoses may be unusual but cannabis use is very common and increasing among young people

International comparisons – problems and possibilities

- It is important to exchange information on drug-related deaths and risks between countries and to strengthen the ability to meet new trends
- EMCDDA makes surveys of the trends in DRD in European countries and has shown that heroin-related death seems to decrease in many countries
- As the frequency of forensic medical investigations and the ability to obtain data on DRD varies among countries it is not possible to make international comparisons of the numbers of drug-related deaths