

# Drug-related deaths – a problematic definition

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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

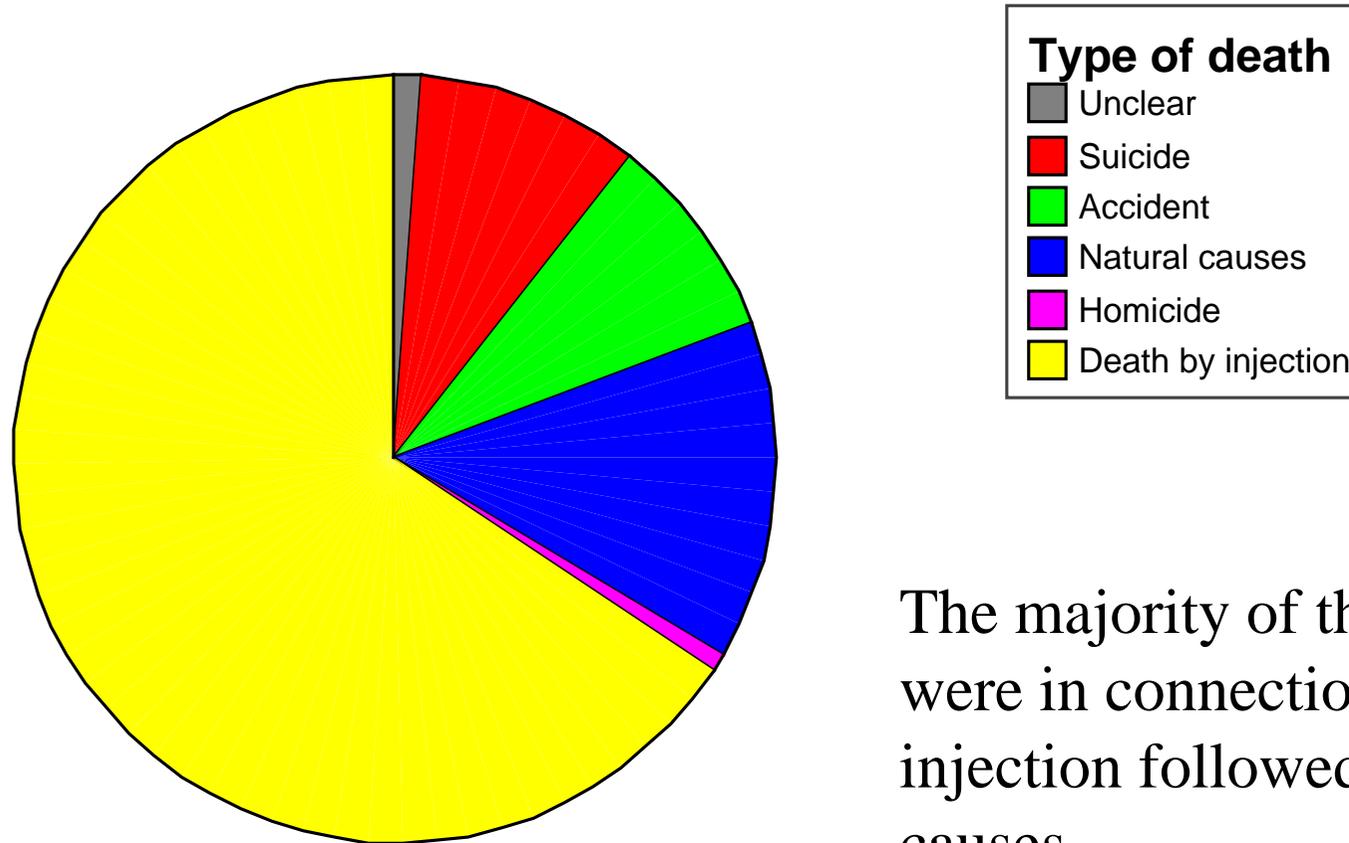
## Which deaths were classified as drug-related in the Stockholm register?

- 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 he injection followed by natur 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

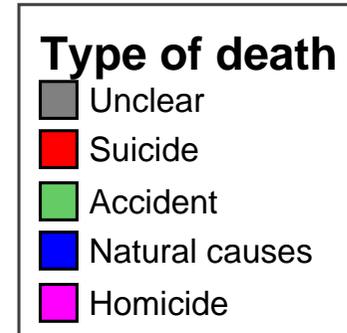
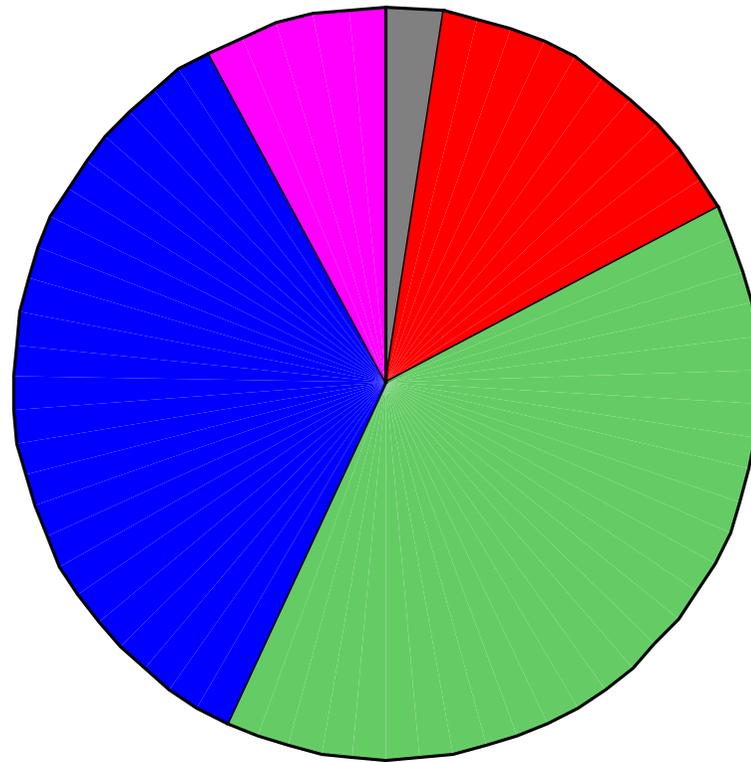
# Heroin intoxications – so called “overdoses”

- 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

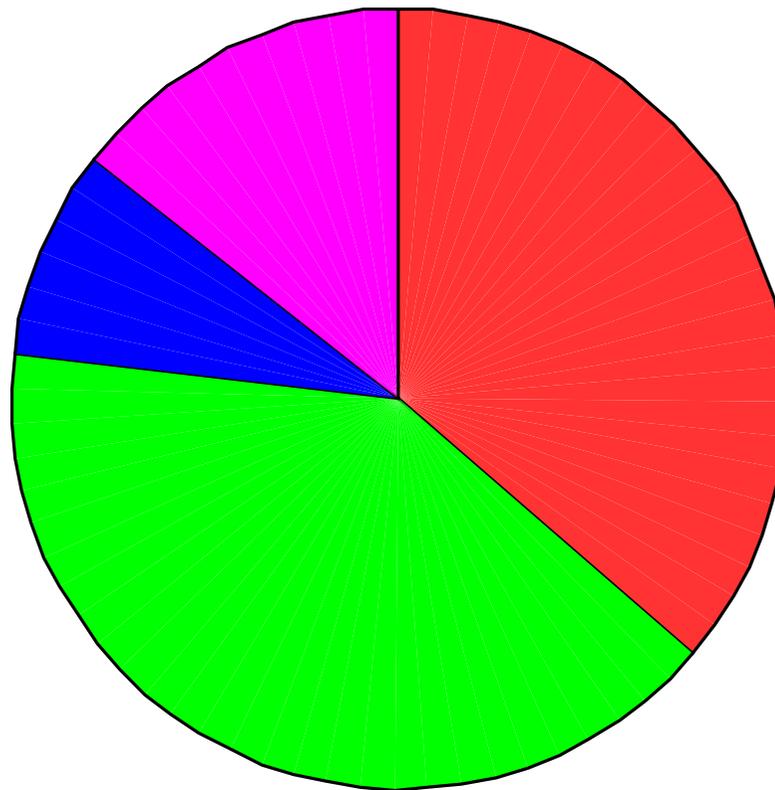
# Amphetamine

- 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

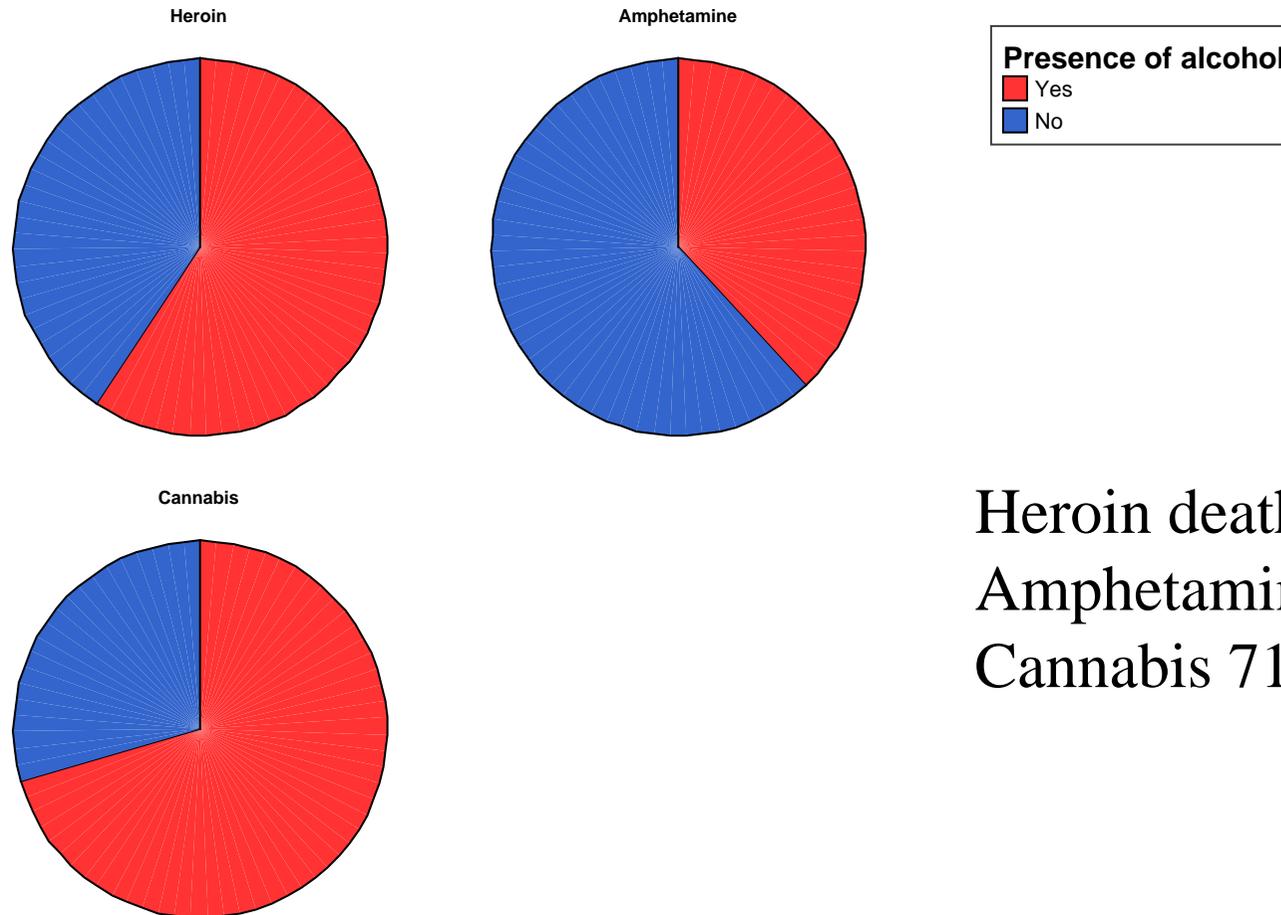
# Risks in connection with cannabis

- 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

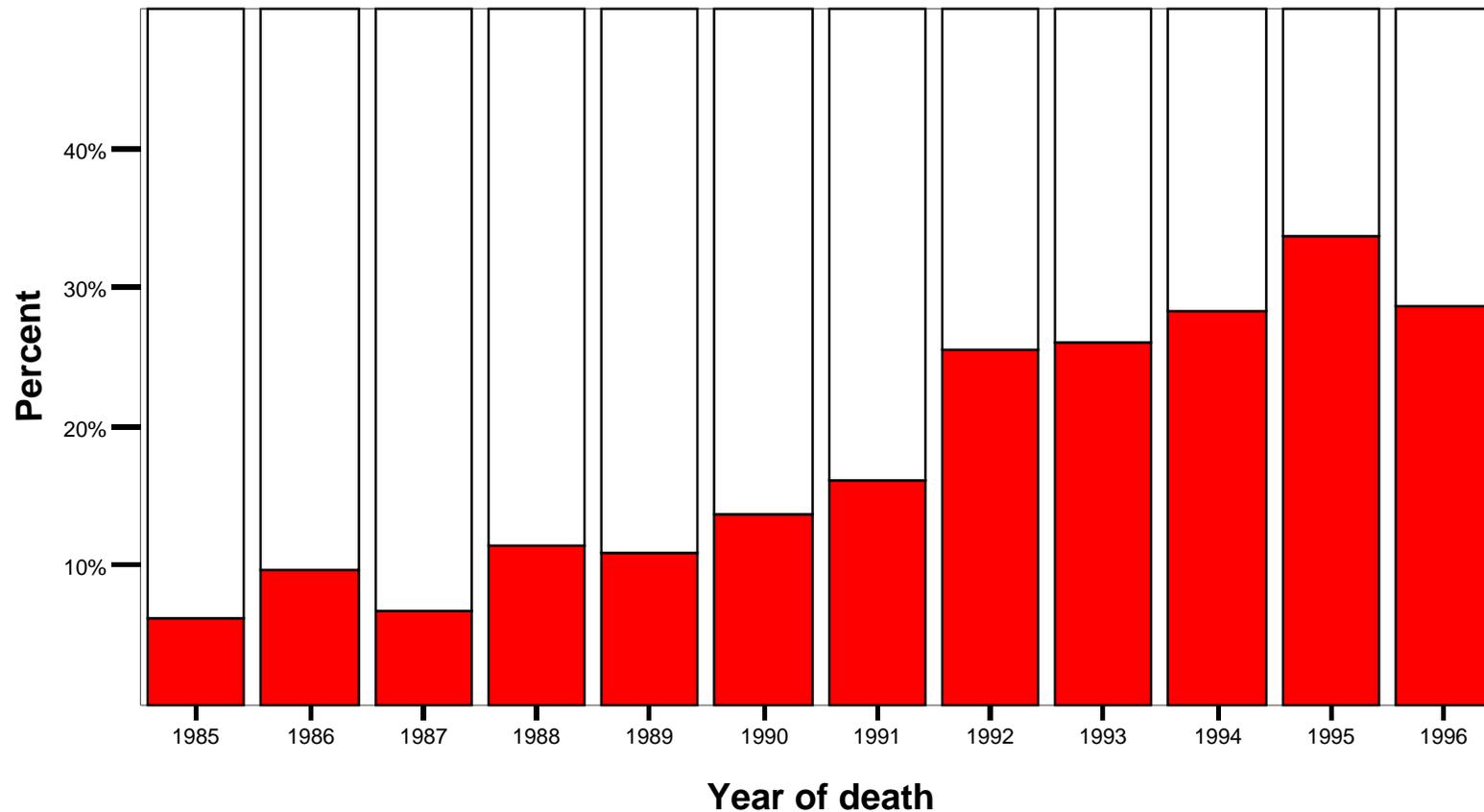
- Very few new cases of HIV among Swedish i.v. drug addicts after 1985 (ambitious testing programmes a possible reason)
- Hepatitis C very common among i.v. drug users – increased risk for cirrhosis and liver cancer
- Some cases of bacterial infections with damage of cardiac valves

# Presence of alcohol in different drug groups



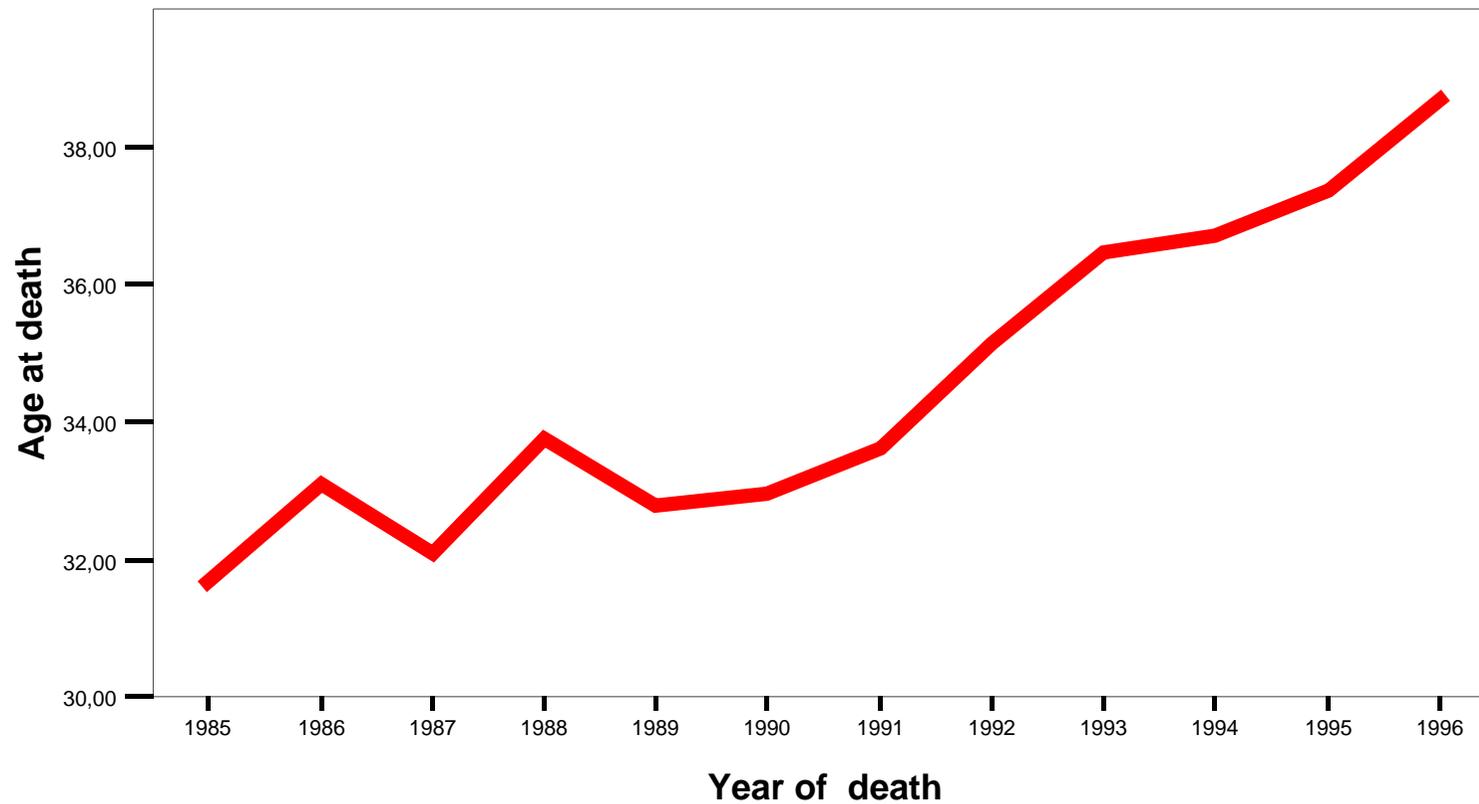
Heroin deaths 59 % alcohol  
Amphetamine 38 % alcohol  
Cannabis 71 % alcohol

# 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

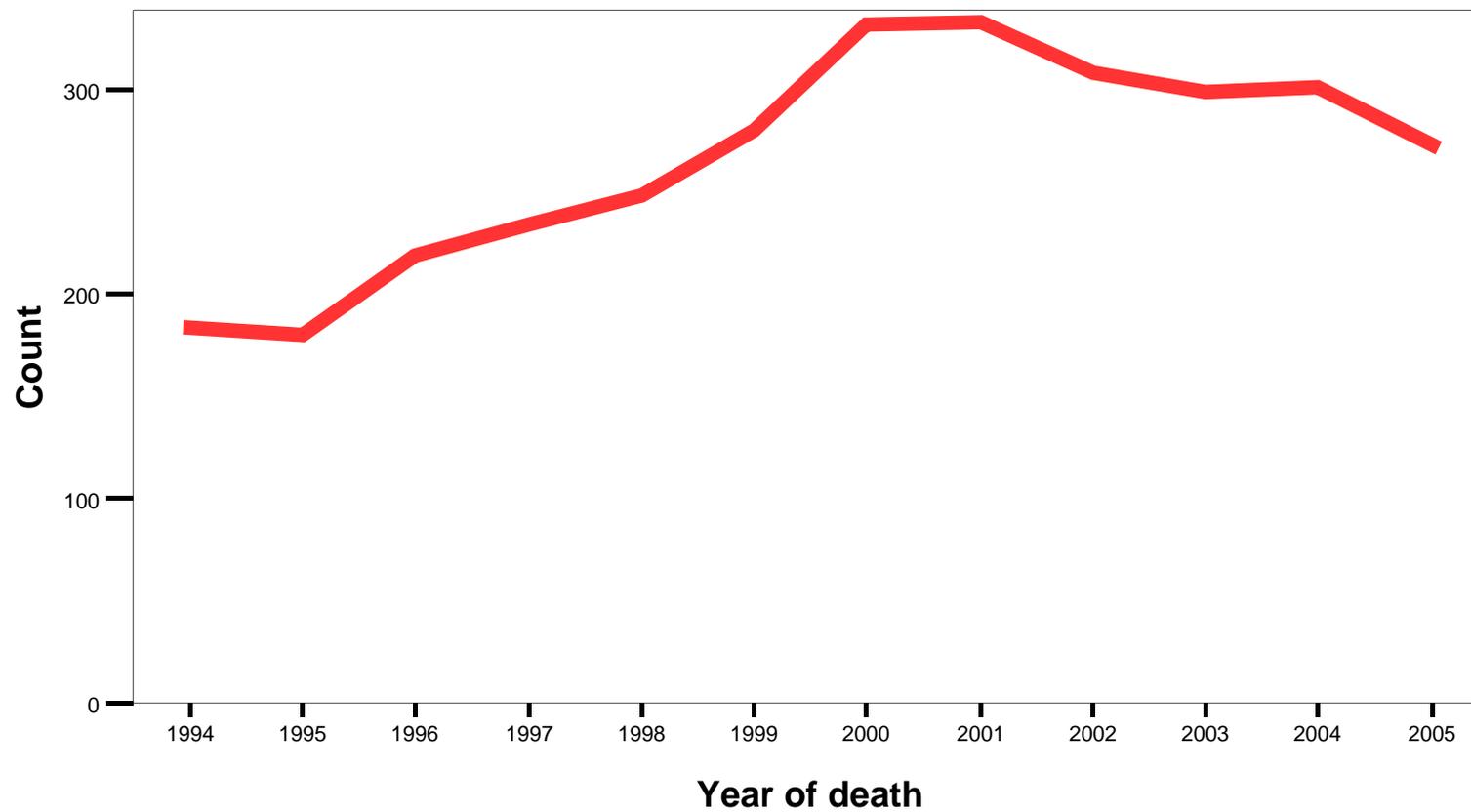
# Data from forensic medical examinations

- 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

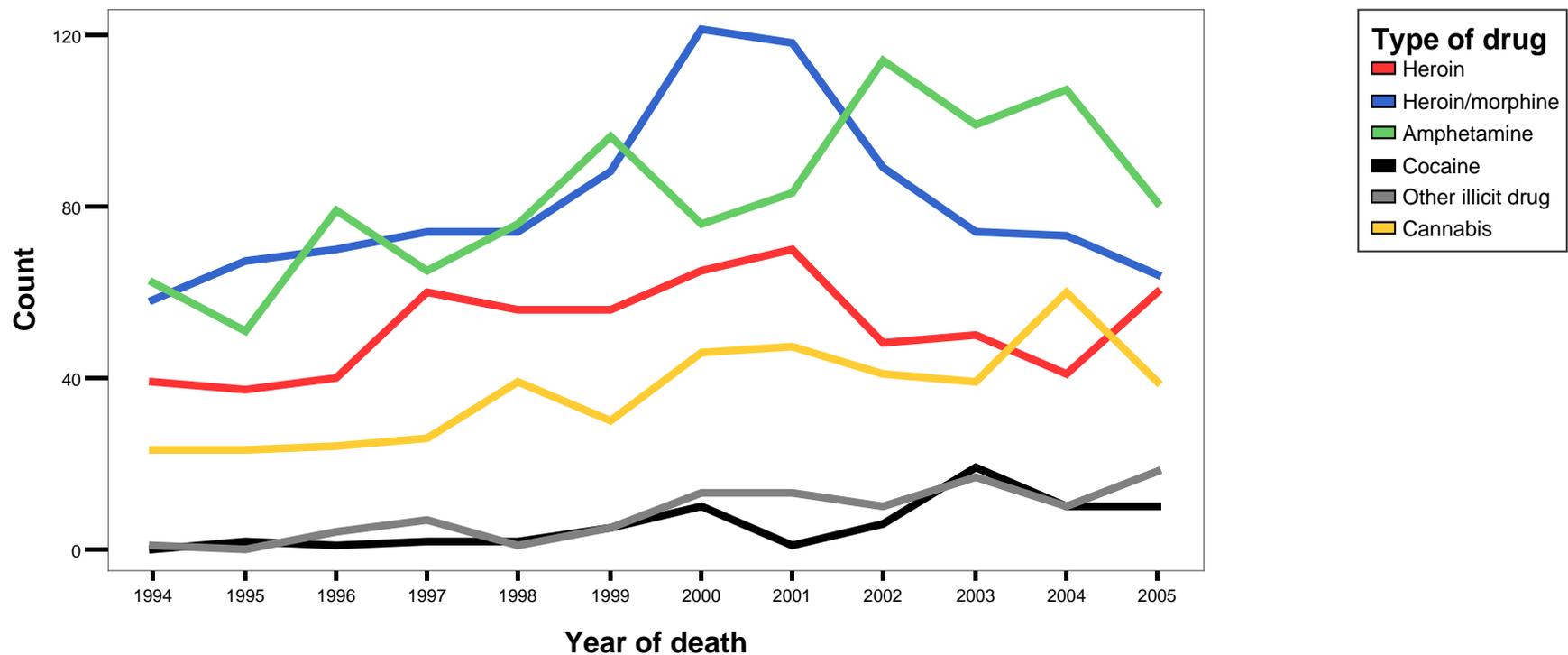
- All deaths, with presence of illegal drugs were collected from the toxicological database at the central board of forensic medicine
- The deaths were classified according to the dominating drug in the following order:
  - Morphine
  - Amphetamine
  - Cocaine
  - Other defined illicit drugs
  - THC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

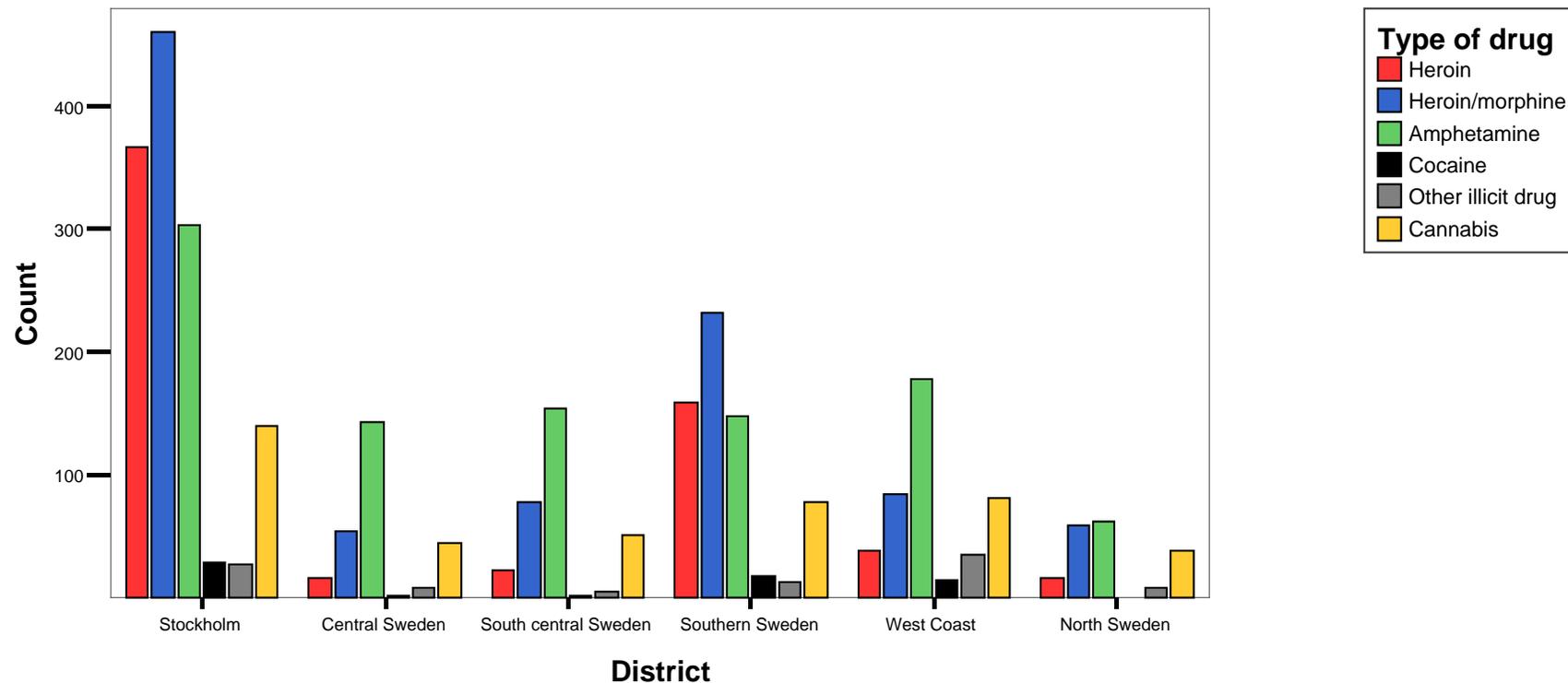


Splitting into different main drugs the figure gives more information on trends

# 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