

# **National Prevalence Estimates**

Improvement of Comparability of National  
Estimates of Addiction Prevalence  
Final Report

Project CT.96.EP.06

IFT Project Team: Roland Simon  
Ludwig Kraus  
Rita Bauernfeind

other contributors: Bert Bieleman  
Jean-Michel Costes  
Fabio Mariani  
Börje Olsson  
Lucas Wiessing

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## Summary

A work group was installed in order to support the development of methods for the estimation of prevalence of problematic drug use at national level. Participants of this group were experts, which had been involved in national estimation procedures in France, Italy, Germany, The Netherlands, and Sweden.

### Overview on methods used before

As a first step estimation methods that had been used before in the different countries were collected and described. A total of nine different methods was found, which are described in Table I. From this list methods 1 - 5 were selected for further examination on the basis that at least two countries had either used the method or felt able to do so within the project.

**Table I: Methods for prevalence estimations used or seen as applicable by different countries**

	Data	Method	France	Italy	Germany	Netherlands	Sweden
1	police death treatment aids jail	multivariate Indicator method	x	⊗	x	x	
2	police data	different multipliers	x	x	⊗	x	
3	treatment	demographic multiplier method	⊗	x	x	x	
4	treatment	coverage multiplier	x	x	x	⊗	
5	population surveys		x		⊗		
6	school surveys	multiplier		x			
7	conscripts urine tests	multiplier		x			
8	general practitioners	multiplier			x		
9	Case finding study	capture-recapture					⊗

### Target group

No solution was found for an adequate operational definition of „problematic drug use“. While in all countries opiate users cause by far most of the health and social problems, other types of problematic drug users also exist. This broader group is difficult to compare between countries, because substances, patterns of use and background differ much more for this type of drug users than for opiate users. For example, intravenous use of amphetamines is nearly exclusively a Nordic phenomenon. Also most of the methods developed were tailored more or less to measure opiate use. For this project the group decided to restrict itself to prevalence estimations of opiate users. An estimation of the mentioned additional group is left open for a later stage of development. The relevant age range was set at 15-54 years, estimates for sub-groups were planned.

## Selection of methods for further analysis

For each of the methods 1 to 5 the contributors of the country indicated by ⊗ in table I gave a detailed description of how they had applied it and what sources they had used. The other members of the group tried to apply the same method using available data and procedures for their country. The experiences from this test phase were brought together, discussed and evaluated.

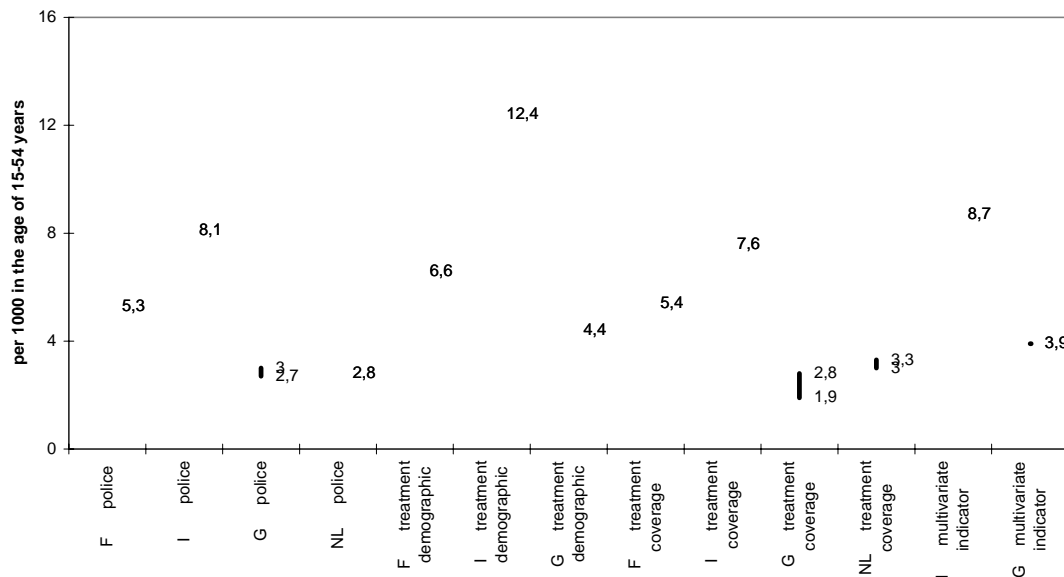
**Table II: Results of the estimations produced by the methods tested**

Data	Method	France	Italy	Germany	Netherlands	Sweden <sup>2)</sup>
1 police death treatment aids jail	multivariate indicator method	--	8,7	3,9	--	--
2 police	different multipliers	5,3	8,1	4,9 - 6,0	2,8	--
3 treatment	demographic multiplier	6,6	12,4	4,4	--	--
4 treatment	coverage multiplier II	5,4	7,6	1,9-2,8	3,0-3,3	--
5 population surveys	--	--	--	0,9-1,3 <sup>1)</sup>	--	--

1) data refer to the age group 18-59 years

2) none of methods 1-5 could be applied in Sweden, where a case finding study had been conducted in 1992

**Table III: Overview on results of the estimations produced by the methods tested**



Comparing the results from the different methods used in this project, it appears, that most of the figure for each country are rather close together. The sequential order of countries is also more or less the same for different types of estimates. The estimates seem to be highly correlated. As the total rates are rather small, the relative differences between rates, however, are still considerably high.

## Choice of the best method(s)

Based on the results and experiences in this project the following choice for the best method(s) was made:

1. The **treatment demographic multiplier method** was assessed as problematic as different trends in incidence produced considerable biases for the estimation.
2. **Estimates from population surveys** could not be applied by any of the other participating countries apart from Germany because information on patterns of use, e.g. frequency, was lacking. Furthermore, due to underreporting and other nonsampling errors the figures from general population surveys with respect to problematic heroin use are usually too low. Therefore this method is no longer seen as a good choice for a European standard estimation method.
3. The best results were found for **police multiplier** and **treatment coverage multiplier** methods. They offer rather stable estimates, which do not differ very much within the countries. The police multiplier method is based on the number of individuals registered as drug offenders for the first time; the multiplier is based on the ratio of drug-related death previously known by the police as drug users to the total number of drug-related death. The treatment coverage multiplier is based on the number of individuals treated for opiate problems divided by the estimated percentage of opiate users in contact with treatment services in a given year.
4. In the long run the most promising method seems to be the **multivariate indicator method**, which integrates information from different sources. It requires a breakdown of these information (offences, drug related deaths, treatment demands etc.) by region. This causes problems, because the administrative structures in a country do not always support this type of breakdown. Additionally, for two or three regions reliable prevalence estimates are necessary.

## Recommendations

1. The quality of the estimations described should also be examined for those countries, which had not been involved in the project. The follow-up project should follow these lines.
2. Additional small scale studies can help to increase the quality of the recommended methods. Studies on the duration of drug use in different countries of the EU as well as the coverage of the drug using population by treatment services could reduce uncertainty concerning the multipliers used.
3. Local estimation methods should be used and further developed to produce regional anchor points for the multivariate indicator method.
4. Since the population of problematic drug users is only partially covered by opiate users an additional estimate should be developed in the future for this broader and less well defined group.
5. The age range 15-54 is perceived as a useful reference frame for the calculation of prevalence rates. However, estimates for smaller age-groups should also be calculated if the necessary information is provided.



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# **1 Concerning this project**

## **1.1 Background**

One of the basic requirements in drug epidemiology are reliability and validity of prevalence estimates on addiction. As shown in many instances techniques used for prevalence estimation in many different countries have often been developed rather unsystematically and ad hoc. In many instances the method of estimation is not described properly. Methods, which are available for local estimation purposes, are often not applicable at the national level. Therefore there is a need to further develop the methodology of prevalence estimation for problematic drug use at a national level.

For this purpose a small number of countries has worked together in this project as a first step. They have described the different methods of estimation used and each country recalculated and analysed these estimates based on the procedures used in the other countries represented in this group.

The overall target of the project was a re-analysis of national prevalence estimates on the basis of comparable methods and data in several member states. This should help to improve the quality and comparability of the methodology for prevalence estimates in the EU. The results of this project will be used as input for a follow-up project where the most promising method of the project described will be applied in countries, that were not involved in the pilot study.

## **1.2 Activities and steps taken**

Several steps were necessary to establish a work-plan for this project.

### **Identification of partners**

In a working meeting in Lisbon on 22. January 1997 the EMCDDA represented by Richard Hartnoll and Lucas Wiessing and the IFT represented by Roland Simon and Ludwig Kraus discussed a first list of possible partners in this project on the basis of the feedback of the EU countries. Each country had been asked before by the EMCDDA to name experts for this as well as for other projects of the EMCDDA work-programme.

The partners for this project were chosen from the number of nominations given by the countries. It was taken care that the countries involved already had produced a national estimate of addiction (or problematic drug use / opiate use). Apart from Germany as the co-ordinator of this project experts from France, Italy, The Netherlands and Sweden were invited to participate. Pleasantly all of them agreed to attend the first meeting in Munich, which was held on 8 and 9 April 1997.

The members of the work-group established in this way have been:

- Rita Bauernfeind  
*IFT Institut für Therapieforschung, München, Germany*
- Bert Bieleman  
*Intraval, Groningen, The Netherlands*
- Jean-Michel Costes  
*OFDT Observatoire Français des Drogues et des Toxicomanies, Paris, France*
- Ludwig Kraus  
*IFT Institut für Therapieforschung, München, Germany*
- Fabio Mariani  
*Consiglio Nazionale delle Ricerche, Pisa, Italy*
- Börje Olsson  
*The Swedish Council for Information on Alcohol and other Drugs, Stockholm, Sweden*
- Roland Simon  
*IFT Institut für Therapieforschung, München, Germany*
- Lucas Wiessing  
*European Monitoring Centre for Drug Addiction, Lisbon, Portugal*

### **First meeting**

Before the first meeting in Munich, a structured questionnaire was sent out to the experts. They were asked to return the filled in form together with an overview of the relevant literature to the IFT. This information was then circulated to all members of the group.

At the first meeting the work-plan was discussed and made operational. The responsibilities of the participants were agreed upon and contracts signed accordingly. Each of the participants gave an overview on the different methods used in his or her country for prevalence estimation. Available sources and informants as well as methodological aspects of the estimations were discussed.

On the basis of the national experiences four methods were chosen for further evaluation and testing. Criteria for the selection of methods were as follows:

- The method had to be applied in one of the 5 countries and had to be applicable in at least two of the four other participating countries:  
The overall goal was the selection of a small number of methods giving comparable prevalence estimates. Methods which seemed not applicable in at least three out of the five participating countries were excluded.
- The method should be easy to use:  
The method should be basically understandable both to decision makers and others who would be in need of these estimates.
- Their reliability and validity should be proven or they should have at least some degree of face validity.

## **Intermediate report**

An intermediate report was forwarded end of May 1997. Based on the work done so far, it gave an overview on the national situations and the estimation methods used in each country.

## **Test of different estimation methods by the participants**

Between the first and the second meeting the participants were asked to give a detailed description of the method, that was used in their country and was chosen for this project. Following these papers the participants tried to calculate national estimates based on the sources available in their countries.

## **Meeting with the Local Estimation Group Co-ordinators**

At a meeting with the co-ordinators of the Local Estimation Group common problems were discussed. Especially the need for a common definition of the target population became apparent. The meeting again underlined that national and local estimations are complementary to one another.

## **Second Meeting**

At the second meeting, in Pisa at 28 and 29 July the problems which arose during the calculations were discussed and clarified as far as possible. Some sources had to be used as substitutes where other data were not available. In other cases more practical questions of data analysis and calculations were discussed.

In some of the countries it turned out to be difficult to get regional data on relevant parameters, such as drug related deaths, offences or cases in treatment for the multivariate indicator method. Also anchor points necessary for the estimation of the total prevalence were not always available.

In general, the enterprise comparing estimates based on different methods and sources turned out to be quite promising. The total range of estimation method to be used in the project was smaller than expected, given the number of different types of input variables and methods used for estimation.

While the statistics caused only little problems and discussion in this meeting, it became clear, that in many instances it was quite time-consuming to get the data needed for estimation in a country. Administrative procedures had to be followed and people had to be motivated to cooperate.

## **Participation in a Meeting of the Local Estimation Group**

At the meeting of the local estimation group in Utrecht at 10th October an overview on the methods discussed in the National Estimation Group was given. The problem of common definitions became clear in this meeting. For reasons of comparability it was underlined that the target group should be opiate addicts or individuals with frequent or intravenous heroin use.

The meeting underlined the complementarity of national and local estimation. At both levels typically different sources and methods are used. While on a local level the capture-recapture method is more or less the standard methodology on a national level surveys and treatment data are more often used. Therefore, results from local and national estimates can be used for cross-validation.

**Final Report**

Based on the written reports of the participants and the calculations done at the IFT the final report was prepared by the IFT. Feedback from the other partners was included, as far as delivered in time. The report includes:

- an overview on the estimation methods used in the participating countries
- a selection of the most promising methods from the total group
- a more in-depth evaluation of these methods
- a recommendation for a standard method for estimation for EU member states
- a recommendation on the implementation of standards

## **2 National prevalence estimates in the participating countries**

At the first meeting in Munich the participants gave detailed reports on the estimation procedures and the sources used in their country. The focus was on recently used national estimation methods, excluding regional or older studies. This chapter gives a general overview on these methods based on the reports delivered by the participants. An evaluation of the method is not included here. For those methods, which seemed to be applicable in most or all of the participating countries details and results of the methodological examination of the different estimation procedures are included.

Furthermore, after discussing each of the methods the participants made a selection of four methods, which seemed most promising as standard methods in an European framework. The detailed work plan was set-up in accordance to this choice.

The Swedish experiences are treated in a different way, as the group found case-finding-studies not applicable as a European standard method for prevalence estimation. In particular the high costs, which would have to be spent even in a country with a medium population size would make the implementation impossible in countries with more limited financial means. The Swedish estimation method based on case-finding studies is therefore discussed in chapter two and will not be considered any further in chapter three, where the methods selected for a national comparison are evaluated in more detail. While this methodology is not seen as an adequate model for other European countries for the reasons mentioned the results of the case-finding studies are recognised as very helpful background information for the work of the group.

## 2.1 France

### 2.1.1 Sources and studies

In France, the global estimate is 7 million of experimental drug users, 2 million of occasional users and about 160,000 heroin addicts. The target group for the group of problematic drug users are usually heroin addicts and iv. drug users.

The following sources have been used for estimation purposes:

- experimental drug users and occasional users:  
School survey (INSERM 1993) among young people;  
National health survey (Baromètre santé 1995) on adults.
- heroin addicts:  
National survey on drug addicts treated (SESI)  
Database on drug addicts in specialized centres (INSERM).

### 2.1.2 Estimation methods

#### Demographic method

The prevalence of heroin addiction in France was estimated in analogy to a well-known formula in demography. There, the total of a stationary population is calculated as the product of the number of births and the average life duration. By replacing the number of births with the number of incidence cases (first treatment contact) and the average life duration with the average length of addiction an estimator of the number of drug addicts was constructed. The average length of addiction was calculated on the basis of the average number of treatment contacts and the period in between. This method will be referred to as Demographic Method throughout this report and will be described in more detail in chapter 4.3.

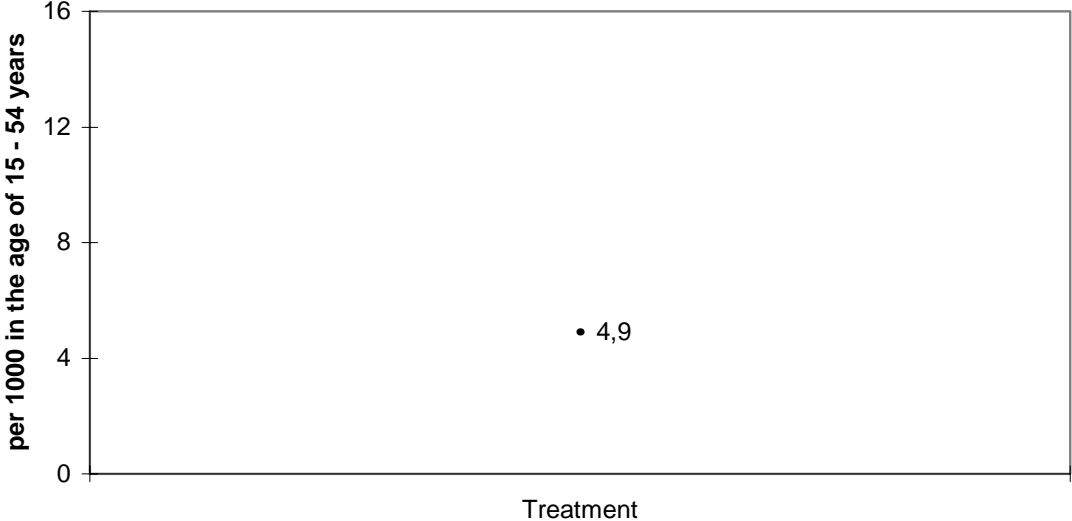
**Table 1 Estimations of problematic drug use for France**

Year	Data	Method	Target Group	Prevalence	Rate /1000
1993	Treatment	Demographic Method	Heroin Addicts	160.000	4,9

Total Population 15-54 years: 32.2 million (1995)



**Chart 1      Estimations of problematic drug use for France**



## 2.2 Germany

### 2.2.1 Sources and studies

In Germany data from police and customs on first offenders against drug laws and on drug related deaths are available. Additionally, outpatient and inpatient treatment units provide information via the national monitoring system (EBIS). Every three to four years a national survey on the use and misuse of psychotropic substances is conducted. All these sources have been used for estimation purposes. While for some years independent estimations were made by different organisations - e.g. the Federal Office of Investigation and the IFT - in 1993 for the first time a work-group of all relevant experts in this field was installed which should develop a comprehensive estimation of problematic drug users. One of the first decisions taken by this group was not to use a single estimation figure but to define three relevant groups of people in contact with drugs.

The broadest group are people, which have tried drugs at least once in their life (lifetime users). Some of these individuals are defined as occasional users based on their patterns of use. All "hard drugs" are targeted, which include any illicit drug other than cannabis. The definition has later been revised to leave out MDMA. A problematic sub-group of this broader group is defined on the basis of high frequent drug use or intravenous drug use (IDU). This group is rather close to the target group of this project. The recent global estimate for this group is 100,000 -150,000.

### 2.2.2 Estimation methods

In this group also different estimations were used and combined afterwards. The first one is an attempt to calculate the underestimation of injecting heroin users on the basis of the 1990 German population survey. Based on an American study (Turner, Lessler & Gfroerer, 1992), it was assumed that a small proportion of non-respondents would display the same prevalence of drug use as the respondents, while a substantial proportion would have a higher prevalence. These assumptions were then related to estimates derived from the drug-related death multiplier method and a series of possible values were calculated. These estimates indicate that the German population survey underestimated the number of injecting heroin users by a factor of between seven to ten (IFT et al., 1994). As in 1990 drug prevalence was low in Eastgermany these estimates de facto are estimates for Westgermany.

#### 1. Survey based multiplier method

The basis of this method is a population survey done in all of Germany in 1995. The total number of subjects was extracted, who used opiates, cocaine, amphetamines or MDMA at least 20 times during the last 12 months. This group was defined as recent users of hard drugs. A sub-group of high frequency users was defined operationally by a frequency of drug use above 100 times. On the basis of comparisons of prevalence rates found for subjects, which were reached directly and easily during the project against those, who could be contacted only after several attempts were made to estimate the amount of underreporting. The non-response rate, on which this calculation was based, is 35%. The estimation of high frequency use of hard drugs was 81,000 - 122,000 persons in all of Germany.

This method will be further examined in detail in chapter 5.4.

#### 2. Multiplier based on police data method

For an estimation based on police data the total number of subjects, who were registered for a drug related crime for the first time, was summed up over a period of 10 years. Only heroin and offences concerning personal use, not trafficking of drugs, were considered. The period of 10 years reflects the mean duration of an individual's drug use, which was found in the literature. This figure was corroborated by treatment statistics for drug users. A multiplier was calculated for the dark field using a ratio of the total number of drug related deaths to the number of these deceased individuals previously registered by the police as hard drug users. For 1995 the number of hard drug users was estimated to 126,000- 152,000. Up to 1991 only figures for Westgermany are available. Due to the low drug prevalence in Eastgermany this will have no serious effects.

This method will be further examined in detail in chapter 4.2.

### **3. Multiplier based on general practitioners method**

A very specific method was developed and applied by KIRSCHNER (1996). He used a sample of general practitioners in Westgermany, who were asked about the number of iv drug users amongst their patients. The assumptions of this method are:

- a rather high percentage of iv drug users seeks treatment every year for different reasons (90%)
- their iv drug use is known to the medical doctor

Double-counting was accounted for by dividing the number of patients by the average number of medical treatments per year, which were calculated for treated drug addicts. As the survey will most likely not be repeated, the basis of this method is no longer available at least for Germany. It only includes iv drug use as other patterns of use are expected to be much more difficult to detect by general practitioners. The applicability as well as the validity of this method therefore seems to be limited.

### **4. Multiplier based on treatment data method**

Treatment data are available from about 600 out-patient centres and clinics. Based on the total number of treatment centres in all of Germany and on the assumption, that about 30 to 40% of all problematic drug users are contacted by a treatment unit every year an estimation of the total figure of drug users was made. In addition drug addicts treated in inpatient centres were included on the basis of data from about 100 clinics. The number of inpatient patients was reduced by 50%, according to the proportion of inpatient clients which were sent by outpatient centres and already counted therefore in the outpatient statistics. The extent of double counting produced by parallel treatment of the same individuals in different treatment units during one year was estimated as 5% to 20%. Based on the ranges given the total number of people addicted to hard drugs was estimated to 81.000-129.000.

This method will be further examined in chapter 4.4.

### **5. Estimation based on the number of drug related deaths**

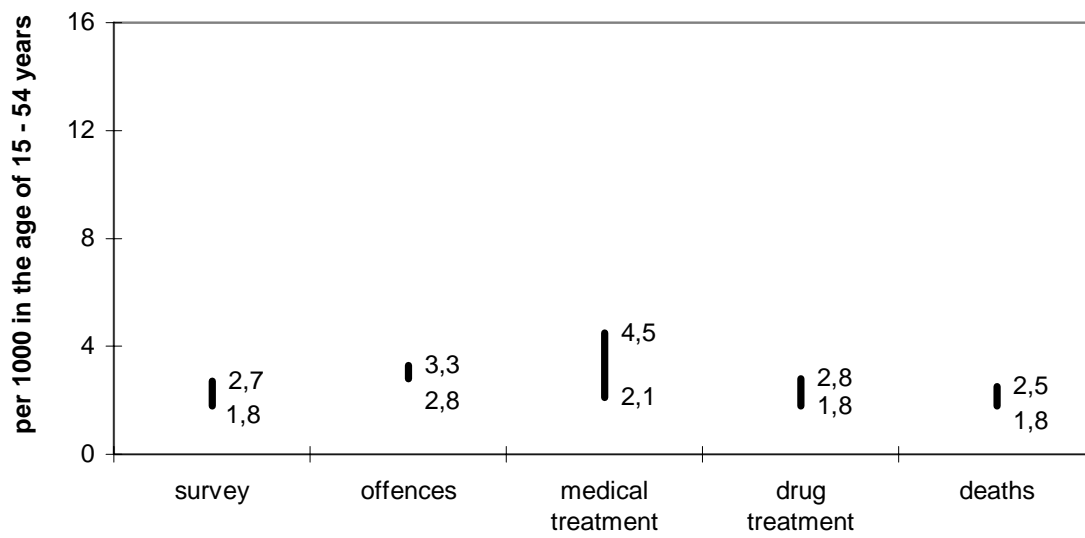
Each year about 1600 drug related deaths are registered in all of Germany. As studies on emergency room episodes and others indicate an annual mortality rate of 1,5-2% for drug addicts in Germany, this can be used as multiplier for the calculation

of the total number of drug addicts. As mortality is mostly linked to iv drug use, changing patterns of drug use can influence this estimation in a critical way. The sharp increase in methadone substitution programmes in Germany for example seems to reduce mortality for drug users - which is one of the intentions of the programme. This might effect the validity of this type of estimation. The estimation is 80.000 - 112.000 for this method.

**Table 2 Estimates of problematic drug use for Germany**

Year	Data	Method	Target Group	Prevalence	Rate /1000
1995	Surveys	regression using response waves	High frequency hard drug users	81.000 - 122.000	1,8 - 2,7
1995	First offences against drug laws	coverage multiplier based on drug related deaths	heroin users	126.000 - 152.000	2,8 - 3,3
1995	Medical treatment	ANOMO coverage multiplier	iv drug addicts	97.000 - 204.000	2,1-4,5
1995	Treated persons	coverage multiplier	hard drug addicts	81.000 - 129.000	1,8-2,8
1995	Drug related deaths	coverage multiplier	hard drug addicts	80.000 - 112.000	1,8-2,5

Total Population 15-54 years: 45,4 Mill. (all of Germany)

**Chart 2 Former estimations of problematic drug use for Germany**

## 2.3 Italy

### 2.3.1 Sources and studies

In Italy different sources of information are available. While many in-depth information e.g. urine tests and conscript surveys are available for some of the 103 provinces, at the national level only police/customs and treatment based data are available. The data are collected at the national level by the Ministry of Health and by the Ministry of the Interior via the regional administrations and prefectures. More exact and detailed estimations of drug use are available for some cities or regions especially in the north and central Italy. The target group of the procedures are opiate users. Some studies from the National Research Council will be made in Verona and Bari for testing the peer monitoring as an alternative way of prevalence estimation.

### 2.3.2 Estimation methods

#### 1. Conscript testing

A project for the estimation of drug abuse prevalence has been carried out in 1995. The research was supported by the Prime ministry - Department of Social Affairs and conducted by the National Institute for Health and the Ministry of Defence. Basically in this project drug testing (urinary screening for cannabis, opiates and cocaine) of a representative sample (over 26.000) of young men at the first medical examination for military service was matched with their demographic profile. The prevalence rate of opiates was found at 4.3‰ for 18 year old males. This gives a total number of 1.380 persons in this group. For the estimation of the total number of opiate users the age and sex marginal percentage distribution of the subjects in treatment services was used as reported in table 3:

**Table 3 Marginal percentages of subjects in treatment services**

	18 years old	other age groups	Total
male			85,3%
female			14,7%
Total	0,6%	99,4%	100,0%

The resulting total figure has been calculated as 269,632 opiate users.

#### 2. Multivariate Indicator Method

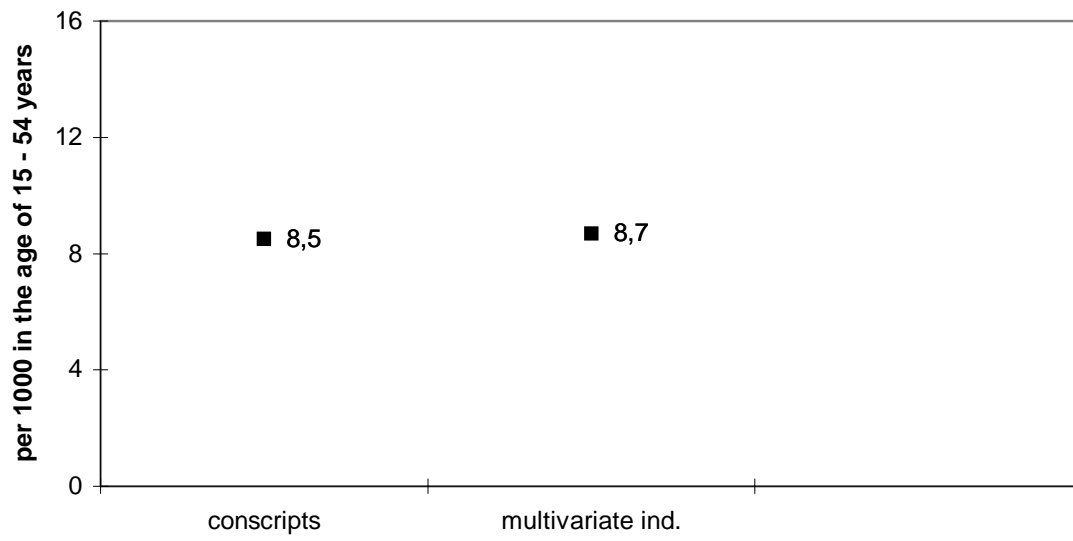
From 1984 to 1992 several indicators from the Ministry of Health, the Ministry of the Interior and the Ministry of Justice were linked together to a multivariate indicator estimate. The sources used include police data on seizures and mortality, clients in treatment, Aids cases and addicts in jail and treatment information. A multiple regression analysis calculates weights for each region. Two regions, which offer independent estimates of drug users are used as anchor points. This method will be further discussed in chapter 4.1.

**Table 5 Estimations of problematic drug use for Italy**

Year	Data	Method	Target Group	Prevalence	Rate /1000
1996	conscripts tests	Multiplier for coverage	Opiate users	269.632	8,5

		of both sexes and all age groups			
1996	school survey	Multiplier	Lifetime experience with opiates	485.669	15,4
1996	treatment, police, emergency ...	Multivariate indicator	Drug Addicts	273.746	8,7

Total Population 15-54 years: 31,6 Mill

**Chart 3** Former estimations of problematic drug use for Italy



## 2.4 The Netherlands

### 2.4.1 Sources and studies

In The Netherlands the availability of data on prevalence estimation is also much better at a regional level than nation-wide. Several household surveys have been conducted in Amsterdam (1991, 1993, 1996) and a school survey takes place every 3-4 years. In a new study on heroin use and petty crime a sample of 16 cities were used. As sources data from police files and treatment centres (LADIS) were available, which were reanalysed for this project. The target group was defined as opiate users, mostly heroin users. The global estimate for this group is 25,000-28,000.

### 2.4.2 Estimation methods

This description is based on a short version of Bieleman & Snippe (1997). The estimates are extrapolations of figures from drug care agencies and police.

#### 1. Extrapolation based on figures from the drug care agencies

This calculation was made using data on the number of hard drug users in contact with care agencies. The proportion of the total population of hard drug users who were in contact with care agencies was calculated on the basis of the number of hard drug users registered at a care agency and estimates of the total number of hard drug users in a sample consisting of 16 municipalities. In this exploration, hard drug users were divided into opiate users and cocaine/amphetamine users.

On the basis of the total number of hard drug users registered at care agencies, and the calculation of the average percentage of hard drug users in contact with one of the help agencies in one year, the size of the total population of hard drug users in The Netherlands was estimated. In 1993, 17,171 opiate users were registered in the National Alcohol and Drugs Information System (LADIS). The care agencies in the municipalities in the sample reached between 33% and 78% of the total population of opiate users. It appears that in these municipalities the care agencies reached on average 57% of the total number of opiate users in one year. If the care agencies reached on average 57% of the total number of users nationally, then in 1993 there were over 30,000 opiate users in The Netherlands;  $(100 : 57) * 17,171 = 30,125$ .

The percentage of users reached by care agencies is mostly estimated by care agencies and police. In four cities, where more extensive research was conducted the percentage is estimated to be on average 62%. If this is taken as an average percentage nationally, then there were 27,700 opiate users in The Netherlands;  $(100 : 62) * 17,171 = 27,695$ .

This method will be further discussed and elaborated in chapter 4.4.

#### 2. Additional estimation of primary cocaine and amphetamine addicts

In addition to opiate users, there were 2,230 cocaine users and 519 amphetamine users registered at the national drug care agencies in 1993. Little is known regarding the users of these hard drugs. Population estimates, and contacts with care agencies and police are dealt with only sporadically in the literature. The number of opiate users who come in contact with care agencies is to a large extent positively influenced by the supply of methadone. A similar type of substitute does not exist for

cocaine and amphetamine. It is assumed that users of these drugs have contact with care agencies less frequently than opiate users. A research project by INTRAVAL (Bielemann & de Bie, 1992) on the character and extent of cocaine use in Rotterdam revealed that 11% of cocaine users who did not use opiates reported that they had serious problems with cocaine. A third of these problematic users (38%) had contact with the drug care agencies. On the basis of this contact percentage, the total number of cocaine users with serious problems is around 5,900 in The Netherlands;  $(100 : 38) * 2,240 = 5,895$ . If these 5,900 problematic cocaine users are added to the above mentioned 27,700 opiate users (assuming a one year contact percentage of 62%), a total of 33,600 opiate and problematic cocaine users is arrived at. Caution is advisable regarding this estimate. The estimate is based on research in one city that is not representative for the whole of The Netherlands. Therefore, this figure should be viewed as a preliminary estimate that provides an indication of the number of problematic cocaine users. A more reliable estimate of the number of problematic cocaine users in The Netherlands requires more information than is available at this time.

### **3. Extrapolation on the basis of police figures**

Unfortunately, no national figures are available on the total number of hard drug users registered by the police, despite the fact that the HKS (Recognition System) is a national system. For this reason, the estimate of the total population of users is based on a sample of municipalities, stratified by number of residents. For 13 municipalities data on police registration were collected. The 13 municipalities define the average number of users registered by the police in the categories of municipalities to which they belong. These averages are then extrapolated in order to estimate the total number of registered users nationally. In this way, the total number of hard drug users registered by the police in their Recognition System is estimated at 11,800. There is no information concerning drugs found, so a distinction between opiates and cocaine cannot be made.

Attempts were made to identify those users who actually resided in the municipality where they were registered by the police. In Arnhem and Vlissingen, two border towns with many drug tourists, on average 35% of the registered hard drug users are not residents of the municipalities. This can lead to double counting of individuals. Therefore for some municipalities it is assumed that only 65% of the registered users reside there. The resulting estimate is an underestimate as smaller municipalities are not included, registration is not always conducted consistently and carefully and the reduction of cases by 35% for some municipalities with an high proportion of commuters might totally miss some relevant cases. The extent to which cocaine users are included in the estimate is not known. It is assumed that cocaine users are less inclined to report that they are hard drug users when taken into custody. As a result, cocaine users will be underrepresented in the estimate.

On the basis of the HKS registered hard drug users, an estimate of the total number of opiate users in The Netherlands was made. In order to make such an estimate, the proportion of hard drug users who come into contact with the police must be known. Research applying the nomination method was used. Such research has been carried out in the municipalities of Utrecht and Groningen (INTRAVAL 1991, 1995). In this research it was found that 45% of users in Utrecht and 39% of users in Groningen reported that they had been in contact with the police during the previous year. On the basis of this information, it is assumed that 42% of users come into

contact with the police each year. Accordingly, the number of hard drug users in the Netherlands is estimated to be 28,100;  $(100 : 42) * 11,806 = 28,110$ .

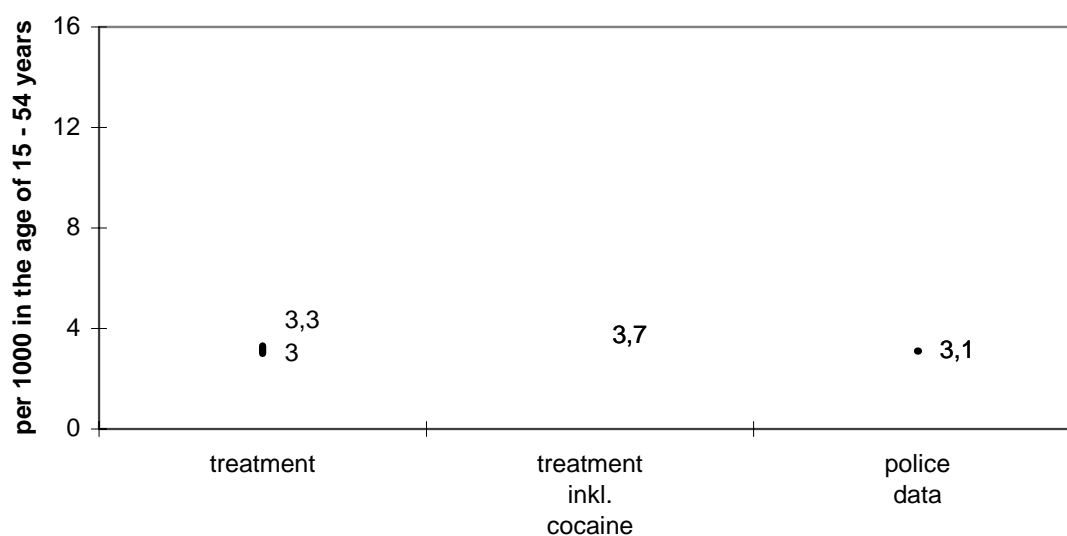
It can be concluded that these two extrapolations lead to conservative estimates. The average of these two estimates should therefore be interpreted as the minimum estimate of the number of opiate users in the Netherlands. This minimum estimate is 28,000 opiate users.

**Table 6 Estimations of problematic drug use for The Netherlands**

Year	Data	Method	Target Group	Prevalence	Rate /1000
1993	treatment	coverage multiplier	opiate users	27.695 - 30.125	3,0/3.3
1993	treatment	coverage multiplier	opiate and cocaine users	33.600	3,7
1993	police data	multiplier	opiate users	28.100	3,1

Total Population 15-54 years(Mill): 9,1 Mill

**Chart 4 Former estimations of problematic drug use for The Netherlands**



## 2.5 Sweden

### 2.5.1 Sources and studies

The "modern" drug problem in Sweden developed during the 1950s and 1960s and the first years of the 1970s. The number of drug addicts and the pattern of drug use then had adopted a seize and shape which only have undergone small changes until today. In comparison to other European countries, the Swedish development was unique in that more severe forms of drug use almost entirely concerned amphetamines (Olsson, B. 1994). Further, it grew within and to a large extent was contained within an already existing criminal subculture. The influx of addicts who started their drug career as a part of the "flower-power" era and lacked contacts with this culture was very limited (CAN, 1997).

Over the years, three comprehensive studies have been made in order to arrive at national prevalence estimates (CAN, 1997). The first was done already in 1967, and was based on a case-finding study in the Greater Stockholm area. Estimates for the entire country, based on other information indicating the difference between the studied area and the rest of the country, yielded a final estimate of 6,000 addicts. A vast majority of them injected amphetamines. From 1967 and during the next five years, other indicators showed a rapid increase in drug use which then levelled off. Around 1975, heroin was introduced on the Swedish drug market and created a slight increase in the number of drug addicts during the next few years.

In 1979, a new nation wide case-finding study was conducted. All known addicts were reported from sources such as social services, hospitals and other medical units, police, prisons, probation offices, drug treatment units, NGO's and a few other organisations. The target population consisted of persons who illegally had used narcotic drugs during the last 12 months and who either injected drugs (regardless of frequency), or who used drugs by other ways of administration on a daily or almost daily basis. The capture-recapture technique was used to take the "dark figure" into account resulting in a final estimate of 12,000 addicts in Sweden (Olsson, B. et al., 1981).

The decade to come, showed limited incidence rates. Fear of HIV and AIDS, as well as massive drug policy efforts may have contributed to this. On the other hand, as only few left the state of "heavy drug addiction", the net result nevertheless was a slow but steady increase in numbers. In 1992, the next and most recent attempt was made to estimate the number of addicts in Sweden (Olsson, O. et al., 1994). The methodology was in large a replication of the 1979 study, with identical definitions, but this time a sample of 100 local communities was included in the case-finding instead of the total number of communities. Application of the capture-recapture technique and an enumeration for the whole of Sweden gave an estimate of 17,000 heavy drug addicts.

## 2.5.2 Estimation methods

### Methodological Problems

Certain objections have been raised against the way the estimates, especially in the 1992 study, have been calculated. Kühlnhorn et al. (1996), claim that the enumeration from the sample of communities to the country is erroneous. The investigators originally excluded addicts who were reported, but who only were visitors in the communities belonging to the sample, before the capture-recapture calculation was done. According to Kühlnhorn et al., not only those with a permanent address, but also visitors, should be included. If this is done, the estimate must be raised to 22,000 addicts, which further is regarded as a minimum since dependence between the reporting systems will underestimate the true number. Compared to the estimate of 12,000 in 1979, this would mean a doubling of the addict population in 13 years. This is indeed a sensational result which contradicts the general perception of a successful drug policy, other indicators as well as the bulk of data Kühlnhorn et. al. present in their own report.

A closer look at the two ways the enumeration's have been done, clearly shows that the one originally used by the investigators is the most appropriate. Kühlnhorn et.al's. calculations would be correct if the sample was drawn - or rather - the data collection was made at one specific point of time. Then, an addict would only "belong" to one community and the extrapolation to the country would not constitute a problem. In practice, however, the data collection lasted for a minimum of 12 and a maximum of 24 month. This means that addicts had the possibility to move back and forth on numerous occasions between communities included in or excluded from the sample. The net result will be a false increase in numbers, since addicts with permanent addresses in one of the sampled communities, most certainly would be registered and reported from this community, even if they have spend most of their time outside it, and since non-resident addicts also will be reported if they have visited and become known as an addict in a sampled community. The mobility of the addict population is sometimes considerable, especially if they live close to bigger cities or if they undergo treatment (treatment institutions are spread all over the country).

An other source of error, which is not corrected for in the 1992 investigation or discussed by Kühlnhorn et. al., is the problem of misclassifications or false positives, that is persons erroneously classified as heavy drug addicts. This problem was thoroughly discussed in the 1979 study (UNO 1980) and based on theoretical considerations and empirical data, it was calculated that the point prevalence estimate should be reduced by approximately 25% as a result of the net effect of misclassifications (false positives and negatives). Neither the 12,000 estimate for 1979 or the 17,000 estimate for 1992 include this correction.

On the other hand, dependence between reporting systems (police, social services, prisons, hospitals, etc.), create a capture-recapture enumeration which is assumingly 10-15% too low. The net effect is a reduction of the point prevalence estimates between 10% and 15%. To underline the uncertainty which nevertheless prevails, a security interval can be given ( $\pm 20\%$ ) in the recalculations. This results in an estimation of 11,990-17,990 cases for 10% reduction and 11,330-16,990 for 15% reduction. These new calculations do not change the relative relation between the numbers in 1979 and 1992, merely that the previous levels seem too high.

An alternative way to estimate the effect of misclassifications is to look at the number of addicts who have been reported from more than one data source. In some cases conflicting information are presented, that is one (or more) informants have described the subject as a heavy drug addict whereas the very same subject is classified as "non-heavy" by others. The official calculations are based on a maximum assumption. If only one informant has classified someone as "heavy", this is enough to count him as such a case (no matter if several others says he is not). As has been mentioned, this leads to a point prevalence estimate of about 17,000 heavy drug addicts.

We could, however, instead require that all informants should agree that the drug user in question fulfil the definition of heavy drug addiction. With this assumption, we get a minimum estimate of about 9,500 heavy drug addicts. A more reasonable assumption would be to say that at least half of the informants should agree upon someone being a heavy addict. This gives a mean estimate of about 15,000 person, only slightly higher than the figures presented in table 1. One should remember that 40% of the group of heavy addicts were reported from only one source. Among them, some have probably made mistakes in their classifications, thus indicating that a reduction should be made by 700-800 persons (according to the discussion about misclassifications above). If the number of addicts using heroin as dominant drug is calculated according to the above mentioned method. Cannabis is set at the same relative level as the official estimate. The "other" category mainly consists of amphetamine users.

**Table 7 Estimates of problematic drug use for Sweden**

Year	Data	Method	Target Group	Prevalence	Rate /1000
1992	treatment, police, social services	case finding + capture-recapture	heroin addicts	1,250-3,000	0,3 - 0.7
1992	treatment, police, social services	case finding + capture-recapture	other addicts (mostly amphetamines)	6,650-11,150	1.4 - 2.4
1992	treatment, police, social services	case finding + capture-recapture	cannabis addicts	1,600-2,850	0.4 - 0.6

Total Population 15-54 years: 4,6 million

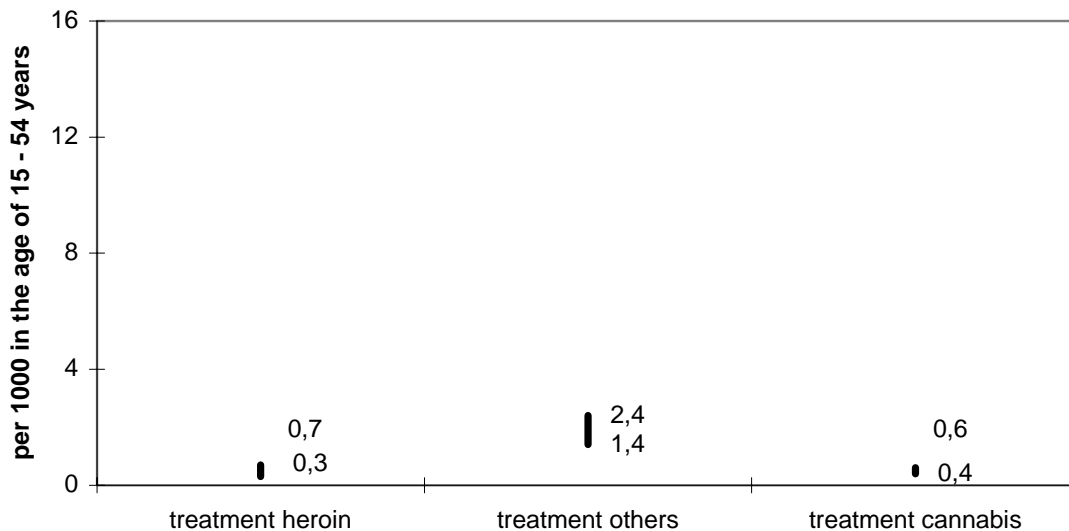
In sum, scrutinising the two case-finding studies lead to the conclusion that the official estimates presented for 1979 and 1992 are too high. However, the new calculations result in similar reductions which do not change the relative increase between these years. Separate **calculations for different substances** in 1992, give about 2,500 heroin addicts and 10,000 addicts of other substances of which a vast majority have injected amphetamines at least once during the last 12 month (cannabis excluded). A few hundred persons using other opiates than heroin, should probably be added to get a category including all opiates. However, the raw data do not allow an accurate estimate of this category.

#### **Other information concerning the 1992 case-finding study**

The majority of addicts are reported from the social services and the police. Together, they reported approximately 75% of all addicts. The overlap, that is, addicts reported from both, is about 33%.

No exact information exist on duration of drug use. Rough estimates give the following distribution: 0-2 years 2%; 3-4 years 5%; 5-9 years 14%; 10+ years 47%; unknown 31%.

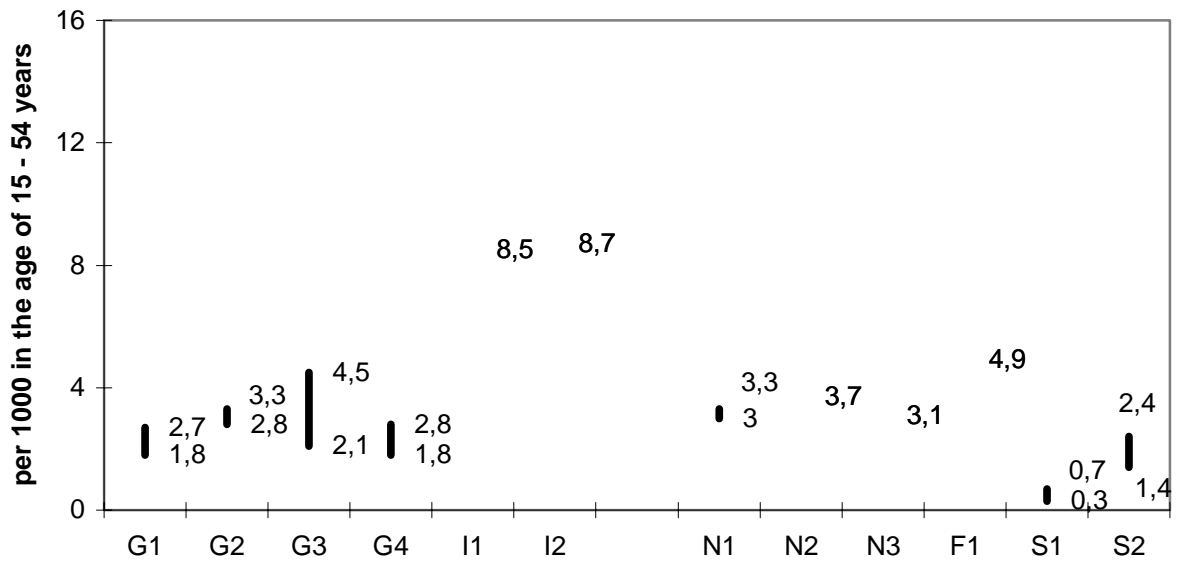
**Chart 5 Former estimations of problematic drug use for Sweden**



## 2.6 Overview on prevalence estimations given before

Chart 6 integrates all estimates described in chapter two as an overview. It has to be underlined again, that target groups for these estimates have been defined differently, data are based on different years and other methodological differences have to be considered, when these data are compared. Much more comparability will be given in the methods evaluated in chapter four in a more consistent way.

**Chart 6 Former estimations of problematic drug use for all participating countries**



G1-G4 Germany  
 I1 - I2 Italy  
 N1 - N3 The Netherlands  
 F1 France  
 S1 - S2 Sweden



### 3 Overview on methods used

#### 3.1 Target groups

In reality today drugs are used in quite mixed, often chaotic patterns. Only very few opiate users don't use any other drug beside these substances. On the other side opiates, especially heroin, are usually those drugs, which for the user cause most of the risk. If the pattern of drug use has to be labelled and categorised in a simple way it can be done on the basis of the drug which personally causes the highest risk. This concept was followed here. Concerning the target group the following definitions were established in accordance with the local estimation prevalence project:

- **Problem drug use** is defined as intravenous drug use (IDU) or long duration/regular use of opiates, cocaine and/or amphetamines. Ecstasy and cannabis are not included
- The operational definition of a person as a problem drug user can be
  - contact with treatment services due to drug problems or
  - contact with police due to drugs or
  - emergency room episodes for drug related reasons

The target group for the estimation is further restricted to **problematic opiate users**. While the project group agrees that there are relevant groups of problematic drug users which are not covered by this definition (e.g. primary cocaine users and problematic users of ecstasy) as a first step these groups are not included. Some of the estimation methods simply don't work for or significantly underestimate them. So the multiplier in the police multiplier method is based on information on drug related deaths. As in the first place iv. drug users are at comparable high risk to die from drug use, this multiplier can be used only for them. This means, according to the modes of administration in most European countries, it works for heroin and/ or opiate users.

As in most of the countries of the EU heroin is still causing the biggest drug problems, a high percentage of the total group of problematic drug users is covered by this definition. As a first step this restriction will therefore cause not too much problems. In future, other steps will be necessary to produce estimates, which also include other relevant groups.

The operational definition of the target group for the estimations in this project can be summarised as follows:

- If a person uses heroin or other opiates he is always classified as opiate user regardless whether he or she also takes other drugs. This is the primary target group of this project.
- If no opiates are used then the person is a non-opiate user. He or she can then be classified as cocaine user (disregarding other drugs) or, if no cocaine is used, as amphetamine user.
- In order to reduce complexity the notion of primary and secondary drugs has not been included.

This logic of categorising patterns of drug use is summarised also in table 8. below.

**Table 8 Groups of problem drug users**

	Groups	Opiates	Cocaine	Ampheta- mines
Opiate users	Problem Opiate user	y		
Non-opiate users	Problem Cocaine user	n	y	
	Problem Amphetamine user	n	n	y

Non-opiate-users 2 + 3

### 3.2 Selection of methods

Table 9 gives an overview on the different methods which have been used in France, Germany, the Netherlands and Sweden for prevalence estimation. The methods have been described in chapter three. ⊗ indicates the country, which has specific experiences for one method and therefore produced the detailed description of the method for this project. Countries marked by „x“ have either used these methods before or felt able to do so within this project.

**Table 9 Methods for prevalence estimations used or seen as applicable by different countries**

	Data	Method	France	Italy	Ger- many	Nether- lands	Swe- den
1	police death treatment aids jail	multivariate indicator	x	⊗	x	x	
2	police data	different multiplier	x	x	⊗	x	
3	treatment	demographic multiplier	⊗	x	x	x	
4	treatment	coverage multiplier	x	x	x	⊗	
5	population surveys		x		⊗		
6	school surveys	multiplier		x			
7	conscripts urine tests	multiplier		x			
8	general practitioners	multiplier			x		
9	case finding study	capture- recapture					⊗

From the estimation procedures, which have been used in the different countries a selection was made. Methods 1 to 5 were selected as most promising as standard methods for the EMCDDA. The most important aspect is the availability of sources in

as many countries as possible. The availability of data in the countries represented in this work group was taken as criterion as it seemed very likely, that the situation in other countries of the European Union would be rather similar. Therefore methods based on treatment or police data were judged as applicable in nearly all countries, as these sources are available in most of the cases. Method 1 was seen as especially interesting as it is based on a combination of several indicators of prevalence. Methods 6 to 9 were no longer followed in this project as in most countries these data were not available (e.g. conscript tests), data collection seemed to too expensive for a routine method (e.g. case finding) or covered only parts of the critical age group (school surveys).

## 4 Test of selected methods

### 4.1 The Multivariate indicator method

#### Description of the method

The application of this method requires a breakdown of national states by regions or provinces and data indicating the prevalence of drug use. These data must be available for each of these regions. For at least two regions reliable prevalence estimates derived independently are also required. The method is described step by step and follows the application of the method as described for Italy in Mariani, Guaiana & Di Fiandra (1994).

1. Data indicating the prevalence of drug use must be collected for a one year period for each region. The following variables were selected as indicators:

A	Number of offences against drug laws
B	Drug-related deaths
C	Clients in treatment
D	Cases of AIDS related to IDU
E	Addicts in jail

In addition, the population size F of the population at risk is needed. In this case the population at risk was defined as the 15-54 year olds in 1995. As already mentioned above for at least two regions reliable estimates G (maybe resulting from a capture-recapture study) are necessary. These regions are called „anchor points“.

2. For each of the variables A to E, G and for each region the figure per 100,000 inhabitants has to be calculated.

$$A\_F = A * 100,000 / F$$

$$G\_F = G * 100,000 / F$$

3. Principal components analysis requires standardised values for A\_F to G\_F (subtracting the mean and dividing by the standard deviate).
4. Principal components analysis of A\_F to E\_F. Two factors are extracted and rotated, the coefficients of the first one are saved.
5. A linear regression (dependent variable: G\_F, independent variable: coefficients of the first factor) results in estimated prevalence rates per 100,000 inhabitants. Finally, these have to be transformed to prevalence estimates for the regions (multiplying with F and dividing by 100,000).

#### Results

As reported in Table 10 the estimated number of iv drug users in Italy is 273,746.

**Table 10 Parameters, anchor points and estimates of the Multivariate indicator method for Italy**

Variables utilised for Italy								
	A	B	C	D	E	G	Estimate	
A	Number of offences against drug laws							
B	Drug-related deaths							
C	User in public services							
D	Cases of AIDS related to IDU							
E	Addicts in jail							
G	Estimated values of regional IDU populations (capture-recapture estimates)							
Italian regions 1995	A	B	C	D	E	G	Estimate	
1 Piemonte	2238	92	10805	281	1445	16752	16468	
2 Valle d'Aosta	49	3	231	5	32		14500	
3 Liguria	996	130	2989	159	387		29314	
4 Lombardia	3633	206	12298	1004	1943	29472	18799	
5 Trentino A.A.	458	22	758	53	135		17918	
6 Veneto	1216	93	6781	222	711		12666	
7 Friuli V.G.	416	21	2212	32	214		12290	
8 Emilia Romagna	1493	102	6398	402	987	17820	18396	
9 Marche	457	16	2273	63	199		12314	
10 Toscana	1189	71	8699	245	740		13807	
11 Umbria	236	14	2386	34	194		10331	
12 Lazio	2527	118	10687	514	1996		17723	
13 Campania	1811	113	9178	167	1260		11675	
14 Abruzzo	385	24	3071	22	384		10072	
15 Molise	68	3	435	2	60		8541	
16 Puglia	1014	48	9551	150	892		9193	
17 Basilicata	128	6	707	9	70		9229	
18 Calabria	516	10	2253	39	167	9791	9492	
19 Sicilia	997	39	6030	170	694		9656	
20 Sardegna	485	24	4560	130	490		11362	
Total	20312	1155	102302	3703	13000		<b>273746</b>	

### Comments

Concerning data collection it is important that data are collected in each region in the same way. If, for instance, in some regions variable E reflects the number of addicts in jail but in other regions the number of convictions of addicts to jail a serious bias will emerge. As regression analysis with more independent variables than measurements for the dependent variable is not possible (the number of indicators exceeds the number of anchor points), principal components analysis was applied. Output of the principal components analysis are the estimated factor scores which serve as measurements for one independent variable in the regression analysis. The idea behind this principal components analysis is that the unobserved prevalence influences the observed indicators and that no other common factor has an effect on the indicators.

Moreover, using principal components analysis we indirectly assume a linear relationship between the unobserved prevalence and the observed indicators. This is criticised in Person et al. (1976). They emphasise that only a monotone relationship can be assumed. The indicators need not be linear functions of the prevalence. For example, an increase in prevalence will lead to an increasing number of addicts in treatment. In practice the number of addicts in treatment is restricted by capacity of treatment services. If prevalence increases by e.g. 100,000 persons the change in

treatment admissions will be smaller if treatment capacity is already nearly fully used. As a consequence Person et al. (1976) replace the indicator values with their ranks in the principal components analysis. Person et al. claim that the information contained in the ranks suffices. In addition, the ranked indicator values are robust against measurement errors. Nevertheless, we feel that the information on the difference in size between the different regions is needed. This information is lost if the indicator values are replaced by their ranks.

In the multivariate indicator situation an alternative to principal components analysis would be a LISREL-type modelling (see e.g. Bielby, 1986). This method, however, also assumes a linear relationship between the latent variable and the indicators. The regression analysis is built upon the assumption of a linear relationship between the estimated factor scores and the variable G\_F. This is a very sensitive assumption: If the real relationship is non-linear the prevalence estimates depend heavily on the choice of the anchor points (Person et al., 1977).

## **Experiences in other countries**

### **France**

The multivariate indicator method cannot be applied in France because there exists only one independent prevalence estimate of a geographical area (Toulouse). The estimate for Toulouse refers to greater Toulouse, but not the whole region. Nevertheless, different indirect prevalence indicators have been collected by region. For the twenty-two regions of France data on arrests, deaths, treatments, AIDS and steribox sales are available.

### **Germany**

Due to the available databases some indicators had to be slightly modified. With the variables B (drug-related deaths), D (cases of AIDS related to IDU), and F (size of the 15-54 year old population) no problems arose. For variable A (number of offences against drug laws) the number of all offences against drug laws excluding cannabis offences was chosen. The figures for variable C (clients in treatment) are published by the Federal Ministry of Health. Unfortunately, these figures are based on different data sources for each of the Laender. Regarding variable E (addicts in jail) data reflect not the number of imprisoned addicts but the number of convictions. As recent capture-recapture studies are not available in Germany a substitute had to be found. Instead of capture-recapture estimates figures from a monitoring study on general practitioners in West Germany was taken. This study yielded an estimated number of one IDU per 308 inhabitants in cities with at least 500,000 inhabitants. As three big cities in West Germany (Berlin, Hamburg, Bremen) are also "Laender" the number of addicts in these three cities was extrapolated and selected as anchor points. Regarding Berlin this extrapolation was based on the number of inhabitants of West Berlin as it is assumed that nearly all of the Berlin addicts live in West Berlin.

**Table 11 Parameters, anchor points and estimates of the Multivariate indicator method for Germany**

Variables utilised for Germany							
A	Number of offences against drug laws						
B	Drug-related deaths						
C	Clients in treatment						
D	Cases of AIDS related to IDU						
E	Convictions of imprisoned addicts						
G	Estimated values of regional IDU population						
German Laender	A	B	C	D	E	G	Estimate
1995							
1 Baden-Württemberg	13225	255	17500	317	1084		22191
2 Bayern	9538	224	12500	307	581		23906
3 Berlin	5507	93	7500	441	599	7073	6978
4 Brandenburg	282	2	100	3	1		5081
5 Bremen	2689	51	3000	51	145	1798	1888
6 Hamburg	6827	141	8500	117	674	5444	5256
7 Hessen	7825	166	9000	256	370		12531
8 Mecklenburg-Vorpommern	123	0	145	3	0		3666
9 Niedersachsen	8020	99	9000	91	1017		16136
10 Nordrhein-Westfalen	26759	380	31000	424	2442		38809
11 Rheinland-Pfalz	3594	69	5500	63	97		796
12 Saarland	1043	25	1200	19	34		2175
13 Sachsen	474	4	375	0	1		8869
14 Sachsen-Anhalt	320	3	150	0	2		5398
15 Schleswig-Holstein	1585	53	3600	21	80		5534
16 Thüringen	205	0	38	0	0		4954
<b>Total</b>							<b>179031</b>

The overall estimate for West Germany is 151,000 which is very close to the figure mentioned in the general practitioners study (ca. 150,000). In this calculation East Berlin is also included since the figures for variables A to E are not available for West Berlin. The multivariate indicator for all of Germany yields an estimated number of 179,000 problematic drug user (Table 11).

Furthermore, a two-anchor-point-solution for West Germany was applied (Hamburg and Bremen) since Berlin has also an East German part. Obviously, the prevalence per 100,000 inhabitants is underestimated if the estimate for West Berlin is divided by the number of inhabitants of all of Berlin. But the two anchor-point-solution yielded a much too low estimate for West Germany. This is certainly due to the fact that both anchor points have higher prevalence rates compared to other federal Laender of West Germany. Of course IDUs are only a subset of problem drug users. The indicators probably are more or less appropriate for estimating the extent of intravenous drug use.

## The Netherlands

In The Netherlands it seems problematic to find appropriate regions. The most common one is the division in provinces, there are 12 of them. However, these provinces do not collect data. Unfortunately, the working areas of the police forces, the justice departments and the drug care agencies are not the same as the provinces. Moreover, it is very difficult to get data from these organisations due to privacy rules. Approval is necessary of every individual organisation, more than 60 in total. This is a very time consuming operation with a high risk that some of them do not want to provide the required information.

Data therefore were collected on this province level from organisations as CBS (Central Bureau of Statistics), IVV (Information Agent Drug care), Ministry of Health and so on. Table 12 gives an overview of the indicators collected in The Netherlands.

**Table 12 Parameters and estimates of anchor points for The Netherlands**

Variables utilised for the Netherlands						
	A	B	C	D	E	G
A	Number of offences against drug laws					
B	Drug-related deaths					
C	Clients in treatment					
D	Cases of AIDS related to IDU					
E	Addicts in jail					
G	Estimated values of regional IDU population					
Dutch regions 1995	A	B	C	D	E	G
1 Groningen		1		--		800 (City of Groningen)
2 Friesland		3		--		
3 Drenthe		2		--		
4 Overijssel		--		--		
5 Flevoland		--		1		
6 Gelderland		1		--		
7 Utrecht		1		1		950 (City of Utrecht)
8 Noord-Holland		5		34		
9 Zuid-Holland		12		12		4.000 (Rotterdam) 3.300 (The Hague)
10 Zeeland		1		1		
11 Noord-Brabant		4		2		
12 Limburg		3		2		

At present information on clients in treatment, on the number of addicts in jail and on offences against drug laws are not available on a regional level. Addicts are sent to prisons all over the country and there is hardly any relation between the place where they live and the jail where they are sent to. With regard to anchor points there are no reliable estimates on a province level. As an alternative one could take those cities in which one or more estimation methods have been applied (e.g. capture-recapture, nomination, network).

There are two reasons not to apply the multivariate indicator method in The Netherlands. First of all, no appropriate anchor points are available. Reliable estimates only exist for some cities but not for regions. Second, only two indicators are available on the regional level. The figures for two further indicators are known on the national level. Dividing these total numbers by the number of 15-54-year-old inhabitants in the provinces as a substitute for the corresponding figures does not solve the problem as in the above described second step the indicators are again



divided by the number of inhabitants. We also tried a modification of the multivariate indicator method by simply omitting the second step. But with the Italian data this modification resulted in negative estimates for some regions.

### **Sweden**

This method cannot be applied in Sweden. In Sweden all kinds of different levels of regions exist. There is no level which could systematically offer a useful number of indicators. The only estimate to be used as anchor point stems from Malmö back in 1978.

### **Summary**

This multivariate indicator method is based on five fundamental steps:

1. Collection of data on a yearly basis (prevalent cases or events);
2. Calculation of the prevalence per 100,000 15-54-year olds;
3. Standardising the figures per 100,000 15-54-year olds (subtracting the mean and dividing by the standard deviate);
4. Analysis of variables (standardised values) with principal component model (rotated component) and saving of estimated values of the first component as index;
5. Linear regression of the estimates for the anchor points on the coefficients of the first factor and utilisation of regression parameters for estimating the unknown points.

The quality of the derived estimates is contingent on the quality of the required indicators. Both validity and reliability of the collected statistical data are rather questionable and may vary over countries. Quality and selection of anchor points may also influence the results. Although the required indicators would be available in most countries, the information needs to be collected on a regional basis. This information is not available in The Netherlands and Sweden. On the other hand, where data are available as in France, the required second anchor point is missing. While in countries with data collection on a regional level data demands seem be solvable in the future, the method is clearly not applicable in smaller countries where there is no such division by region or province. For Italy and Germany the results are summarised in table 13. Possible sources of biases are summarised in table 14. It is not clear in which direction the prevalence estimate is biased if one indicator is overestimated in all regions including the anchor points. This has two reasons: First, the influence of this indicator on the results of the principal component analysis can not be predicted. Second, the prevalence estimate depends heavily on the anchor points. The linear regression step may correct possible biases due to the indicators.

**Table 13 Estimates (per 1000 inhabitants 15-54 years old) of the Multivariate Indicator Method**

Method 1	France	Italy	Germany	Nether-lands	Sweden
Absolute	x	274,000	151,000 (West)  179,000 (Total)	x	
Rate/1000	x	8.7	4.0 / 3.9	x	

**Table 14 Possible biases: Multivariate Indicator Method**

Target group prevalence estimation	target group of the method used	practical consequences	possible bias
problematic opiate users	drug users in contact with police and treatment	mostly opiates, but also primary users of other substances included	--
	contact with police	not only problematic users	--
	drug users with severe consequences (AIDS, death, emergency)	mostly iv heroin users	--
15-54 years	no restrictions	limited, only less than 1% opiate users in treatment are younger than 15 or older than 50 years	--

## 4.2 Extrapolation from police data

In Germany, law enforcement data collected on the number of drug offenders include information on the substance consumed by an individual. However, drug offenders are only included in the data the first time they are charged and no distinction is made between drug-addicts and episodic users. Additionally, the regular comparison of national drug-related deaths and the registered drug user data allows to keep a record of previously unknown individuals. To estimate the number of first registered hard drug users the number of cases known to the police over the last 10 years are counted. This ten-year period reflects the mean duration of an individual's drug use. A multiplier is then estimated using the ratio of the total number of drug-related deaths to the number of these deceased individuals previously registered by the police as hard drug users. Thus, the following calculations are applied:

T Number of current users of heroin/ opiates

B Number of first registered drug users in past ten years

c Dt/Dn, ratio of the number of drug-related deaths and the number of drug-related deaths previously known to the police,  
where

Dt Number of drug related deaths in a given year

Dn Number of drug related deaths in a given year having been registered as drug user before

$$\Rightarrow T = B * c$$

### Estimation of the benchmark

The number of opiate users registered by the police for the first time serves as a benchmark. According to the literature (Robins, 1979, Bschor, 1987, Marks, 1990) the estimated mean duration of addiction is ten years. To estimate prevalence, the number of first offenders against drug laws in the previous ten years are summed up.

### Estimation of the multiplier

The correction term assuming to reflect the extent of the dark-field is the ratio of the total number of drug-related deaths to the number of these deceased individuals previously registered by the police as hard drug users. Again, this comparison is made over a ten-year period.

### Modification of the method

The proportion of all known users among drug related deaths varies over time. Thus, using just one multiplier might be problematic. Therefore, a variant of this method was developed: In a first step the required proportion is calculated for each year between 1986 and 1995. This information, however, is only available since 1992. For the years 1986 and 1991 this proportion varies between 30% and 55% ( $c = 1,43 - 2,22$ ). To get an estimate of the total prevalence the estimated incidence is again cumulated over ten years (assuming a duration of problematic drug use of ten years).

## Results

In Table 15 the calculations for the estimate are summarised.

### Table 15 Extrapolation from police data for Germany

Year	N of offenders first registered by police B	Correction term $c=Dt/Dn$	Year-specific estimate T
1986-1991	33677	1.43 / 1.86	45158 - 62639
1992	10452	2.23	23308
1993	8384	1.92	16097
1994	8501	2.40	20402
1995	6970	2.57	17913
<b>Total</b>			<b>120878 - 135359</b>

### Comments

According to certain rules individual files are deleted from police records. Thus, double counting can not be excluded and leads to an overestimation of the benchmark. Secondly, the assumption on the mean duration of addiction is hard to prove. This estimate was derived on the basis of several projects but basically is an estimate for mean duration of heroin addiction. There are no reliable estimates for mean duration of addiction of other opiates. At present there is even no information on the variation of mean duration of addiction. It cannot be decided whether the assumption of a mean duration of addiction of ten years will result in an underestimation or an overestimation of the benchmark. In Italy and France duration of addiction is estimated to be 8.5 and 8 years respectively. Nevertheless, for the extrapolation of police data Italy used the assumption of a mean duration of addiction of ten years.

It is important to keep in mind that in Germany the statistics on drug related deaths does not only consist of deaths due to an overdose. Suicides, fatal accidents under the influence of drugs, and deaths resulting from long-term abuse are also included. Therefore, a drug-related death which is not caused by an overdose has certainly a higher probability of being classified as a drug-related death if the drug user has been registered before. This leads to an underestimation of the benchmark.

### Experiences in other countries

#### France

In France the estimation of the multiplier makes use of a local study in Toulouse. The estimation is established:

1. by calculating the number of opiate users arrested by the police at least once during a period of 8 years (estimated mean length of addiction);
2. by estimating the percentage of opiate users that have not been arrested.

#### *Estimation of the benchmark*

It was possible to calculate B by using a special method on the OCRTIS file: the National File of Perpetrators of Drug-related Offences. Repeated arrests of the same individual were added together and the number of different individuals arrested over the last 7 years was calculated. 74,000 individuals were arrested for using or using and selling heroin in France between 1990 and 1996. Extrapolating this number over an 8 year period comes to 85,000.

#### *Estimation of the multiplier*

The multiplier is estimated by combining the results of the two different prevalence estimation methods applied in Toulouse. Information taken from the OCRTIS file provides the number of individuals living in Toulouse who were arrested over the last 7 years. The capture-recapture method provides an estimate of 2,150 opiate users in Toulouse in 1995. 1,000 individuals living in Toulouse were arrested for using or using and selling between 1990 and 1996. Extrapolating this number over an 8 year period comes to 1,150. This results in  $c = 1150/2150 = 0,5$ .

#### *Result*

$T = 85000/0.5 = 170000$ .

#### *Comments*

This method, whose basic parameter was established by means of retrospective observations, has the underlying hypothesis that the phenomenon is stable. The observation period for arrests (1990-1996) is centred around the year 1993. Thus, this estimation is more a reflection of prevalence in the first half of the 1990's. Heroin is the only substance taken into account. Other opiates only represent a marginal share of arrests.

#### **Italy**

In Italy this method can be applied in the same way as in Germany.

Estimation of the benchmark consists of the number of individuals arrested by the police for drug possession for personal use between 1986-1995. For each subject the police gave notion for an eventual penal/administrative sanction to the magistrate before 1990 and to the Prefect after 1990. The indicator includes all types of users (first user, user, addict, etc.), and all types of substances used (cannabis, ecstasy, cocaine, heroine, etc.). In general however, subjects are first offenders against drug laws. This cannot be re-examined for the years before 1990.

#### *Estimation of the multiplier*

The ratio of the number of drug-related deaths to the number of drug-related deaths previously known to the police can be calculated for each year in the period 1986-1995.

#### *Result*

In Table 16 the data for the estimation are summarised.

**Table 16 Extrapolation from police data for Italy (only the „heavy“ substances related notifications).**

Year	N of offenders first registered by the police	N of drug related deaths previously known to the police	N of drug related deaths	Correction term	Year-specific estimate
	B	Dn	Dt	c=Dt/Dn	T
1986	9823	157	292	1.86	18270
1987	14266	437	543	1.24	17726
1988	19424	709	809	1.14	22164
1989	19069	785	974	1.24	23660
1990	13007	957	1161	1.21	15780
1991	24699	972	1383	1.42	35143
1992	24279	934	1217	1.30	31635
1993	20306	795	883	1.11	22554
1994	25945	773	867	1.12	29100
1995	30556	905	1195	1.32	40347
<b>Total</b>					<b>256379</b>

### The Netherlands

In The Netherlands no national police data set exists. 25 police forces have to be contacted. At the moment data collection is still in process. It seems, however, that not all police forces are able to deliver information on first registration. Approximately 6-7 units do not register these data at all.

As an alternative the number of drug users registered by the police in a given year is used as a benchmark for prevalence. For the proportion of drug users that have not come into contact with the police an estimate derived from regional studies conducted in Utrecht and Groningen are taken. The estimates were derived from the following steps:

- T Number of current users of hard drugs
  - B Number of registered drug users in a given year
  - c proportion of hard drug users that have come into contact with the police
- ⇒  $T = B / c$

#### *Estimation of the benchmark*

In The Netherlands the size of the drug using population in a certain year serves as a benchmark. Unfortunately, figures are only available for 13 Dutch municipalities. So these figures are extrapolated to a national figure: To account for the estimated prevalence of drug use in larger municipalities, the Dutch municipalities are stratified by the number of residents. Then the extrapolations for each stratum are summed up.

To avoid double counting only registered hard drug users residing in the concerning municipality are taken into account. Some municipal police departments provide no

information if a registered hard drug user also resides in the municipality. For some municipalities it is known or suspected that not all of their registered users are residents. For those municipalities it is assumed that 65% of the registered also reside within the municipality. Therefore, those municipalities enter the above described extrapolation step with the figure "number of registered hard drug users" x 0.65. The assumption that 35% of the registered hard drug users do not reside in the concerning municipality is derived from police figures in Arnhem and Vlissingen (Bieleman & Snippe, 1997) , two border towns with many „drug tourists“.

#### *Estimation of the multiplier*

It is estimated that 42% of hard drug users come into contact with the police each year. This figure was found using nomination technique. 45% of users in Utrecht and 39% of users in Groningen reported that they had been in contact with the police during the previous year.

#### *Result*

The total number of hard drug users registered by the police in their Recognition System is estimated at 11,800. Given a contact rate of 42% yields:

$$11,800 \times (100/42) = 28,100.$$

The number of hard drug users in The Netherlands for 1993 is estimated to be 28,100. No data are available for 1995.

#### *Comments*

This procedure leads to an underestimation of the benchmark as hard drug users who commit no crimes in their own municipality are excluded. Additionally, figures for small municipalities are not available. Municipalities with less than 20,000 inhabitants are not considered in the extrapolation step. This also contributes to an underestimation of the benchmark. Inconsistent or careless registration is a further source of error. Since type of drug used is not registered by the Dutch police, it is not possible to estimate the extent of the use of certain drugs.

#### **Sweden**

No police data based on individuals are available in Sweden.

#### **Summary**

The benchmark-multiplier method using police data is based on two data sources:

1. The number of first registered drug users in a given time period.
2. The ratio of the number of drug-related deaths and the number of drug-related deaths previously known to the police.

There are a number of methodological problems involved in this method:

- no distinction between occasional and regular users
- double counting can not be excluded
- poly drug use is not accounted for
- delays in data entry
- variations in recording of data between police services
- uncertainty with regard to the estimation of the duration of drug use
- variation in the definition of drug-related death
- link between drug-related death record and record of first registered drug users

In Germany only possession for personal use is used for the estimation of the benchmark. In Italy there are three articles, 72, 74 and 75, of which the last one is 'possession for personal use'. In France four categories exist, two refer to 'simple use' and 'use and resell' and two to trafficking definitions. The French estimation used only the first two, which comprise about 70% of all offences. In The Netherlands not possession of drugs is used but drug users are identified from all other offences (burglary etc.) as possession is very little registered.

Results from the extrapolation of police data are given in table 17, possible biases are summarised in table 18.

**Table 17 Estimates (per 1000 inhabitants 15-54 years old) on the basis of police data**

Method 2	France	Italy	Germany	Netherlands	Sweden
Absolute	170 000	256379	121 000- 135 000	28 100*	--
Rate/1000	5.3	8.1	2.7 - 3.0	2.8	--

\*) Benchmark and multiplier differ from the definitions applied in France, Italy and Germany; only 1993 data available

**Table 18 Possible biases: Extrapolation from police data**

Target group prevalence estimation	target group of the method used	practical consequences	possible bias
problematic opiate users	drug users in contact with police	mostly opiates, but also primary users of other substances included  not only problematic users	overestimation
	for ratio only drug related deaths	only iv drug users, i.e. nearly exclusively heroin users	underestimation, as non iv users are expected to be less often known to the police
15-54 years	no age range set	only very few cases below 15 and above 54	very small



### 4.3 Extrapolation from treatment data I: The Demographic method

The methodological framework used for an extrapolation of treatment data is the demographic theory of stationary populations. A "stationary population" is one which has the following characteristics: its size remains constant, also entry and exit flows (births and deaths) remain constant and balance each other out. The size of the stationary population is equal to the number of births on an annual basis (entry flow), multiplied by the life expectancy rate at birth (average length of life). In analogy to the demographic model, the times when one becomes addicted and when one stops using drugs are considered as "birth" and "death". Accordingly, the prevalence estimate is the product of the number of new users (entry flow) multiplied by the mean length of use.

T estimate of the number of „problematic opiate users“.

B annual flow of new users estimated from the annual number of treatments

c mean length of problematic drug use

⇒  $B * c$

This method is described as applied in France.

#### Estimation of the benchmark

The number of newcomers in treatment who have never been in treatment before serves as a benchmark (OFDT, 1996). In France the annual entry flow of heroin users is not directly available. This has to be estimated from the SESI'S annual survey concerning those who were treated for the first time within the health and social system. This estimation consists of three steps:

1. As SESI regards only those heroin addicts being in treatment in November an extrapolation to the whole year is necessary. The coefficient of extrapolation (5.8) is the number of first treated drug addicts in 1995 divided by the number of those first treated drug addicts being in treatment in November 1995.
2. The proportion of those heroin users treated within the health and social system for the first time (0.36) is derived from the question about previous treatments in the SESI survey.
3. The coefficients found in the two preceding steps are applied to the number of those heroin addicts who were treated in November.

The estimation of the benchmark results in 27,000 users, mainly using heroin or substitute substances, who were treated for the first time in the health and social system in 1995.

#### Estimation of the multiplier

As a multiplier the average length of addiction has to be estimated. This is done by using the following data:

- a The average period of time heroin has been consumed by those treated at specialised centres for the first time (INSERM's 1991 database)
- b The average number of treatment episodes of treated heroin addicts

c The average length of time elapsed since the last time treatment was sought preceding treatment at the time of the survey (SESI's 1993 survey).

Obviously, all observations are right-censored. The number of forthcoming treatments until the end of addiction cannot be observed. Therefore, the mean number of treatments is estimated by doubling the average number of treatments observed up to now. Altogether, the multiplier is estimated by  $a + 2*b*c$ .

For France the mean length of addiction is estimated at 8 years. This estimate, however, may include abstinence periods.

## Result

$$T = 27\,000 \times 8 = 215\,000.$$

## Comments

Drug addicts who have never been and will never be treated are not taken into account in the estimate. Therefore, this method could be completed by applying a coefficient for drug addicts covered by the health and social system. Only the types of use which are well known within the health and social system may be estimated: heroin use, IVDU. With respect to the multiplier the effects of handling right-censoring by simply doubling observed figures are not clear.

Obviously increasing incidence of drug use causes an overestimation of the number of drug addicts, decreasing incidence an underestimation. Until 1992 only rough ideas on prevalence were available for France, the demographic method was an improvement to that. Since services are increasing and the heroin using population is not stationary (probably decreasing) a better estimate is needed. The assumptions of the demographic method do not hold in France at present. Still it could be used as an upper or lower limit if it was clear in what direction results from non-stationary population are biased.

The first undergone treatments dating back to 1995 are an indirect reflection of use which began on average 5 years before in 1990. Thus, this estimate rather reflects prevalence in the early 1990's. The very first prevalence estimation established using this method resulted in a remarkable small figure. The following results were calculated using data from the SESI 1993 survey:

$$T = 20\,000 \times 8 = 160\,000.$$

## Experiences in other countries

### Germany

The French prevalence estimation method is simply the product of an estimate for the mean duration of addiction and the annual entry flow. In Germany data of the number of previous treatments and the time between treatments is not available. In EBIS (the German documentation system on outpatient treatments) questions regarding the number of previous treatments and their duration are not available for all subjects. The French method had to be slightly changed for the German situation. Note, that in the following the term „newcomers“ refers to all individuals starting treatment in a certain year regardless of previous treatments.

*Estimation of the benchmark*

As shown in table 19 EBIS provides the number of newcomers in outpatient treatment centres (Tauscher et al., 1996).

**Table 19 Newcomers in 1995**

	newcomers in 1995	number of treatment centres
male opiate addicts	6288	456
female opiate addicts	1978	448

This yields an estimated total of

$$(6288 \times 1091) / 456 + (1978 \times 1091) / 448 = 19861 \approx 20,000 \text{ newcomers.}$$

Based on the proportion of individuals treated for the first time, which is available in EBIS in 1996 the number of opiate addicts treated for the first time is calculated as 63.9%:  $20.000 \times 0.639 \approx 12800$ .

*Estimation of the multiplier*

From EBIS the following figures for the duration of heroin addiction of the 1995 newcomers in outpatient treatment centres are available (table 20 is defined according to ICD-10) (Tauscher et al., 1996):

**Table 20 Duration of drug use**

	Duration in years					Total number
	1	2-3	4-5	6-10	> 10	
male	16.5%	21.3%	20.0%	26.7%	15.5%	5560
female	18.6%	21.8%	20.4%	24.7%	14.5%	1713

Note that all the observations are right-censored, thus only the beginning of addiction but not its end can be observed. To estimate length of addiction the observed times since beginning of addiction were doubled. As "observed times" the midpoints of the intervals [0;1], [2;3], [4;5], and [6;10] and the lower limit of the open interval (10;  $\infty$ ) were taken. This yields:

$$1 \times 0.165 + 5 \times 0.213 + 9 \times 0.2 + 16 \times 0.267 + 20 \times 0.155 = 10.402 \text{ for males,}$$

and

$$1 \times 0.186 + 5 \times 0.218 + 9 \times 0.204 + 16 \times 0.247 + 20 \times 0.145 = 9.964 \text{ for females.}$$

Altogether, the mean duration of addiction is estimated by

$$(10.402 \times 5560 + 9.964 \times 1713) / (5560 + 1713) = 10.299 \approx 10 \text{ years.}$$

### *Result*

T = 12.000 x 10 = 128.000 opiate addicts.

### *Remarks*

There are some differences between the original French method and the application in Germany. Concerning the multiplier in Germany a very simple method was applied to estimate the non-observed duration of addiction. This method provided very bad results in an empirical comparison with the results of a panel analysis in an attempt to estimate the duration of being employed in a certain company (Preisendörfer & Wallaschek, 1987). This finding is not surprising since in a panel study not all observations are right-censored and therefore more information is provided. As we do not have any results from panel studies concerning the duration of addiction we have to rely on cross-sectional observations. Estimates could be improved if we had some information on the distribution of duration of addiction: If reasonable assumptions on the distribution of duration of addiction were available the observations could be fitted to their distribution and result in a more reliable estimate of the mean duration of addiction. Furthermore, estimating prevalence by weighing the newcomers by their expected remaining duration of addiction and taking the average would make more sense with the German data. This is tried in the next example. If a mean duration of addiction of ten years is assumed regardless of the time being addicted the following estimates are achieved:

$$[0,165 \times (10 - 9.5) + 0.213 \times (10 - 2.5) + 0.2 \times (10 - 4.5) + 0.267 \times (10 - 8)] \times \\ \times (6288 \times 1091) / 456 = 49857$$

for male addicts and

$$[0,186 \times (10 - 9.5) + 0.218 \times (10 - 2.5) + 0.204 \times (10 - 4.5) + 0.247 \times (10 - 8)] \times \\ \times (1978 \times 1091) / 448 = 16108$$

for female addicts.

Of course this rather rough method should be improved as about 15% of those in treatment (those who have been addicted more than 10 years) are no longer taken into account. This results in rather low estimates.

Two estimation methods for the duration of addiction have been tried. Both are not satisfying. The first method consists of simply doubling the observed times. Consequently an individuals estimated remaining duration of addiction equals the up to now experienced time of addiction. This method takes into account that the expected remaining duration of addiction obviously depends on the up to now observed duration of addiction. This method, however, is rather rough. In the second case a figure found in the literature was taken (10 years). Then an individuals estimated remaining average duration of addiction is "10 years minus the observed duration of addiction". Applying this method means that individuals with a duration over 10 years can not be regarded.

To improve the demographic method for Germany reliable figures on the expected remaining duration of addiction conditioned on the up to now experienced time of addiction are required. In addition, the prevalence estimate should be a weighted

average of the number of newcomers where the weights are the estimated remaining duration of addiction.

## Italy

### *Estimation of benchmark*

By the national system for data collection of the Ministry of Health the annual number of people in treatment at public services as well as the number of new cases (first treatment) are provided (table 21).

**Table 21 Annual number of total and new cases in treatment public services**

Years	Total cases	New cases
1985	13.905	6.416
1986	32.719	9.605
1987	39.039	12.133
1988	47.488	15.923
1989	56.604	18.209
1990	66.702	23.811
1991	92.853	32.386
1992	103.805	34.987
1993	105.147	35.126
1994	113.984	36.762
1995	123.828	38.964

In addition, the Ministry of Interior annually collects data on the number of people in treatment at private services. From this the incidence rate for the public service in 1995 can be calculated:  $38964 / 123828 = 0.3147$ .

On 31-12-1995 the number of people in treatment at private services was 22,161. Using the incidence rate of treatments in public services the number of new cases treated in private services can be estimated:  $22161 \times 0.3147 = 6973$ .

Thus, the annual entry flow in public and private services in 1995 is  $38964 + 6973 = 45937$ .

### *Estimation of the multiplier*

Utilising the data of the epidemiological monitoring system working in the Lombardia Region the following figures for the duration of heroin addiction of the 1995 newcomers are derived (table 22).

**Table 22 Duration of addiction**

	New cases % by duration of addiction at time of treatment demand					total number
	1 year	2-3 years	4-5 years	6-10 years	> 10 years	
male	28.6 %	26.2 %	13.1 %	19.0 %	13.1 %	3903
female	35.0 %	12.6 %	11.6 %	26.6 %	14.2 %	828

Taking the midpoints of the categories and doubling yields an estimate of the length of addiction:

for males  $1 \times 0.286 + 5 \times 0.262 + 9 \times 0.131 + 16 \times 0.19 + 20 \times 0.131 = 8.44$

and

for females  $1 \times 0.35 + 5 \times 0.126 + 9 \times 0.116 + 16 \times 0.266 + 20 \times 0.142 = 9.12$

### Results

The estimated mean duration of addiction is 8.5 years. Applying the formula for T yields an estimated total of  $45937 \times 8.55 = 392,986$  opiate addicts in Italy.

### The Netherlands

The number of newcomers in treatment who have never been in treatment before is based on information from the IVV. It is not a complete picture, because of the way the clients of the ambulant drug care agencies have been registered before 1994. From 1994 on corrections can be made for double counting. What has been done is to take the individual clients in 1996 and see how many were already registered in 1995, and how many in 1994. This is seen as the new comers in 1996. This number is 2,383. Looking to the literature of studies, researches etc. of hard drug users the last couple of years you might say that the mean duration of addiction is at least 12 years.

#### Estimation

$12 \times 2,383 = 28.596$

### Summary

The demographic multiplier method based on treatment data makes use of two data sources:

1. The incidence new users in treatment
2. the estimated mean length of problematic drug use

The presented method assumes the drug using population to be stationary. Recent trends in incidence, however, indicate an increase in most countries which violates the assumption. As already discussed this will result in an higher estimate of the number of problematic opiate users in this countries.

As mentioned above in connection with method 2 (extrapolation from police data) the estimation of the mean duration of drug use needs further exploration and reliable data. Table 23 gives the results for the demographic multiplier method and in table 24 possible biases are summarized.

**Table 23 Estimates (per 1000 inhabitants 15-54 years old) on the basis of treatment data**

Method 3	France	Italy	Germany	Nether-lands	Sweden
Absolute	215 000	393 000	200 000	28 500	--
Rate/1000	6.6	12.4	4.4	3.1	--

**Table 24 Possible biases: Extrapolation from treatment data I**

Target group prevalence estimation	target group of the method used	practical consequences	possible bias
problematic opiate users	drug users in contact with treatment	mostly opiates, but also primary users of other substances included  mostly problematic users, as they actively seek treatment	overestimation
15-54 years	no age range set	only very few cases below 15 and above 54	--

#### 4.4 Extrapolation from treatment data II

This estimation method extrapolates the number of opiate users who underwent treatment in a given year. The extrapolation factor is the estimated reach. This method has been used in The Netherlands and can be stated as follows:

- T estimate of the number of „problematic opiate users“  
 B total number of „problematic opiate users“ who underwent treatment in 1995  
 c estimated coverage rate of „problematic opiate users“ by the treatment system in 1995  
 ⇒  $T = B/c$

#### Estimation of the benchmark

The benchmark is the total number of opiate users (including poly-drug users) registered at care agencies (Bieleman & Snippe, 1997).

#### Estimation of the multiplier

In 12 municipalities the staff of care agencies was asked to estimate the number of opiate users in their own municipality. In four municipalities (Groningen, Utrecht, Amsterdam, Rotterdam) more extensive research was conducted to estimate the size of the opiate using population. On the basis of these four municipalities the reach was estimated to be 62%. Including the remaining 12 municipalities this leads to an estimated reach of 57%.

#### Comments

The figure obtained with this method is assumed to give a minimum estimate for the extent of hard drug use in the Netherlands since e.g. addicts in inpatient drug care agencies were not included.

#### Result

In 1993, 17,171 opiate users were registered in the National Alcohol and Drugs Information System (LADIS). The care agencies in the municipalities in the sample reached between 33% and 78% of the total population of opiate users. Given that the

care agencies reached on average 57% of the total number of users nationally, then there are over 30,000 opiate users in The Netherlands:  $17171 \times (100/57) = 30125$ . The percentage of users reached by care agencies is estimated by the care agencies and police. In four cities, where more extensive research has been conducted the percentage is estimated to be on average 62%. If this is taken as an average percentage nationally, then there are 27,700 opiate users in The Netherlands:  $17171 \times (100/62) = 27695$ . For The Netherlands the number of opiate users is estimated in the range 27,695-30,125. Data for 1995 were not available.



## Experiences in other countries

### France

#### *Estimation of the benchmark*

The benchmark B is estimated from the results of the SESI annual drug addiction survey in 1995. 12,750 „problematic drug users“ who mainly used heroin or substitute substances, were treated in the health and social system in November, 1995. The extrapolation of this figure to all of 1995 results in an estimated benchmark  $B = 56\,000$ .

#### *Estimation of the multiplier*

The multiplier c is estimated from a database called "étude multicentrique 1995", which provides information on drug addicts seen in the streets (IREP; n= 1703). Out of 100 individuals, 65 reported having previously undergone a course of treatment, and 32 reported having undergone a course of treatment the preceding year:  $c = 0.32$ .

#### *Result*

$T = 56000/0.32 = 175\,000$ .

#### *Remarks*

The method's weakest part is the coverage rate. The data used have been roughly calculated: The multiplier is based on information from accidental sampling. It has not been proven that this sample represents all types of users, small subgroups may be overrepresented. The coverage rate of treatment has no equivalent in the SESI data set from which the benchmark was taken.

### Germany

#### *Estimation of the benchmark*

In Germany only 459 out of 1091 outpatient centres are monitored by EBIS. Additionally, the documentation system SEDOS supervises 17,545 out of 32,600 inpatient treatments. Both documentation systems list treated clients with symptoms of addiction according to the ICD-10 criteria. The situation in Germany is quite different from the situation in The Netherlands or in France where each hard drug user attending drug care agencies is registered. Therefore, in a first step we have to extrapolate the number of clients registered in EBIS or SEDOS to the total of all addicts in treatment centres.

The estimate arrives at

$B1 = 1091/459 \times 15,900 \approx 37,800$  addicts in outpatient treatment centres

and

$B2 = 32,600/17545 \times 3,070 \approx 5,700$  addicts in inpatient treatment centres.

About 50% of the inpatient treatments are sent from outpatient treatment centres to inpatient treatment. Furthermore, it is assumed that 5%-15% of the clients are registered twice in the same year. Regarding these two figures a total of about 32,500-38,600 addicts in treatment is estimated.

### *Estimation of the multiplier*

In the next step a multiplier has to be applied to estimate the size of the drug addicted population. It is assumed that about 30%-40% of problematic consumers come to inpatient or outpatient treatment centres. Using this assumption for the multiplier the result would be 81,000 to 129,000 'hard drug addicts' in Germany.

### *Remarks*

As has been mentioned before, not all centres are registered in EBIS (national treatment data base). Additionally, not all centres that are in EBIS provide treatment and some of the "centres" may be treating a small number of drug addicts (being more focused on alcohol). This makes the estimation a treatment multiplier quite difficult. The assumption is that 30-40% of DUs come to treatment during a year, but this differs by type of DU and maybe also by region. On the basis of EBIS and SEDOS it would be possible to estimate different benchmarks for opiate users and non-opiate users. However, regarding the multiplier more research on the reach of opiate users and non-opiate users is necessary.

### **Italy**

The Italian procedure applied to treatment data differs from the benchmark-multiplier method described in this chapter. Instead it utilises capture-recapture methodology on the basis of two independent treatment services and their overlap. In Italy yearly prevalence is collected by two different services (public agencies SERT and private agencies which are mainly rehabilitation centres and therapeutic communities). The number of subjects in the private services known by the public services (sent by the SERT to rehabilitation centres) can be utilised to estimate the size of the heroin using population with "need for care". This figure is estimated applying capture-recapture. The 1995 data which come from the information system of the Ministry of Health and the Ministry of Interior are summarised in table 25.

**Table 25 Clients in public and private treatment agencies in Italy in 1995**

		private services		
		treated	not treated	total
public services	treated	15,923	107,905	123,828
	not treated	16,413		
total		32,336		

The size of the heroin using population with "need for care" is estimated as  
 $T=(123,828 \times 32,336) / 15,923 = 251,467$

As altogether  $123,828 + 32,336 - 15,923 = 140,241$  of 251,467 persons are in treatment in 1995 the estimated coverage rate is 55.8%. This is quite similar to the Dutch figure.

Capture-recapture relies on the assumption of quasi-independence: Here it means that the probability of being treated in a private service must be independent of having been treated in a public service or not. Since clients are sent from public

services to private services the quasi-independence assumption surely is violated. Obviously, the probability of being treated in a private service is higher for clients of public services than for a not treated addict. Therefore, the size of the heroin using population with need for help probably is underestimated, the coverage rate is overestimated.

### Sweden

In Sweden multipliers are very difficult to apply, as there are no routine data available on problematic drug use in treatment (definition is too wide).

### Summary

The multiplier-benchmark method using treatment data simply extrapolates from the number of individuals treated in a given time period to the total population by applying a multiplier that estimates the reach of problematic opiate users by the treatment system. While treatment monitoring data are available and in parts quite reliable, some basic problems are difficult to solve. First, in some of the countries not all service providers and relevant institutions are included in the data collection on treatment activities. This needs another multiplier, which is sometimes hard to calculate. It seems even more difficult to estimate the coverage rate of the treatment system, which can vary considerably due to the characteristics of the national services. The coverage rate should be based as much as possible on clear evidence, e.g. based on surveys in drug using populations. Table 26 shows the results of extrapolations from treatment data; table 27 covers possible biases.

**Table 26 Estimates (per 1000 inhabitants 15-54 years old) on the basis of treatment data**

Method 4	France	Italy	Germany	Nether-lands	Sweden
Absolute	175 000	251 500	89 000 129 000	27 700 30 100	
Rate/1000	5.4	7.6	1.9 - 2.8	3.0-3.3	

**Table 27 Possible biases for extrapolation from treatment data II**

Target group prevalence estimation	target group of the method used	practical consequences	possible bias
problematic opiate users	drug users in contact with treatment	mostly opiates, but also primary users of other substances included  mostly problematic users, as they actively seek treatment	overestimation
15-54 years	no age range set	only very few cases below 15 and above 54	--

## 4.5 Estimation from general population surveys

### Estimation method

Prevalence rates from general population surveys can also be used to estimate the size of a specific group of drug users. Multiplying the proportion of a well defined group of "problematic drug users" with the size of the general population at risk yields an estimate of the number of problematic drug users in that population. In this context problematic drug use is defined as regular use of opiates, cocaine or amphetamines excluding ecstasy and cannabis. In a recent attempt to estimate the extent of hard drug use in Germany a regular user of hard drugs including opiates, cocaine, LSD, amphetamines or crack was defined as a person who took these drugs at least 100 times in the past year. The age of the 1995 survey sample ranged between 18 and 59 years, the sample size was nearly 8000. The estimate without correction for underreporting arrived at 44,000 to 63,500 problematic drug users (Bühringer et al. , 1997).

### Comments

The General Population Survey in Germany covers the age group 18-59. Estimates for the 15-17 year olds would be available from a comparable Youth Survey.

However, there are some restrictions concerning estimation from general population surveys: First, the sample is made "representative" for the demographic structure of the general population by weighing according to demographic variables like age and gender. Nevertheless, it is not guaranteed that this weighing procedure makes the sample also representative for patterns of drug use. Second, due to underreporting and other nonsampling errors the figures from general population surveys especially with respect to heroin use are usually too low (IFT et al., 1994).

### Experiences in other countries

Population surveys also available in France, Italy and Sweden.

#### France

Information on frequency of drug use is not available in France. Therefore it is not possible to extract a sub-group of drug users from the total studies, which can be characterised as „problematic“ based on the frequency defined in chapter 3 for the target group of this project.

#### Italy

In Italy data are only available from school surveys (ESPAD). As problematic patterns of drug use, especially use of opiates typically starts after the age of 17 or 18, the age group 15-16, on which the ESPAD study is based, is not sufficient for an estimation of prevalence.

#### The Netherlands

In The Netherlands a national population survey is underway. Data will be available in 1998. Every 3-4 years a school surveys taken place.

#### Sweden

Sweden has found little relation between general population surveys and problematic drug use. According to Swedish survey data the number of opiate users was

estimated to 6,000, of whom 1,500 could be classified as 'problematic opiate users'. This means that survey data missed most problem drug users, as the current estimate yields about 6,000 problematic opiate users in Sweden. Table 28 shows the results from GPS; Table 29 summarises possible biases with respect to General Population Surveys.

**Table 28 Estimates (per 1000 inhabitants 18 - 59 years old) on the basis of survey data**

Method 5	France	Italy	Germany	Nether-lands	Sweden
Absolute			44.000 - 63.500		
Rate/1000			0.9-1.3		

**Table 29 Possible biases for extrapolation from General Population Surveys**

Target group prevalence estimation	target group of the method used	practical consequences	possible bias
problematic opiate users	recent opiate users with a lifetime frequency of at least 100	only part of them are expected to be problematic users	overestimation
15-54 years	18 - 59	only very few cases between 15 and 18 expected	small underestimation

## 5 Evaluation and recommendations

### 5.1 Comparison of estimations

**Table 30 Results of the estimations produced by the tested methods**

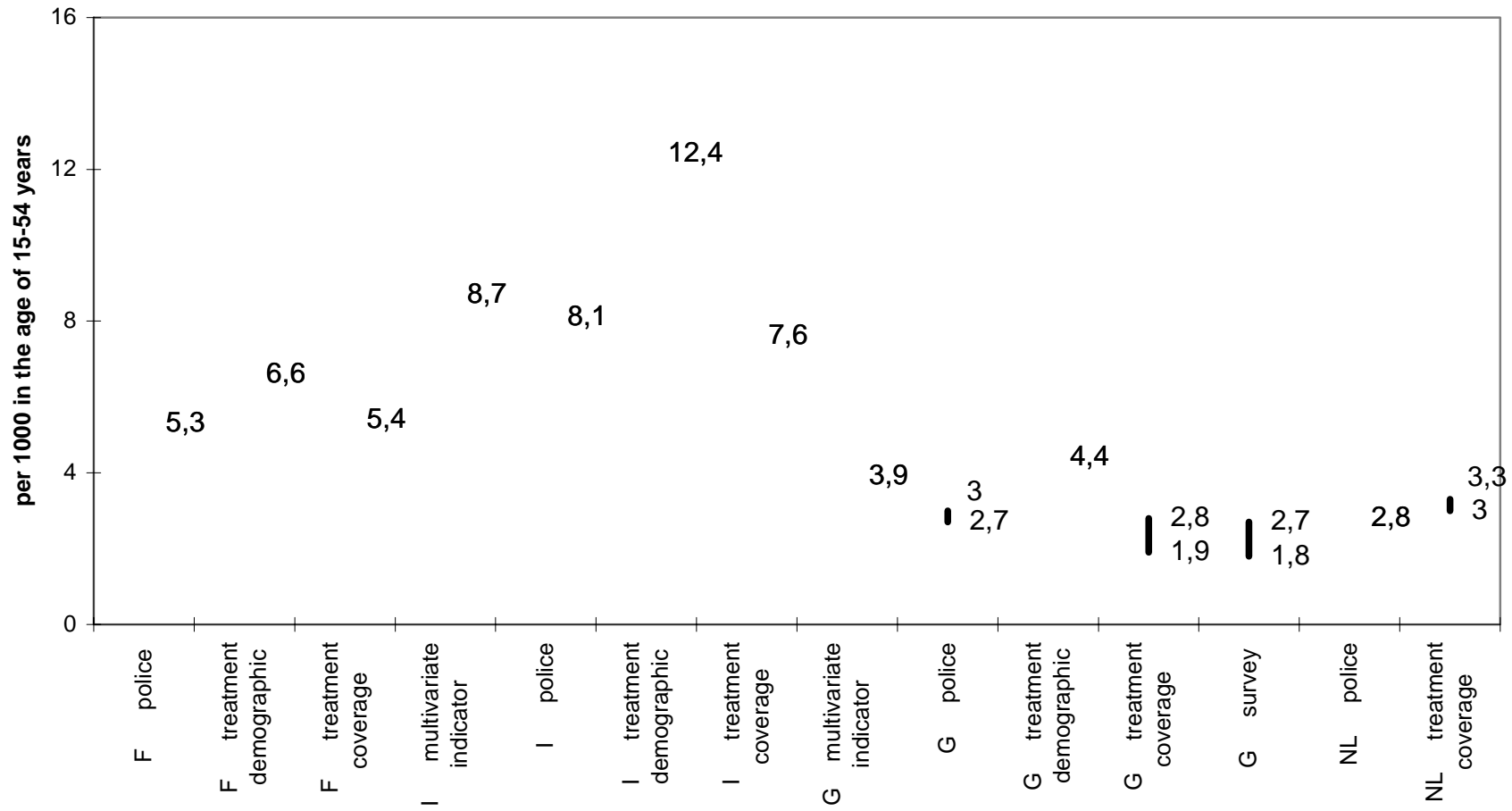
Data	Method	France	Italy	Germany	Nether-lands	Sweden
1 police death treatment aids jail	multivariate indicator method		8.7	3.9		
2 police	different multipliers	5.3	8.1	4.9 - 6.0	2.8	
3 treatment	demographic multiplier	6.6	12.4	4.4	3.4	
4 treatment	coverage multiplier II	5.4	7.6	1.9-2.8	3.0-3.3	
5 population surveys	--			0.9-1.3 <sup>1)</sup>		

1) data refer to the age group 18-59 years

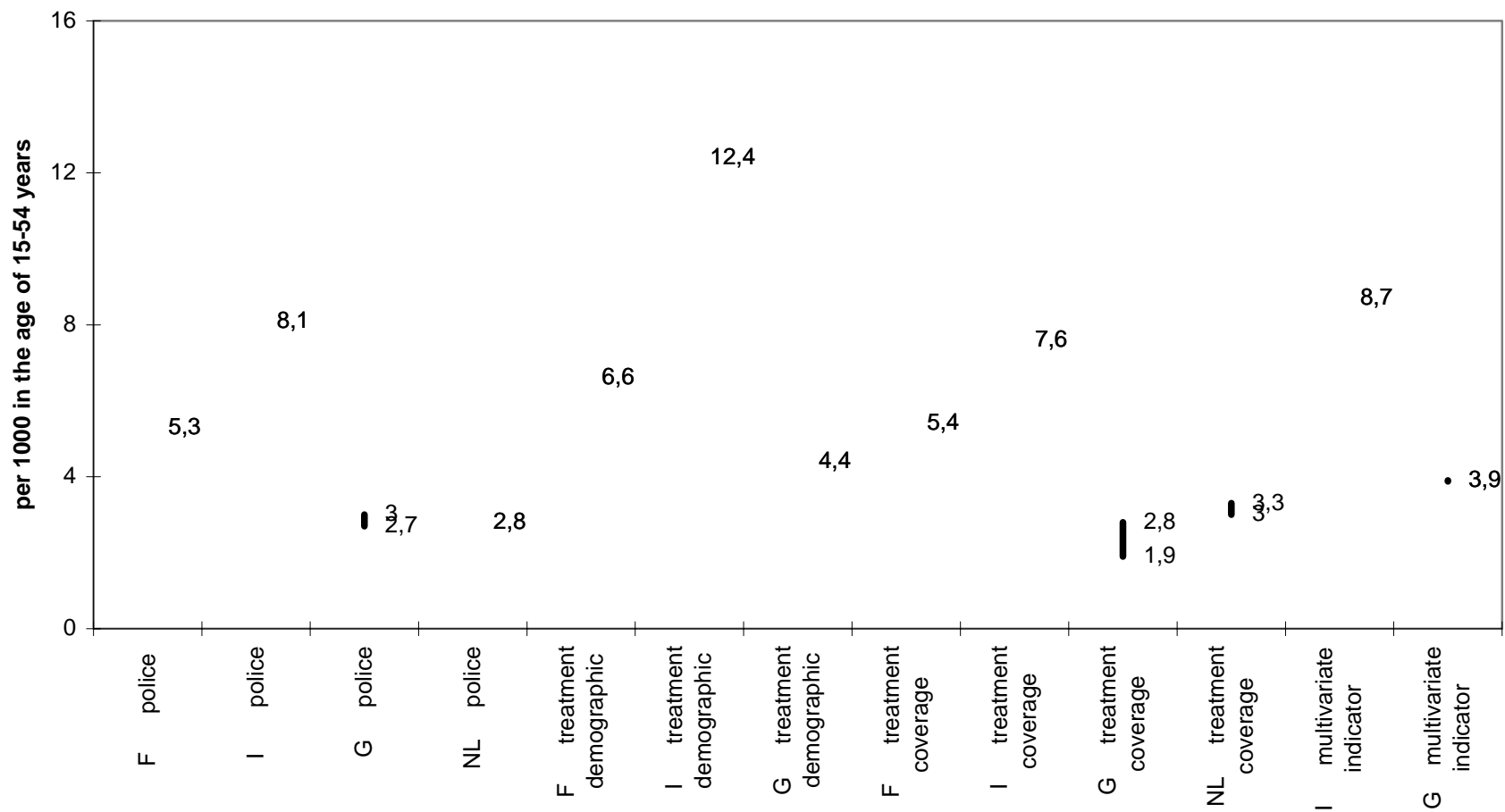
Comparing the results from the different methods used in this project, it appears that most of the figures for each country are rather close to one another. Rather high estimates compared to others results from the treatment demographic multiplier method for Italy and the extrapolation from police data for Germany. Given the small base rates, however, the relative range is considerable high.

The sequential order of countries is the same for each of the methods used: the highest prevalence figures are found for Italy, followed by France and Germany. Unfortunately no data from Sweden were available for the methods under examination and except for the demographic multiplier method the data from The Netherlands are based on 1993 only.

**Chart 7 Overview on estimates from tested methods by country**





**Chart 8 Overview on estimates from tested methods by method**

## 5.2 Choice of the best method

The **treatment demographic multiplier method**, shows considerable effects, if incidence of drug use changes over time. On the basis of these effects estimations seem to be biased in different directions depending on the changes in incidence during the last years. Also within France recent applications of this method result in apparently too high estimates based on the same phenomenon. For these reasons this method is not recommended for further use at an European level.

**Estimates from population survey** could not be utilised in any other country apart from Germany. This and the difficult translation of „problematic use“ into „high frequency of use during the last 12 month“ in the survey also is seen as critical. At the moment therefore also this method is not recommended at the European level for estimation purposes.

The best results were found for **police multiplier method** and **treatment coverage multiplier method**. For both data are available in most of the countries. These data exist also for The Netherlands and might be accessible in the future for estimation purposes. As the resulting estimates do not differ dramatically, a combination of both of these estimates might be the method of choice as a standard in Europe. Apart from this general positive evaluation, there are still many details to improve. The most important aspects found in this study are:

- the coverage multiplier for treatment should be based on empirical evidence. This could be accomplished with studies in the general population or in other relevant populations.
- the duration of drug use as a multiplier to extrapolate from police data should be examined more thoroughly. The figure should be validated on the basis of new studies in several European countries.
- data on treated populations do usually not include all treated individuals in a country. This information should cover the treated population as complete as possible. At least a reasonable estimate on the basis of the institutions covered compared to the total services should be given.

In the long run even more promising is the **multivariate indicator method**. It integrates different indicators and sources producing broader and even better comparable prevalence estimates for European countries. Two problems have to be solved before this method can be applied in a country:

- A significant number of relevant information related to drug use (offences, treatment, deaths etc.) must be available on a regional basis. Where political structures do not require this regional breakdown, it might be difficult to get this type of information.
- At least two, better three anchor points are necessary in a country. This means, for these regions independent estimates for prevalence of problematic drug use are needed. This requirement should motivate the local estimation experts to develop estimates for regions, which could be used as anchor points.

### **5.3 Specific problems and details**

#### **Estimates by age-groups**

It turned out that it was almost always impossible to break-down the total estimate into age groups as has been planned before. Either the basic information, (e.g. the number of first offenders against drug laws) or information necessary for the calculation of the multiplier (e.g. drug related death previously known to the police) were not available for different age-groups.

#### **Relevant age-range**

The age-group 15-54 has been set at the beginning of the project as a standard range. On the basis of data from treated populations it was found, that more than 99% of all problematic opiate users are covered by this range. In some instances, age-groups below 18 and above 49 could not be included. This also seems to have only a very small effect on the total figure. In The Netherlands, however, an increasing aging heroin population is observed and thus serious biases might emerge. As a standard rates should be based on the population in the age range 15-54 years.

#### **The target group**

For this project it was necessary to define problematic drug use as opiate use. In a next step this limitation has to be overcome. For other substances the heterogeneity of substances and patterns of use is much higher between countries. This is especially true for amphetamine use in the Scandinavian countries. Therefore an estimate using a broader definition of problematic drug use is necessary.

### **5.4 Recommendations**

On intermediate terms the police multiplier and the treatment multiplier methods should be used for each country as national estimates of problematic opiate use. The estimate should be based on the age range 15-54.

The quality of these methods can be increased by additional studies on the duration of opiate use and on coverage of treatment monitoring systems.

The multivariate indicator method should be developed further and it should be examined, if regionalised datasets can be found in different European countries. Regional studies should be further developed to serve as anchor points. Outcomes from the local estimation group could be useful in this respect.

The most problematic group of drug users can be described as opiate users. The methods described above are targeting this group. There are, however, other substances (e.g. cocaine, MDMA, amphetamines) , which cause health, psychiatric and social problems. An additional estimate should be developed in the future covering this broader definition of problematic drug use.

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## 7 Annex

### 7.1 Participants

Rita Bauernfeind  
IFT Institut für Therapieforschung  
Parzivalstr. 25  
80804 München  
Germany

Tel.: 0049-89-36 08 04-34  
Fax: 0049-89-36 08 04-69  
Bauernfeind@ift.isar.de

Bert Bieleman  
INTRAVAL  
Bureau for Social-Scientific Research and Consultancy  
Nieuwe Boteringestraat 96  
9712 PS Groningen  
Netherlands

Tel.: 0031-50-3134052  
Fax: 0031-50-3127526  
intraval@pi.net

Jean-Michel Costes  
OFDT  
Observatoire Francais des Drogues et des Toxicomanies  
105, rue La Fayette  
75010 Paris  
France

Tel.: 0033-1-53 20 16 16  
Fax: 0033-1-53 20 16 00

Ludwig Kraus  
IFT Institut für Therapieforschung  
Parzivalstr. 25  
80804 München  
Germany

Tel.: 0049-89-36 08 04-33  
Fax: 0049-89-36 08 04-69  
kraus@ift.isar.de

Fabio Mariani  
Consiglio Nazionale delle Ricerche  
Via Trieste, 41  
56100 Pisa  
Italy

Tel.: 0039-50-502771-21282  
Fax: 0039-50-589038  
marifa@nsifc.ific.pi.cnr.it

Börje Olsson  
Department of Criminology  
University of Stockholm  
S-10691 Stockholm  
Sweden

Tel.: 0046-8-674 70 50  
FAX: 0046-8-15 78 81  
borje.olsson@crim.su.se

Roland Simon  
IFT Institut für Therapieforschung  
Parzivalstr. 25  
80804 München  
Germany

Tel.: 0049-89-36 08 04-60  
Fax: 0049-89-36 08 04-69  
simon@ift.isar.de

Lucas Wiessing  
European Monitoring Centre for  
Drugs and Drug Addiction  
Rua Cruz de Santa Apolónia 23-25  
P-1100 Lisbon  
Portugal

Tel.: 00351-1-811 3016  
Fax: 00351-1-813 7943  
lucas.wiessing@emcdda.org

## 7.2 Work Plan

At the work shop the common **target population** was defined as IDU and/or regular users of opiates, cocaine and amphetamines. The consent for survey data, however, was to extrapolate the past year prevalence of opiates, amphetamines, and cocaine in the age-group 18-39 years. Following a proposal of the EMCDDA we change the age group to 15-54 years, which is the standard EMCDDA range. Furthermore, at the Local Addiction Prevalence project the adopted age range was 15-55 (not 54). the EMCDDA also suggested to stratify by age. Ideally, 5 - year age groups should be built (15-19, 20-24,..., 50-54). If this is not possible, a three strata solution (15-24, 25-34, 35-54) should be used instead. To make the definition of "problematic drug use" more similar to the one adopted at the Local Addiction Prevalence project the EMCDDA suggested to use "problematic drug use, including IDU or long duration/regular use of opiates, cocaine, amphetamines, but excluding ecstasy and cannabis". The operational definition can be contact with treatment or police or hospital emergency rooms etc..

It was agreed upon that **case-finding studies** are too expensive to be repeated in other European countries. On the other hand an analysis of the Swedish Data might provide helpful insights into the overlap of police data and treatment data, the duration of opiate use and others.

The following methods are generally seen as applicable in at least 3 other countries and will be used therefore in the further project:

- A) multivariate indicator method
- B) demographic multiplier method
- C) extrapolation from police data
- D) extrapolation from treatment demand
- E) extrapolation from population surveys

Each of the countries will be responsible for the exact description of one method and will support the other participants, who try to apply this method in their country, if requested:

- Fabio Mariani describes the **multivariate indicator method**. These indicators should be a combination of seizures, mortality, trafficking, number of drug users in prison, AIDS cases, conviction and treatment demand data.
- Jean-Michel Costes summarises the **demographic multiplier method** which has been used for the French data.
- The IFT recapitulates **extrapolation from police data**. The reanalyses in the participating countries should be based on the 1996 heroin cases. If this is not possible the 1995 heroin cases should be used.
- **Extrapolation from treatment demand** will be covered by Bert Bieleman. As in the police data case reanalyses should include only the 1996 heroin cases or the 1995 cases if data from 1996 are not available yet.
- The IFT recapitulates **extrapolation from population surveys**. The target group is defined use of heroin, cocaine or amphetamines within the last 12 months.
- Börje Olsson **analyses** the overlap between police data and treatment data and the duration of drug use in the 1992 Swedish study and will give.

All methods will be described in as much detail as needed to apply it in all countries involved. This description will include the required computations by the participants of the meeting and be sent to the IFT within one month. The IFT distributes the descriptions to all participants.

Each participant will decide, whether certain methods can be applied in his or her country and analyse his or her data with the appropriate methods, using already existing data bases.

By end of July the work group will meet again, discuss the results and redefine the workplan for the rest of the project. Based on this each country will reanalyse its data available for 1996 or 1995 for all the methods chosen and deliver the resulting estimates for the final report.

The IFT will prepare an compilation and review of the result of the exercise and prepare a draft final report on the basis of this. The draft will be circulated to allow all participants to react and will be finalized by mail until November. Proposals for further steps, which include more countries in this project and allow to further develop estimation methods will be formulated also in this report. At the end of the year, may be at the Heads of Focal Point Meeting, other countries should be informed on the results of this group.