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for Drugs and Drug Addiction

TECHNICAL REPORT

Estimating the size of the main illicit retail drug markets in Europe

EMCDDA

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Executive summary

Estimates of the total size of the retail drug market in the European Union (EU) in 2013 for cannabis, heroin, cocaine, amphetamines and ecstasy have been constructed using a demand-side approach to assist policymakers in prioritising interventions and understanding changes over time. Additional estimates are provided that include Norway and Turkey for cannabis and heroin, and Norway for cocaine, amphetamines and ecstasy. These initial estimates are likely to underestimate the size of the market due to gaps in the currently available data on which to base them. However, the process has proved valuable in identifying key gaps in our knowledge, and the intention is to repeat the estimation process and improve it over time by undertaking quality improvement work and new data collections to plug data gaps.

This report presents estimates of aggregate market size for the different drugs at the EU and European level and describes in detail how these estimates were achieved. Country-level estimates are not reported, given the uncertainty around some of the individual estimates, which affect comparability.

Some key principles underpinning the approach taken are:

- European estimates were obtained by summing individual country estimates.
- Wherever possible, the data used came from routine data collections held by the EMCDDA to facilitate the planned process of updating over time.
- Where imputation of missing data was necessary, we sought as far as possible to base this on other related data.
- We have sought to clearly note all imputations and assumptions made within the estimation process so that the limitations are clear.

Estimates of the size of the retail market have been calculated in terms of both quantity and value (in Euros). The basic model used in the estimation process can be expressed in simple form as:

No. of last year users * Amount used per year = Total annual consumption (quantity)
Total annual consumption * Price = Market value (per year)

For cannabis, cocaine, amphetamines and ecstasy the estimates were largely based on the number of adult users in the household population (aged 15–64), subdivided into groups according to frequency of use, obtained from general population surveys (GPS). Additionally, estimates based on the use of these drugs by problem opioid users (who are unlikely to be represented in GPS samples) have been added, in as have, in the case of amphetamines, estimates of consumption by problem users in those countries where such estimates are available. For heroin, the market size estimates were based on estimates of heroin consumption by problem opioid users sub-divided according to those in treatment and those not, as it is known that consumption decreases considerably in treatment.

The overall estimates obtained from this process are as follows:

Estimates of the size of the European illicit drug market, 2013.

	EU			EU + Norway + Turkey ([1])		
	Amount (tonnes)			Amount (tonnes)		
	Mid	Low	High	Mid	Low	High
Cannabis	1 288.5	1 154.2	1 789.7	1 303.4	1 167.3	1 811.1
Cocaine	91.0	72.2	110.2	91.7	72.7	111.0
Amphetamines	76.3	52.1	101.6	78.0	53.1	104.6
Ecstasy([2])	86.6	78.9	94.0	87.1	79.3	94.6
Heroin	138.4	121.4	162.5	141.7	124.0	169.4
	Value (EUR millions)			Value (EUR millions)		
	Mid	Low	High	Mid	Low	High
Cannabis	9 313.4	8 405.6	12 851.2	9 484.1	8 555.3	13 097.1
Cocaine	5 742.2	4 545.9	6 962.5	5 815.6	4 603.1	7 056.1
Amphetamines	1 828.1	1 210.3	2 497.3	1 892.7	1 248.9	2 608.9
Ecstasy	666.1	607.0	723.1	675.0	615.2	732.8
Heroin	6 782.7	6 041.6	7 845.6	7 064.0	6 264.1	8 327.3
Total	**24 332.5**	**20 810.4**	**30 879.6**	**24 931.4**	**21 286.5**	**31 822.1**

Note: ([1]) Turkey was not included in estimates for cocaine, amphetamines and ecstasy.
([2]) Ecstasy amounts in millions of tablets.

Key limitations to be borne in mind when considering the estimates presented here are:

- Under-coverage: General population surveys of adults (aged 15–64) have formed the basis for most of the estimates of users, but it is known that these may under-represent some groups of users, particularly some marginalised groups. While we have attempted to use estimates of problem users and treatment data to identify use by some of these groups, there are still likely to be gaps in coverage.
- Under-reporting of use: The estimates of the number of users and the frequency and amounts used are based on self-reports and it is known that, particularly with respect to stigmatised behaviours, people will often underestimate or under-report use. We have not made any adjustment for this because at present we have no suitable data on which to base any adjustment, and the extent of under-reporting is likely to vary considerably between countries.
- Knowledge gaps: There are significant gaps in our knowledge of some basic data that are fundamental to estimating market size. In particular, we have very little information about the amounts of drugs used by different groups of users (e.g. occasional versus frequent users), different forms of drugs (e.g. resin versus herb or ecstasy powder versus tablets), and in different countries, although we know this varies widely. Similarly, the information on prices paid is limited. In such areas we have had to make assumptions and use the best data that we can find in the circumstances.

In the light of the above limitations it is clear that the estimates presented in this report must be interpreted with caution and must be seen as minimum estimates. There is a need to develop a programme of work to improve the basic data on which such estimates are based, to improve them in future.

1 Introduction

Estimates of the size of the market for a range of illicit drugs can provide policymakers with information on both drug consumption and the value of the trade in drugs, contributing to their ability to prioritise interventions and, over time, evaluate change. The European Commission therefore requested that the EMCDDA commence a programme of estimating the size of the main European illicit drug markets, identifying the importance of these estimates and their potential use.

Initial estimates for cannabis, heroin, cocaine and amphetamine-type stimulants (ATS) have been constructed with the intention of repeating and improving the estimation process over time. The methodology used, the rationale for the approach, and the assumptions made in the process are described in this report. Wherever possible, country-level data regularly monitored and updated by the EMCDDA have been used. Existing work on estimating the market size for drugs, in particular that undertaken with financial support from the European Commission by the Rand Drug Policy Research Center, Trimbos Institute and Institute of Criminal Policy Research (Kilmer and Pacula, 2009; Trautmann et al., 2013), has been used for additional data and to guide the estimation process.

The EMCDDA is continuously trying to improve its data collection, either by extending coverage to as many countries as possible or by adjusting instruments. The estimation exercise has highlighted areas of EMCDDA data collection that need to be augmented and improved. This is useful not only for the market size estimates, but also more generally in ensuring that the monitoring of the drug situation remains appropriate.

A section on the basic model and common concerns will be followed by a description of the estimation process for each of the substances: cannabis, cocaine, amphetamines, ecstasy and heroin. Finally, the limitations of and possibilities for improving the estimates over time will be discussed.

2 Overview of the methodology

There are two main approaches to assessing market size. The first takes a supply side or top-down approach, combining data on production, amounts seized and prices to obtain an estimate of the overall market size (UNODC, 2005). The second and more common approach is demand side or bottom-up, in which prevalence data is combined with either assumptions on the quantity used and price data to give expenditure estimates (e.g. van Laar et al., 2013; Kilmer and Pacula, 2009; Pudney et al., 2006; Casey et al., 2009) or with self-reported spend data to directly obtain expenditure (e.g. Legleye, et al., 2008) and then using price data to work backwards to estimate the quantity used. This paper uses a demand-side approach.

The basic model used in such an approach can be expressed in simple form as:

No. of last year users * Amount used per year = Total annual consumption (quantity)

Total annual consumption * Price = Market value (per year)

In other words, an estimate of the number of users (for cannabis this might be generated from the GPS last year prevalence rate) is multiplied by an estimate of the average number of days of used

per year and an average quantity used per day to obtain the estimated total annual consumption. This estimate can then be multiplied by price data to obtain the market value.

However, such a simple model ignores many things that we know about the variety in patterns of use among the population, and the limitations of the data sources being used. Thus even the base model needs refinement. One obvious issue concerns the heterogeneity of users and the impact on amounts used. Drug users range from people who experiment only once or twice and are likely to consume comparatively small amounts on these occasions to daily users who may use large quantities of the drug each time. To deal with this issue we have tried, as far as possible for each type of drug, to identify different types of user, which changes the simple formula for calculating quantity used to:

$$\sum \{(\text{No. of LY users})_U * (\text{Amount used per year})_U\} = \text{Total annual consumption (quantity)}$$

where *u* denotes different types of users. However, the extent to which it is possible to identify different types of users varies between drugs and between countries, along with a range of other data issues; how these have been addressed and the rationale and assumptions made in doing this are highlighted below.

Information on the amounts of drugs used by different groups of users is an area in which the data available are extremely limited. A recent EU-funded project described in the report *Further insights into aspects of the EU illicit drugs market, Part I: Drugs market: an assessment from the demand side* (Trautmann et al. (eds), 2013) attempted to obtain this information through an online survey in seven EU Member States (Bulgaria, the Czech Republic, Italy, the Netherlands, Portugal, Sweden and England & Wales), with varying degrees of success. They also used the information to identify the annual amounts used by different user groups. Given that this information was obtained quite recently and that they considered the potential for integrating the findings with those from the GPS, it was decided to utilise the data on amounts used and the user types from the different components of that study as the basis for our estimates.

In order to obtain an estimate of the size of the illicit drug market in the EU we first calculate the size of the market in each country and then sum these to provide European figures. The reason for this is because we know the patterns of use vary considerably between countries, in a range of ways. For example, the survey data reported to the EMCDDA show that frequency of use is not necessarily related to last year prevalence rates; for instance, in some countries with low prevalence rates the proportion of frequent users can be comparatively high. Similarly, we know that although in general the amount used per session of use by frequent users tends to be higher than for occasional users, there appears to be differences between countries in the amounts used (Trautmann et al., 2013).

Three other issues common to the estimation of the market size for each of the drugs need to be considered. First, the data necessary for the estimates are not available for all countries and the amount of missing data varies between the different types of drugs. In these cases, missing data have had to be imputed in order to arrive at EU totals. Where possible, available country-level information has been used to fill data gaps, though in some instances country-level data are not available and by necessity information from other countries or averages of the data from other countries have been applied. Details of how this has been done in each case are given in the relevant section below. The data gaps and need for imputation and assumptions to fill them are clearly a

weakness in the estimation and an area where improvements in data can be made over time. Information on the amounts used by type of user is particularly scarce for drugs other than cannabis. Even for cannabis, the lack of consistency between countries on sub-groups of users makes applying the available information difficult.

Second, the GPS, the main data source for the number of cannabis, cocaine, amphetamines and ecstasy users, are likely to suffer from under-coverage; some groups may not be included in the sampling frame for surveys, for example, or may simply be hard to reach or enumerate. GPS are unlikely to include problematic or heavy drug users, who may account for a substantial amount of use of a range of drugs. An effort has been made to include problematic drug users in the overall estimates for cannabis, cocaine and amphetamines. This is another area for future development, both in terms of improving the way in which consumption by problem drug users is estimated and by developing methods for including other sub-populations not covered in GPS.

Third, reliance on self-reported drug use raises the issue of under-reporting. Kilmer and Pacula (2009), drawing on the work by Harrison et al. (2007), describe studies in the USA comparing information from biological testing with self-reported drug use and calculate a correction factor for each of the drugs. Correction factors have not been applied to the estimates here because there is no equivalent source of data on under-reporting in European countries and it is very likely that there are considerable inter-country differences due to cultural factors and the extent to which drug use is normalised. A systematic data collection on studies of under-reporting in surveys across the EU would help to establish the level of correction required, and is a further area for future development.

3 Cannabis

Cannabis is the most frequently used drug and hence the data available relating to its use are relatively comprehensive and robust. The decisions made about the data to be used within the estimates, imputation processes and assumptions made are described for each component of the base model below. The main limitations and concerns are also highlighted but are discussed further together with areas for possible future developments in Section 7.

3.1 Number of users in the general population

Basic approach

Cannabis users are mainly well integrated in society and likely to be quite well represented in GPS. Since there is good evidence that the amount of cannabis used in a session or a day will be greater the more frequently people use it, it is important to break down the total number of users by frequency of use. Within Europe, most countries have a fairly recent GPS that includes questions on use in the last year and the last month, and on frequency of use (most often relating to use in the last month but sometimes in the last year). These data are reported to the EMCDDA routinely, and the number of cannabis users included in the surveys is often reasonably large so that estimates of the prevalence of different types of users can be constructed for most countries. Therefore, for the base model, GPS data have been used as the main source of prevalence data for the estimates.

As discussed above, it was decided that this study would use the data from the *Further insights* research programme for information on amounts used by different types of users. For cannabis these were presented in the report by van Laar et al. (2013). To match the groups used in that

publication, for each country those who had used cannabis in the last year were sub-divided into four groups based on their responses to the GPS questions on their use of cannabis in the last year and last month, and frequency of use. However, the way in which frequency of use is ascertained varies between countries, with some asking about number of days in which drugs were used and others presenting frequency groups, such as 'less than once a week'. These were matched as nearly as possible to the groupings used in the van Laar et al. (2013) survey as follows:

- Used in the last year (LY) but not in the last month (LM) (infrequent).
- Used less than once a week or 1–3 days in LM (occasional).
- Used once up to several times a week or 4–19 days in LM (regular).
- Used daily or almost daily or 20+ days in LM (intensive).

This approximation is similar to that used by van Laar et al. (2013); however, the frequency of use questions are quite variable from country to country, so further minor variations in the categories used were necessary.

The GPS data came from different years, as some countries are only able to conduct a GPS every four years or so. As the goal was to provide an estimate of the overall size of the EU drug market, it was decided that it was desirable to obtain a market size estimate for a single year and, given the time lags in the provision of data to the EMCDDA, 2013 was deemed most appropriate. Thus for each country the GPS data from the survey nearest to 2013 was used and the prevalence rates for the four categories of user type were converted into the number of users by multiplying by 2013 EUROSTAT population data for 15- to 64-year-olds.

Imputation procedures

Seven of the 30 countries that supply data to the EMCDDA either did not have a general population survey or were missing data on some of the items necessary to calculate the number of users in the different groups. In order to obtain EU totals it was therefore necessary to impute values in these cases. Because of the enormous inter-country variation in drug use in Europe, in conducting the imputation we sought as far as possible to use any country-specific data available and only use European averages as a last resort.

Greece, Malta, Romania, Sweden and Turkey did not have data on frequency of use in the last month, but did have data on lifetime, last year and last month use. It was therefore decided to use a regression equation based on these data items in those countries that did have frequency of use data to predict the likely prevalence of occasional, regular and intensive users. Thus the proportion of the total number of last month users in each of the user categories was regressed in turn against lifetime prevalence and the ratio of last month prevalence to last year prevalence to obtain an equation with which to estimate the missing values. To obtain the prevalence of use for each of the user groups for the countries with missing data, the estimated proportion of the total number of last month users in each of the user groups obtained using the regression equation was multiplied by the prevalence in the last month.

Prevalence data for Estonia and Luxembourg had to be imputed before the estimated regression equation could be applied to obtain estimates of the proportion of last month users in each of the user groups. In the case of Estonia, lifetime prevalence was not available. The simple average of the

ratio of last year to lifetime prevalence was calculated for all the available surveys and then the last year prevalence reported by Estonia was multiplied by the inverse of this to obtain an estimate of lifetime prevalence.

Luxembourg has no adult survey. However, it does participate in the Health Behaviour in School-aged Children (HBSC) survey and the Eurobarometer survey, and in each of these the prevalence of cannabis use is very close to the average value. We therefore imputed EU average values for lifetime, last year and last month prevalence for Luxembourg. Applying the estimated regression equation to imputed values is clearly a weakness in the procedure, but was necessary to obtain a total number of users for Luxembourg in the absence of the necessary data.

Table 1: Regression results: number of users in the last month in each user group against lifetime prevalence and the ratio of last month to last year prevalence

Dependent variable:		Occasional	Frequent	Intensive
Lifetime prevalence	B	0.001	-0.004	0.003*
	SE	0	0	0
	t	0.26	-1.97	2.21
	p	0.79	0.06	0.04
Last month/last year prevalence	B	-0.736**	0.077	0.658***
	SE	-0.22	-0.19	-0.14
	t	-3.34	0.41	4.68
	p	0	0.68	0
Constant	B	0.832***	0.390***	-0.222**
	SE	-0.11	-0.1	-0.07
	t	7.26	4	-3.03
	p	0	0	0.01
r2		0.359	0.163	0.601
P		0.012	0.168	0
df_r		20	20	20

Note: * p<0.05, ** p<0.01, *** p<0.001

The regression method was adopted in order, where possible, to make use of any available data to generate the estimates. The model parameters are shown in Table 1 and it can be seen that, although a number of different models were considered, the results obtained from the selected model are not ideal. In fact, in two instances, intensive users in Estonia and Sweden, the estimated values fell out of bounds, -1 and -713 respectively, and were replaced with 0 as a minimum value. We considered using the averages of the existing prevalence rates and rescaling to ensure the sum of the group prevalence matched the last month prevalence for the country being estimated. This shifted values towards the intensive users, and provided values within scale, but did not utilise the available information on lifetime and last year prevalence.

Table 2: Estimated number of cannabis users by user group and country, 2013

Country	Infrequent	Occasional	Regular	Intensive
Austria	102 694	45 031	41 567	10 392
Belgium	146 078	77 480	72 922	39 500
Bulgaria	73 486	32 916	56 646	8 420
Croatia	59 902	39 782	29 047	13 892
Cyprus	6 096	4 314	1 876	1 125
Czech Republic	345 034	151 112	140 569	24 600
Denmark	152 260	67 316	16 010	14 555
Estonia	40 264	8 246	4 009	0
Finland	151 235	41 216	35 720	10 991
France	1 884 913	939 194	917 353	907 992
Germany	1 194 175	645 940	265 975	336 540
Greece	57 715	29 074	25 773	10 082
Hungary	74 539	37 947	27 105	16 263
Ireland	96 782	40 553	32 204	11 927
Italy	1 857 459	644 582	693 230	364 858
Latvia	33 793	8 647	8 647	2 982
Lithuania	31 890	8 969	4 983	0
Luxembourg	8 691	4 165	3 198	1 467
Malta	1 439	584	469	97
Netherlands	376 628	200 681	164 035	144 840
Norway	86 665	26 666	17 777	8 889
Poland	681 224	337 709	206 377	28 142
Portugal	69 045	30 333	51 435	35 609
Romania	136 223	63 594	55 991	16 638
Slovakia	86 689	32 087	19 819	1 887
Slovenia	29 580	16 389	9 529	6 479
Spain	815 771	555 450	710 491	804 863
Sweden	134 547	28 380	15 143	0
Turkey	51 088	34 936	44 831	22 410
United Kingdom	1 249 937	1 082 610	316 186	142 794
EU total	**9 898 089**	**5 174 303**	**3 926 310**	**2 956 935**
EU + NO, TR	**10 035 843**	**5235 905**	**3 988 918**	**2 988 234**

Note: Yellow highlights denote values estimated on the basis of the regression equations; red denotes values out of range (i.e. negative values), which were replaced with 0.

Table 2 shows the numbers of users by user group, obtained by the above method, that were taken forward into the market size estimation process. Table A.1 in the Appendix details the data on numbers of users drawn from GPS, while Table A.2 provides details on prevalence rates used.

3.2 Correction for under-coverage: problem opioid users

GPS are acknowledged to be unlikely to cover more problematic drug users, such as problem opioid users, who are known to often use other drugs alongside their primary problem drug (e.g. Rehm et al., 2005). To correct for this type of under-coverage, an estimate of the cannabis consumption amongst problem opioid users has been made to complement the estimates derived using GPS. The simple model remains the same, multiplying the number of users by the amount used to obtain a quantity consumed, and multiplying this number by the price of the drug to obtain values.

Basic approach

Once again, standard EMCDDA data collections were used as far as possible to obtain an estimate of the numbers of problem opioid users who use cannabis. The EMCDDA collects data, by country, on estimates of the number of problem opioid users as part of the problem drug use (PDU) indicator. Data on secondary drug use amongst those entering treatment are available from the treatment demand indictor (TDI). A primary drug and up to two secondary drugs are reported for entrants into treatment. We assume that the use of cannabis by people entering treatment primarily for opioid use in each country is a reasonable proxy for cannabis use among problem opioid users more generally. On this basis, to obtain the number of problem opioid users using cannabis in each country, estimates of the number of problem opioid users in the country were multiplied by the proportion of the total number of entrants into treatment for opioids who reported using cannabis as a secondary drug.

Imputation procedures

In a number of instances the necessary data were missing so, as in the case of the general population estimates, missing data had to be imputed in order to obtain EU estimates.

First, the data on the number of problem opioid users had to be imputed for six countries: Belgium, Bulgaria, Denmark, Estonia, Romania and Sweden. Different approaches were used depending on the available data. Problem drug use estimates (with upper and lower confidence intervals), defined by the EMCDDA as a broader group than problem opioid users and including injecting drug users (IDUs) and long-term cocaine and amphetamine use, were available for Bulgaria, Denmark and Sweden. These were adjusted using the proportion of entrants into treatment for problem drugs who were opioid users. The upper and lower bounds were calculated in the same way using the confidence intervals of the estimates. This assumes that the treatment population reflects the overall problem drug use population (i.e. that problem users of different drugs have an equal propensity to seek treatment). This may well not be the case but in the absence of any better data source it seemed the best approach.

No data on the number of problem drug users were available for Belgium other than information on the number of individuals in opioid substitution treatment (OST). An estimate of the average OST coverage in the EU was calculated from those countries with available data, and this was then applied to the number in OST figure for Belgium to get an estimate of number of problem opioid users.

For Romania, information on the number of opioid injectors in Bucharest was augmented by 10 % to account for those outside the capital on the basis of information on treatment demands for opioids in their annual reports to the EMCDDA.

For Estonia, a three-year average (2007 to 2009) of estimates of IDUs was adjusted by an estimate of the proportion of IDUs who were opioid users taken from a study in Talinn (Uusküla, 2011, Uusküla et al 2013). For the central values for Belgium, Romania and Estonia, upper and lower bounds were calculated assuming a Poisson distribution for the count.

Table 3: Estimated numbers of problem opioid users and the proportion assumed to be cannabis users based on secondary drug use among treatment entrants for opioid use

	Estimated number of problem opioid users				Treatment entrants for opioids using cannabis as secondary drug	
Country	**Year**	**Central**	**Lower**	**Upper**	**Year**	**%**
Austria	2013	28 550	27 790	29 311	2014	31
Belgium	2014	29 136	28 795	29 477	2014	22
Bulgaria	2009	30 934	18 759	43 108	2013	51
Croatia	2010	10 726	9 598	11 853	2014	72
Cyprus	2014	1 094	874	1 410	2014	53
Czech Republic	2014	11 300	10 200	12 400	2014	22
Denmark	2009	16 000	15 069	16 930		27
Estonia	2009	5 769	5 617	5 921		27
Finland	2012	13 836	12 700	15 090	2014	52
France	2013	211 000	180 000	300 000	2014	43
Germany	2013	155 994	142 623	169 364		27
Greece	2014	17 245	15 098	19 781	2014	40
Hungary	2010–11	3 244	2 910	3 577		27
Ireland	2006	20 790	18 136	23 576	2014	24
Italy	2014	203 000	179 000	227 000	2014	51
Latvia	2014	6 151	4 427	9 854		27
Lithuania	2007	5 458	5 314	5 605		27
Luxembourg	2007	1 608	1 900	2 463	2014	55
Malta	2014	1 614	1 500	1 759	2014	73
Netherlands	2012	14 000	12 700	16 300	2014	12
Norway	2013	9 015	6 708	13 977		27
Poland	2009	15 119	10 444	19 794	2014	35
Portugal	2012	31 858	27 434	36 282	2014	69
Romania	2014	11 000	10 790	11 210	2013	2
Slovakia	2008	4 888	3 966	9 782	2014	18
Slovenia	2013	5 200	4 750	5 740	2014	36
Spain	2013	65 648	52 122	79 173		27
Sweden	2007	12 110	12 110	12 110		27
Turkey	2011	12 733	11 126	26 537	2014	17
United Kingdom	2010–11	330 455	324 048	342 569	2014	15

Note: Yellow highlights denote imputed values.

The second area requiring imputation was for the proportion of treatment entrants for opioids who reported cannabis as a secondary drug. Data on secondary drug use was not available for nine countries: Denmark, Estonia, Germany, Hungary, Latvia, Lithuania, Norway, Spain and Sweden. The overall proportion of opioid users reporting cannabis as a secondary drug in the EU and Turkey (0.27) was applied.

The data taken forward into the estimation, including the outcome of the imputation procedures is shown in Table 3. Aside from the obvious limitations resulting from estimating missing data, the problem opioid use estimates are for a broad range of years, with just under half referencing 2012 or later. The methods adopted to estimate the numbers of problem drug users differs across the reporting countries, weakening inter-country comparability. Regular estimates using comparable methods from established data sources for more countries are required to improve these estimates. This continues to be the long-term goal of the EMCDDA and the Reitox network.

3.3 Amounts used by different user types

The lack of data on amounts used by the different user types for most countries is a fundamental problem for market size estimates at the present time. As discussed earlier, the data from the van Laar et al. (2013) study on annual use by user type for seven countries currently presents the widest range of data in a consistent format across European countries, so has been used in this study. The trimmed mean and the confidence intervals provided were used to give a high and low value for the seven countries included in that study. For other countries, the mean of the values for the seven countries in the study were used. The unweighted mean was used, as it was not clear on what basis the data should be weighted. Table 4 shows the amounts used per year by the different user types that have been used.

Table 4: Amounts of cannabis used per year by type of cannabis user used in the estimates

Country	Infrequent users			Occasional users			Regular users			Intensive users		
	Trimmed mean	Lower bound	Upper bound	Trimmed mean	Lower bound	Upper bound	Trimmed mean	Lower bound	Upper bound	Trimmed mean	Lower bound	Upper bound
Bulgaria	0.66	0.56	0.84	5.4	3.8	7.86	39.82	31.67	60.87	282.55	186.44	384.3
Czech Republic	1.12	0.99	1.65	9.38	8.16	12.61	54.28	52.92	90.23	303.76	283.41	384.9
Italy	0.84	0.81	1.37	6.74	6.25	9.3	89.39	92.85	120.99	339.89	336.19	408.4
Netherlands	0.8	0.8	1.2	6.5	6.4	8.9	63.2	63.1	86.7	310.5	306.1	408.0
Portugal	0.8	0.61	1.36	10.27	6.19	15.64	79.46	48.73	140.28	183.91	144.38	258.8
Sweden	1.04	1.04	1.6	9.87	10.24	16.98	90.7	91.61	128.03	362.79	325.42	499.3
United Kingdom	0.8	0.6	1.5	6.8	5.3	11.5	55.6	45.5	88.5	373.8	307.9	575.6
Mean	0.87	0.77	1.36	7.85	6.62	11.83	67.49	60.91	102.23	308.17	269.98	417.1

Source: van Laar et al., 2013.

The number of users within each user group derived from the GPS data is multiplied respectively by the annual amount of cannabis used per person of that user type to provide the amount (by weight) of cannabis used in each country.

An assumption is made that problem opioid users who also use cannabis will have used cannabis within the last month. In the absence of information on the frequency of cannabis use within this group it was decided to assume that they reflected a similar pattern of use to those in the van Laar

(2013) web survey of users. A weighted average amount used by country was calculated from the individual amounts used in each of the occasional, regular and intensive groups, with the number of users in each group providing the weights. This was repeated for the lower and upper values of the amounts used. Arguably, problem opioid users are more likely to be heavy users and, assuming they are, using data based on a cross-section of last month cannabis users may well result in an underestimate of the amount consumed.

3.4 Dividing the market into herb and resin

The cannabis market in Europe is composed mainly of cannabis herb and cannabis resin. Although cannabis herb, mostly grown in Europe, is increasingly dominant in the market, across Europe there are still differences between countries in the relative importance of these two types of cannabis.

Data on variation in amounts used for these different types of cannabis are limited but the study by van Laar et al. (2013), which did ask users about their use of herb and resin separately, suggests that differences are small. We have assumed that amounts used are the same for resin and herb and as described above calculated a total amount used. However, price data is reported to the EMCDDA for resin and herb separately and we have therefore split the total amount used into herb and resin.

Table 5: Seizures of herbal cannabis as a proportion of total cannabis seizures (three-year averages)

Country	Proportion herb 2012–14	Country	Proportion herb 2012–14
Austria	0.855	Latvia	0.902
Belgium	0.821	Lithuania	0.931
Bulgaria	0.993	Luxembourg	0.915
Croatia	0.928	Malta	0.602
Cyprus	0.982	Netherlands	0.815
Czech Republic	0.972	Norway	0.329
Denmark	0.170	Poland	0.660
Estonia	0.925	Portugal	0.146
Finland	0.783	Romania	0.883
France	0.140	Slovakia	0.986
Germany	0.837	Slovenia	0.981
Greece	0.977	Spain	0.482
Hungary	0.953	Sweden	0.570
Ireland	0.825	Turkey	0.908
Italy	0.527	United Kingdom	0.903

Note: Yellow highlights denote imputed values.

Although the price information is provided to the EMCDDA separately for the two forms, there are very little data on the prevalence of use that distinguish between the two forms and none compiled systematically across Europe. However, seizures data reported routinely to the EMCDDA do distinguish between cannabis herb and resin and are available for most EU countries. In most countries, seizures of small amounts of cannabis from users or street level dealers make up the bulk

of the total number of seizures and so it was felt that the number of seizures of the different types of cannabis was the best proxy available for retail market share. The proportion of seizures that were herb was calculated based on the average of the most recent three years of data (see Table 5), as the data can be quite variable over time. The total amount used in grams calculated in previous steps is then multiplied by the proportion of seizures for herb to obtain the total amounts used for herb and resin separately.

Imputation procedures

Data were imputed for three countries. The Netherlands has not reported the number of seizures for some time so the midpoint of the amount reported from the survey in the Netherlands in van Laar et al., 2013 (p. 102) was used. The most recent data for number of seizures reported by France are 2008 so we have used the 2006–08 average (the quantity seized has stayed fairly stable since then so this was considered reasonable). Poland has only reported seizure numbers for one year (2012) so in this case we used the ratio of herb seizures to all seizures for the total of all countries other than France, the Netherlands and Poland.

3.5 Calculating the value of the market

To translate the market size by weight into market size by value we used the price data for cannabis resin and herb submitted to the EMCDDA by the national focal points. The data submitted are very variable both in terms of how they are collected (test purchasing, user surveys, expert opinion, etc.) and in the measure of central tendency used. A standard procedure for choosing which measure of central tendency to use was adopted: the mean (the most widely available measure of central tendency) was used where it was available; if not, then the median if available; followed by the mode; and finally the mid-point of a range. In seven countries price data were available from more than one source and in six of these the value provided by law enforcement (the most common source) was taken (Belgium, France, Cyprus, Latvia, Poland, Norway). In the remaining country, Bulgaria, for practical reasons, the source with a price for both resin and herb was selected.

Table 6: Prices for cannabis herb and resin used in the estimation process

	Price EUR / gram			Price EUR / gram	
Country	**Herb**	**Resin**	**Country**	**Herb**	**Resin**
Austria	8.0	8.0	Latvia	14.0	17.0
Belgium	8.7	9.1	Lithuania	10.4	11.6
Bulgaria	7.3	20.4	Luxembourg	15.0	7.4
Croatia	11.8	10.4	Malta	22.5	21.5
Cyprus	20.0	12.0	Netherlands	4.7	8.9
Czech Republic	6.8	6.3	Norway	18.8	15.6
Denmark	10.8	10.9	Poland	7.7	8.5
Estonia	20.0	15.0	Portugal	6.2	2.6
Finland	17.0	10.0	Romania	13.6	15.9
France	8.5	6.5	Slovakia	10.0	12.0
Germany	10.8	10.0	Slovenia	5.0	10.0
Greece	15.0	20.0	Spain	4.7	5.5
Hungary	7.3	8.4	Sweden	14.0	12.0
Ireland	20.0	6.0	Turkey	9.3	9.5

Italy	8.0	10.5	United Kingdom	3.6	6.4

Note: Yellow highlights denote imputed data.

In most cases data from 2014 were used, but there were some missing data. Denmark had no price data for either herb or resin, so in each case a simple average of the values for other countries was imputed. In the case of Luxembourg, Norway and Romania, data for 2013 were used. The prices used are shown in Table 6.

These prices were applied to the market size quantity estimates to obtain a value for the cannabis market in each country that was summed to provide a total figure for the EU.

3.6 Market size estimates obtained

The process described above was first undertaken to provide estimates of the cannabis market size in each country by both quantity and value for the number of cannabis users derived from GPS data, and then for the number of problem opioid users (POUs) who use cannabis. These were then summed to provide estimates of the retail market size for the EU and the EU plus Norway and Turkey (see Table 7). For a number of reasons discussed earlier and also in more detail in Section 7, these are likely to be underestimates and so should be regarded as minimum estimates to be improved in the future.

Table 7: Estimates of the retail market size for cannabis in Europe, 2013

EU	Herb (tonnes)			Resin (tonnes)			Total cannabis (tonnes)		
Users identified from:	**Mid**	**Low**	**High**	**Mid**	**Low**	**High**	**Mid**	**Low**	**High**
GPS	627.28	565.44	871.20	621.04	557.04	851.84	1 248.32	1 122.48	1 723.04
POU coverage	19.92	15.99	31.38	20.26	15.76	35.23	40.18	31.75	66.61
Total EU	647.20	581.43	902.58	641.30	572.80	887.07	1 288.50	1 154.22	1 789.65
EU + Norway + Turkey	**Herb (tonnes)**			**Resin (tonnes)**			**Total cannabis (tonnes)**		
Users identified from:	**Mid**	**Low**	**High**	**Mid**	**Low**	**High**	**Mid**	**Low**	**High**
GPS	637.98	574.88	886.25	624.81	560.37	857.16	1 262.79	1 135.25	1 743.41
POU coverage	20.18	16.18	32.09	20.41	15.86	35.57	40.59	32.04	67.66
Total EU + 2	658.16	591.07	918.34	645.22	576.23	892.73	1 303.38	1 167.29	1 811.07
EU	**Herb (EUR millions)**			**Resin (EUR millions)**			**Total cannabis (EUR millions)**		
Users identified from:	**Mid**	**Low**	**High**	**Mid**	**Low**	**High**	**Mid**	**Low**	**High**
GPS	4 604.43	4 163.31	6 356.33	4 386.98	3 983.31	5 972.07	8 991.41	8 146.62	12 328.40
POU coverage	170.62	137.48	268.20	151.35	121.48	254.56	321.97	258.96	522.76
Total EU	4 775.05	4 300.80	6 624.53	4 538.33	4 104.78	6 226.63	9 313.38	8 405.58	12 851.16
EU + Norway + Turkey	**Herb (EUR millions)**			**Resin (EUR millions)**			**Total cannabis (EUR millions)**		
Users identified from:	**Mid**	**Low**	**High**	**Mid**	**Low**	**High**	**Mid**	**Low**	**High**
GPS	4 716.82	4 262.53	6 514.46	4 440.13	4 030.20	6 047.00	9 156.94	8 292.73	1 2561.46
POU coverage	173.62	139.66	276.10	153.56	122.94	259.51	327.17	262.61	535.61
Total EU + 2	4 890.43	4 402.19	6 790.56	4 593.68	4 153.15	6 306.51	9 484.12	8 555.34	13 097.07

4 Estimation of the market size for cocaine, amphetamines and ecstasy

The same basic model as that described for cannabis was applied to cocaine, amphetamines and ecstasy, namely establishing the amount consumed by multiplying estimates of the number of users by the amount used, and converting this to a value by multiplying by price. However, less information is available for these drugs than for cannabis, and prevalence of use is much lower, so it is not possible to subdivide users into as many sub-groups.

No robust data on the prevalence of use of these substances were available from the Turkish GPS. It was not felt appropriate to use an average from the existing data to impute a number for Turkey, particularly as with a large population the result would noticeably influence the totals. It was therefore decided to exclude Turkey from the analysis for these substances. This is clearly a limitation, Turkey being an important country with a large population, and it is hoped that data will become available in the future that will allow its inclusion. The EU estimate is not affected.

It should be noted that in most of the data available, particularly on use, it is not possible to distinguish between methamphetamine and amphetamine so these are treated together under the umbrella term 'amphetamines'.

4.1 Number of users in the general population

Basic approach

GPS are the main source of data used to establish the number of users. As was the case for cannabis, prevalence rates obtained from GPS are multiplied by 2013 EUROSTAT population data for 15- to 64-year-olds.

Far less information is available in GPS on the frequency of use for cocaine, amphetamines and ecstasy than is available for cannabis. Because of the lower prevalence rates for the use of these drugs, few countries have a sufficient number of last month users to provide robust data on frequency of use in the last month. Hence it is not possible to distinguish the same range of user types as was possible for cannabis. The web survey conducted as part of the *Further insights* study similarly obtained much smaller samples of users of these drugs (Frijns and van Laar, 2013). They distinguished three groups of users: infrequent users who used less than once a month or less than 11 times a year; occasional users who used 11 to 50 days a year or at least once a month but less than once a week; and frequent users who used weekly or more often, or more than 50 times a year.

It was not possible to distinguish these three groups in most countries on the basis of GPS data. However, it was possible to approximate two groups of users as follows:

- Infrequent users: those using in the last year but not in the last month (LYP–LMP).
- Frequent: those using in the last month (LMP).

Only last year prevalence and last month prevalence are required to distinguish these groups and the first group approximates to the infrequent user group in the Frijn and van Laar (2013) study, with the second group approximating a combination of the occasional and frequent users in that study. Nevertheless, some countries did not have the information available to produce even these simpler groupings, and values had to be imputed in such cases.

Imputation procedures

In the case of Belgium, France and Norway no recent data for last month prevalence of cocaine, amphetamines and ecstasy were reported, while Malta reported data for lifetime but not last year and last month prevalence. As was the case for cannabis, Luxembourg did not report any prevalence data as it has no GPS.

For France and Norway consideration was given to using last month prevalence from previous surveys in 2005 and 2009, respectively. However, because there had been significant changes in LYP, the assumption that LMP had not changed did not seem tenable. The use of a simple average was also considered but did not seem appropriate for some countries, e.g. Malta.

All countries apart from Luxembourg had some prevalence rates available, either LTP or LYP. Following the principle of making use of as much country-specific data as possible, it was decided to calculate the population weighted average of LYP/LTP and LMP/LTP for those countries with complete data (listwise deletion) and then estimate values for those countries with missing data by multiplying the available values of LTP and LYP by the appropriate ratio. These imputed prevalence rates were then used to estimate the number of users in the two user groups. In the absence of any prevalence data at all for Luxembourg, the population weighted average values were used for LYP and LMP. The values obtained in this way appear broadly in line with the other Benelux countries. The estimated prevalence rates of each user group by country used in the estimation procedure are shown in Table A.3.

Table 8: Estimated number of stimulant users by user group and country (adults aged 15–64 in the general population)

			Cocaine		Amphetamines		Ecstasy	
Country	**Year**	**Sample size**	**Infrequent (LYP–LMP)**	**Frequent (LMP)**	**Infrequent (LYP–LMP)**	**Frequent (LMP)**	**Infrequent (LYP–LMP)**	**Frequent (LMP)**
Austria	2008	3 761	17 116	34 231	17 116	11 410	17 116	11 410
Belgium	2008	6 792	24 645	11 875	10 281	4 327	13 659	8 253
Bulgaria	2012	5 325	4 899	4 899	14 697	14 697	39 193	19 596
Croatia	2012	4 756	5 705	8 557	17 115	5 705	5 705	5 705
Cyprus	2012	3 500	1 219	610	1 219	610	610	1 219
Czech Republic	2012	2 108	21 565	7 188	14 376	14 376	35 941	7 188
Denmark	2013	10 470	21 751	10 876	14 501	7 250	3 625	3 625
Estonia	2008	1 401	5 252	875	5 252	4 377	8 753	1 751
Finland	2014	3 128	10 551	7 034	31 654	7 034	28 137	10 551
France	2014	13 488	310 938	149 819	88 437	37 224	234 998	141 984
Germany	2012	9 084	271 403	162 842	162 842	217 123	108 561	108 561
Greece	2004	4 351	7 214	0	0	0	14 429	0
Hungary	2007	2 710	0	13 553	13 553	20 329	20 329	13 553
Ireland	2011	5 128	30 244	15 122	9 073	3 024	12 098	3 024
Italy	2014	18 898	309 576	116 091	77 394	0	116 091	38 697
Latvia	2011	4 491	1 352	1 352	2 703	1 352	5 407	0
Lithuania	2012	4 831	3 986	0	1 993	1 993	3 986	0
Luxembourg			2 533	1 504	1 084	717	1 688	979
Malta	2013	1 869	181	87	85	36	219	133
Netherlands	2014	5 867	110 773	66 464	88 618	55 387	199 392	77 541
Norway	2013	1 790	20 245	9 755	14 075	5 924	8 311	5 022
Poland	2014	1 135	54 498	0	54 498	0	54 498	54 498
Portugal	2012	5 355	6 904	6 904	0	0	6 904	13 809
Romania	2013	7 200	27 245	0	13 622	0	13 622	13 622
Slovakia	2010	4 055	3 870	3 870	3 870	0	11 610	7 740
Slovenia	2012	7 514	5 634	1 409	2 817	1 409	2 817	1 409
Spain	2013	23 136	376 510	313 758	94 127	94 127	156 879	62 752
Sweden	2014	6 523	30 579	6 116	30 579	12 232	24 463	6 116
United Kingdom	2014	20 080	624 969	374 981	166 658	83 329	416 646	291 652

Notes: Yellow highlights denote imputed data.

Table 8 shows the numbers of users of stimulants by user group obtained by the above method that were taken forward into the market size estimation process Table A.4 provides the stimulant prevalence rates by user group.

4.2 Number of users within the problem drug using population

Use among problem opioid users

As was done for cannabis, to complement the estimates derived from GPS, the consumption of cocaine and amphetamines by problem opioid users was estimated (use of ecstasy/MDMA by this group is not significant). The approach was the same as for cannabis, i.e. the proportion of opioid users entering treatment who mentioned using either cocaine or amphetamines as a secondary drug was applied to estimates of the number of problem opioid users in each country.

Table 9: Proportion of problem opioid users assumed to be cocaine or amphetamine users based on secondary drug use among treatment entrants for opioid use

Country	Year	Cocaine (%)	Amphetamines/ methamphetamines (%)
Austria	2014	41	12
Belgium	2014	26	6
Bulgaria	2013	9	37
Croatia	2014	42	17
Cyprus	2014	52	21
Czech Republic	2014	0	47
Denmark	2011	22	5
Estonia	2013	22	5
Finland	2014	1	69
France	2014	25	2
Germany	2012	22	5
Greece	2014	7	1
Hungary	2012	22	5
Ireland	2014	8	1
Italy	2014	77	5
Latvia	2011	22	5
Lithuania		22	5
Luxembourg	2014	76	1
Malta	2014	61	0
Netherlands	2014	14	2
Norway	2012	22	5
Poland	2014	10	34
Portugal	2014	78	5
Romania	2013	2	0
Slovakia	2014	1	35
Slovenia	2014	33	1
Spain	2013	22	5
Sweden	2014	22	5
United Kingdom	2014	4	4

Notes: Yellow highlights denote imputed data.

As with cannabis, the number of problem opioid users who used cocaine and amphetamines was calculated by multiplying the estimate of the number of problem opioid users by the proportion of

the total number of entrants into treatment for opioids who reported using cocaine and amphetamines respectively as a secondary drug. Table 9 shows the proportion of opioid users in treatment who reported using cocaine and amphetamines that were used in the estimation process (the problem opioid figures used are as in Table 3).

The same approach to dealing with missing data was used here as in the cannabis example. Data on secondary drug use for cocaine and amphetamines were not available for Denmark, Estonia, Germany, Hungary, Latvia, Lithuania, Norway, Spain and Sweden. This was imputed as the proportion of the total number of opioid users entering treatment who reported cocaine and who reported amphetamines as a secondary drug (0.22 and 0.05 respectively). However, as was the case for the estimation process based on GPS data, Turkey was excluded as it did not provide the necessary data and there were concerns about the applicability of average values to a country and the potential impact on the estimates of using inappropriate data for a country with such a large population.

Problem stimulant users

In some countries there are marginalised populations of problem stimulant users who, like problem opioid users, are unlikely to be represented in GPS. Therefore, we wanted to include estimates of use by these groups wherever data were available to permit this. Seven countries report estimates of the numbers of problem stimulant users, which have been produced using different approaches, including treatment multiplier (TM), capture-recapture (CR), truncated Poisson (TP) or other methods (OT) (see Table 10).

Table 10: Estimates of the number of problem users of amphetamines

Country	Year	Method	Central estimate	Lower bound of prevalence estimate	Upper bound of prevalence estimate
Cyprus	2014	TP	127	80	244
Czech Republic	2014	TM	36 400	35 000	37 800
Finland	2012	CR	13 898	10 980	17 760
Germany	2013	TM	55 411	50 661	60 160
Latvia	2014	TM	2 177	1 695	2 832
Norway	2013	TM	11 208	8 745	17 072
Slovakia	2007	OT	8 083	5 783	15 742

It was decided not to apply this method to estimates of the numbers of problem cocaine users due to concerns as to whether the users were already included in the general population survey estimates. The United Kingdom has estimates for problem crack users in England as part of its problem drug use estimates but further investigation was needed concerning the overlap with other problem use and, in addition, information on the amounts of crack used by different users was limited. It was therefore decided not to include them at this stage. This is an area for further development in future iterations of these estimates.

4.3 Amounts used by different user types

There are very few data on amounts used by different user types for cocaine, amphetamines and ecstasy. Once again, the data reported in the *Further insights* study (Frijn and van Laar, 2013) were used to obtain the amounts for a limited number of countries, which were then applied to all countries. Based on the number of respondents to the web surveys conducted, the number of countries that were deemed by the authors to have usable data fell from the seven countries for cannabis to three for amphetamines and only one for cocaine and ecstasy. This clearly raises doubts about the estimates, but it was felt that using a consistent source in the absence of many other alternatives was the best approach.

For amphetamines, the Netherlands, the Czech Republic and Sweden were considered to have sufficient numbers in each of the breakdown categories. For ecstasy and cocaine, the Netherlands was the only country with a sufficient sample size for the data to be used in the estimation process.

For cocaine and ecstasy, the amounts used for the Netherlands were applied to all countries. For amphetamines, the average of the amounts used for Czech Republic, the Netherlands and Sweden were applied to all countries without an estimate. The occasional and frequent groups from Frijn and van Laar (2013) were combined into a single group called 'frequent' by weighting the amounts by the size of the sample in each of the user groups (see Table 11).

Table 11: Amount used per year by type of stimulant user used in the estimates
Amounts are in grams for cocaine and amphetamines and in tablets for ecstasy

Country	Infrequent users				Frequent users			
	Sample size	Trimmed mean	Lower bound	Upper bound	Sample size	Trimmed mean	Lower bound	Upper bound
Cocaine								
Netherlands	427	2.06	1.84	2.28	227	51.84	41.82	60.97
Amphetamines								
Netherlands	450	1.70	1.46	1.94	445	89.00	74.94	103.06
Czech Republic	72	1.01	0.69	1.31	71	53.36	31.90	70.53
Sweden	134	2.04	1.65	2.37	59	147.11	94.83	198.82
Mean (weighted)		1.58	1.27	1.87		96.49	67.22	124.14
Ecstasy								
Netherlands	1 111	9.14	8.73	9.51	666	79.92	72.11	87.51

Source: Frijn and van Laar, 2013.

The estimated numbers of people of each user type obtained from GPS, shown in Table 8, were then multiplied by the relevant amount used to obtain their contribution to the market size by weight.

It was assumed that problem stimulant users and those problem opioid users who used stimulants were most likely to be frequent users. Hence, the amounts used by frequent users were applied to the numbers of problem users in Tables 9 and 10 to provide an estimate of the contribution of these groups to the cocaine and amphetamine market.

4.4 Calculating the value of the market

The data on price were drawn from the EMCDDA's annual data collection and the rules followed to select a price when more than one was provided are described in Section 3.

Luxembourg and Norway did not provide data for the price of any of the stimulant drugs in the most recent data collection, so data from the previous year were used, and prices refer to 2013 rather than 2014.

For cocaine, no data were available for Denmark at the time the estimates were made, and the simple average of the final selected price of the remaining countries was used. Data provided subsequently gave quite similar values (EUR 78 for cocaine, EUR 16 for amphetamine and EUR 8 for ecstasy), except for amphetamines, which were significantly lower.

Table 12: Prices for the stimulant drugs used in the estimation process

Prices are EUR per gram for cocaine and amphetamines, and EUR per tablet for ecstasy

Country	Cocaine	Amphetamines	Ecstasy
Austria	100.0	40.0	9.0
Belgium	57.0	9.5	4.9
Bulgaria	65.0	4.5	6.3
Croatia	78.9	23.0	11.3
Cyprus	100.0	130.0	10.0
Czech Republic	72.0	46.2	8.4
Denmark	76.4	25.9	8.8
Estonia	100.0	15.0	8.0
Finland	100.0	30.0	20.0
France	65.0	15.0	8.5
Germany	77.0	16.2	8.8
Greece	85.0	10.0	5.5
Hungary	56.7	10.3	5.3
Ireland	70.0	15.0	10.0
Italy	71.1	27.4	15.9
Latvia	80.0	17.0	6.5
Lithuania	72.4	9.9	5.5
Luxembourg	82.0	46.0	7.5
Malta	68.0	30.0	8.5
Netherlands	52.4	7.0	3.7
Norway	112.5	37.5	18.8
Poland	46.1	8.9	3.3
Portugal	47.8	25.9	4.4
Romania	100.0	25.9	13.5
Slovakia	91.0	37.0	6.5
Slovenia	60.0	10.0	4.0
Spain	57.6	28.1	11.1
Sweden	100.0	28.0	14.0
Turkey	71.3	55.3	9.5
United Kingdom	49.5	12.4	6.2

Note: Yellow highlights denote imputed values; blue highlights denote data for 2013 rather than 2014.

For amphetamine, no data were available for the Czech Republic but since most amphetamine used in that country is methamphetamine, for which a price had been provided, the price for methamphetamine was used. There were also no data available for Denmark, Portugal and Romania. In these cases, the simple average of the final selected price from those countries with data was used (EUR 25.9 per gram). This average price falls between the prices reported in other Scandinavian countries and in Germany (Norway 37.5, Sweden 28, Finland 30, Germany 16.2) so this seems a

reasonable proxy value for Denmark. A similar situation is seen with respect to Portugal, as the mean is only slightly less than the price in Spain (28.1). However, for Romania, it does not match well with the prices in neighbouring countries (Bulgaria 4.5 and Hungary 10.3) so using it may have inflated the value of the amphetamine market in this country.

For ecstasy, price data were unavailable only in the case of Denmark and here the simple average of the final selected prices was used.

4.5 Estimates of the size of the market for stimulant drugs

The estimates obtained for the size of the market from the above process in terms of quantities related to the different groups of users and in total are shown in Table 13 while the equivalent estimates for the value of the market are shown in Table 14.

Table 13: Estimates of the retail market size for cocaine, amphetamines and ecstasy by quantity in Europe, 2013

EU	Cocaine (tonnes)			Amphetamines (tonnes)			Ecstasy (million tablets)		
Users identified from:	**Mid**	**Low**	**High**	**Mid**	**Low**	**High**	**Mid**	**Low**	**High**
GPS	73.1	59.4	85.7	58.8	41.7	75.0	86.6	78.9	94.0
POU coverage	17.9	12.8	24.5	7.9	4.7	12.0			
Problem stimulant users				9.6	5.8	14.7			
Total EU	**91.0**	**72.2**	**110.2**	**76.3**	**52.1**	**101.6**	**86.6**	**78.9**	**94.0**
EU + Norway	**Cocaine (tonnes)**			**Amphetamines (tonnes)**			**Ecstasy (million tablets)**		
Users identified from:	**Mid**	**Low**	**High**	**Mid**	**Low**	**High**	**Mid**	**Low**	**High**
GPS	73.7	59.9	86.3	59.4	42.1	75.7	87.1	79.3	94.6
POU coverage	18.0	12.8	24.6	7.9	4.7	12.1			
Problem stimulant users				10.7	6.4	16.8			
Total EU + Norway	**91.7**	**72.7**	**111.0**	**78.0**	**53.1**	**104.6**	**87.1**	**79.3**	**94.6**

Table 14: Estimates of the retail market size for cocaine, amphetamines and ecstasy by value in Europe, 2013

EU	Cocaine (EUR millions)			Amphetamines (EUR millions)			Ecstasy (EUR millions)		
Users identified from:	**Mid**	**Low**	**High**	**Mid**	**Low**	**High**	**Mid**	**Low**	**High**
GPS	4 513.7	3 666.7	5 288.8	1 048.4	732.1	1 346.0	666.1	607.0	723.1
POU coverage	1 228.5	879.2	1 673.8	159.3	97.3	238.1			
Problem stimulant users				620.5	381.0	913.2			
Total EU	**5 742.2**	**4 545.9**	**6 962.5**	**1 828.1**	**1 210.3**	**2 497.3**	**666.1**	**607.0**	**723.1**
EU + Norway	**Cocaine (EUR millions)**			**Amphetamines (EUR millions)**			**Ecstasy (EUR millions)**		
Users identified from:	**Mid**	**Low**	**High**	**Mid**	**Low**	**High**	**Mid**	**Low**	**High**
GPS	4 575.3	3 716.8	5 360.9	1 070.6	747.7	1 374.6	675.0	615.2	732.8
POU coverage	1 240.3	886.3	1 695.2	161.1	98.2	241.6			
Problem stimulant users				661.0	403.0	992.7			

Total EU + Norway	**5 815.6**	**4 603.1**	**7 056.1**	**1 892.7**	**1 248.9**	**2 608.9**	**675.0**	**615.2**	**732.8**

5 Heroin

5.1 Number of users

It is recognised that a large proportion of opioid users lead chaotic lives and are unlikely to be well represented in GPS, and hence very low prevalence rates are found in these surveys. Nevertheless, because those dependent on heroin and other opioids tend to consume the drugs frequently the market for opioids is an important one. Heroin is the main opioid used in Europe, but in a few countries other opioids are quite important, for example in Finland and Estonia other opioids dominate the market (EMCDDA, 2015).

No single source of data for the number of either heroin or other opioid users for all countries is available at the EMCDDA, so a combination of different data collections has to be used. In the light of the many gaps in the data it was decided at this stage to focus solely on an estimate of the market size for heroin in this iteration of the market size estimates. For this an estimate of the number of heroin users in each country is required and since most people who use heroin are frequent, often dependent users an estimate of 'problem heroin users' is likely to be the best approximation.

One of the EMCDDA's key indicators is the PDU indicator. Within this indicator, data on the number of problem opioid users (POUs) are part of the core dataset. In some cases, countries specify the main opioid drug used and then, if that is heroin, a problem heroin user estimate is provided instead of a POU estimate. This was the case for seven countries.

Where there were no estimates of problem heroin users available, it was necessary to impute this based on POU estimates in combination with treatment data (TDI), if available. If this information was not available, other data sources such as PDU estimates or injecting drug use estimates had to be used. In some cases published data from sources other than EMCDDA data collections had to be used as described in the section on Imputation procedures.

In estimating the size of the heroin market an important factor to take into account is whether or not the individual is in treatment, because while in treatment heroin consumption is considerably reduced. As some people may be in treatment for long periods of time, particularly if they are in OST, this is an important consideration. Nevertheless, a significant proportion will 'top up' with heroin even while in treatment, so those in treatment cannot be excluded from the estimation process. McSweeney and Skrine (2013) investigated the impact of OST on heroin use and estimated that there was a 70 % reduction in the amount of pure heroin consumed while people were retained in OST. Since many of the methods used to estimate the numbers of POUs utilise treatment data in some way as part of the estimation process, the POU estimates may include people in OST. The reduced heroin use by this group therefore needs to be taken account of in some way when estimating heroin market size. However, if the POU estimates do not include people in OST it will be necessary to make sure those are also included in the market size estimation process.

Thus our basic approach involved obtaining an estimate of the number of problem heroin users sub-divided into those in treatment and those out of treatment[1] for each country. It was decided that the best available data for estimating those in treatment were the number of clients in OST provided by the availability and access to treatment 'indicator'. This was the data collection with the most complete coverage, with fairly recent data available for most countries. The approach taken for estimating the number in treatment if OST data were not available is described below, together with the methods for imputing the overall number of problem heroin users where this was not directly available.

Imputation procedures

Countries with problem heroin user estimates

The first stage of the process involved obtaining the number of problem heroin users, and as indicated above only seven countries (the **Czech Republic, France, Greece, Hungary, Italy, Malta and Spain**) had such estimates available. In five of these (the Czech Republic, France, Hungary, Italy and Malta) all OST clients were included in the initial estimates, so no further adjustment of the initial estimates of the overall number of problem heroin users was necessary; the number of heroin users in treatment was assumed to equal the number of clients in OST, and the number out of treatment was assumed to be the problem heroin use estimate minus the number in OST.

The confidence intervals (CIs) around the estimate of problem heroin users provided to the EMCDDA were used to provide a range for the market size estimates. However, only the central heroin estimate and no CIs were provided for the heroin estimates in the Czech Republic, although they were available for the overall PDU estimate. The central estimate of PDUs in that country was 11 300 users and that of heroin users 4 100. The ratio between the two values was used to estimate the CIs of the central heroin estimates, by using it to adjust the CIs of the PDU estimate.

In Spain, only a proportion of OST clients were included in the initial problem heroin user estimates. According to Spanish experts' opinions, as reported to the EMCDDA through their National reports, approximately 40 % of OST clients can still be considered to be POUs and had been included in the POU estimate. However, the reliability of this estimate was not clear so it was decided not to use this information in the estimation process at this time and so it was assumed that all OST clients were in the estimate. This may have led to an overestimation of the proportion of problem heroin users in treatment and an underestimation of the heroin market in the country, and this will be reviewed and additional data sought in future iterations.

In Greece, only new OST clients had been included in the initial problem heroin user estimates. To avoid underestimation by not including all OST clients in the estimate, an estimate of the number of continuing OST clients needed to be added to the initial overall estimate of problem heroin users. To obtain this the number of new OST clients in 2013 was estimated as the difference in number of OST clients between 2013 and 2012. This number was then subtracted from the 2013 OST estimate to give the number of continuing OST clients in that year. This number was then added to the initial problem heroin estimates in Greece to give an overall total for problem heroin users. The total

([1]) 'Out of treatment' refers to those users who have never entered treatment or who have been in treatment in the past but not in the last year.

number of OST clients, both new and continuing, was then used as described earlier to obtain numbers in and out of treatment.

Countries with problem opioid user estimates

Seventeen countries provided an estimate of problematic opioid users: Austria, Croatia, Cyprus, Germany, Finland, Ireland, Latvia, Lithuania, Luxembourg, the Netherlands, Norway, Poland, Portugal, Slovakia, Slovenia, Turkey and the United Kingdom. To estimate the proportion of heroin users among opioid users, the proportion of heroin users among opioid users in treatment (obtained from TDI data) was applied to the POU estimates where available. This assumes that the same proportion would also apply to the out of treatment opioid users, i.e. that users of different types of opioids in a country are equally likely to access treatment. This may not be the case, but seems a reasonable assumption in the absence of data on relative rates of treatment seeking.

In Germany and Norway, the proportion of heroin users among those in treatment for opioid problems was not available. For Germany, the proportion of heroin users among opioid injectors was available and used as a proxy, assuming that the injectors and non-injectors of opioids follow the same pattern regarding heroin consumption (and it should be noted that the TDI data suggests that injecting users make up over half (60 %) of heroin users in treatment in Germany). A four-year average (2011–14) of the percentage of heroin users among opioid injectors was used instead of the latest data available, to account for the fluctuation in this percentage across years (which ranged from a low of 55 % in 2012 to a high of 60 % in 2013). In the case of Norway, no information was available from the TDI on the proportion of heroin users among opioid users, so an EU average of the proportion of heroin users among opioid users (76 %) for 2013, the year of the available POU estimate, was used.

As a general principle, the data from the TDI that was used to adjust the POU estimates was taken from the same collection year as the POU estimate and not the most recent year available, so that both POU and TDI estimates refer to the same point in time. However, this was not possible for Ireland, Luxembourg and Lithuania, while in the United Kingdom the POU estimate referred to a period spanning two years (2010 and 2011). For the United Kingdom, TDI data from 2011 were used. For Luxembourg, TDI data from the year closest to the POU estimate (2006 instead of 2007) were used. For Lithuania, no TDI data on the proportion of heroin users among opioid users were available before 2013, so the 2013 figures were used to assess the proportion of problem heroin users among POUs for its 2007 estimate. For Ireland, a POU estimate was available for 2006. The report from the Irish Focal Point to the EMCDDA in 2015 provided more information on the trends in treatment provision and highlighted the development in treatment services and drug use patterns over the previous decade. It reported that from 2004 to 2013 users of other opioids than heroin accounted for on average 3.7 %. On this basis it was decided to use the value of 96.3 % average for 2004–13 for the proportion of opioid users using heroin.

To estimate the numbers in and out of treatment in those countries where the methods for estimating the number of POUs involved the use of data on individuals in OST, it was assumed that this group were fully included in the initial POU estimates and therefore in the derived problem heroin use estimates. This applied in 10 of the 17 countries (Austria, Denmark, Ireland, Cyprus, Latvia, the Netherlands, Portugal, Slovenia, Finland and the United Kingdom).

OST clients were completely excluded from the POU estimates in Norway, so it was necessary to add them in to the derived problem heroin use estimate. The total number of OST clients, 7 055 in 2013, was adjusted to allow for users of other opioids in treatment, as was the case for the POU estimates (again using the EU average of 76 % of people in treatment for opioid problems that were heroin users) and the estimate added to the derived estimate of problem heroin users.

In six countries (Croatia, Luxembourg, Lithuania, Poland, Slovakia and Turkey) it was not clear whether or not OST clients were included in the POU estimates. In these cases, it was decided not to make any adjustment to the estimates to account for OST clients, since it was not clear whether this would introduce extra bias. Although assuming that OST clients are included in the POU estimates may lead to a rather conservative estimate of problem heroin user prevalence in these cases, in most of these countries other data indicate that OST availability was low at the time of the POU estimates, so any adjustment was likely to be small anyway.

Countries with only Problem Drug Use estimates

Two countries (**Bulgaria and Denmark**) only had estimates for all problem drug users. Values for POUs for these countries were derived by using the proportion of POUs amongst PDUs in treatment in those countries for which this data was available. Cannabis users, originally in the estimate of PDUs for Denmark, were excluded (n = 10 900). The proportion of POUs attributable to heroin amongst treatment entrants was derived from the TDI, and applied to the POU estimate to obtain a problem heroin use value. This assumes the breakdown of drugs used is the same for those in and out of treatment.

Upper and lower values were provided for the PDU estimates in both these countries. The confidence intervals were taken from the original calculations, where the variance of the PDU estimate was estimated assuming the interval was arrived at using the equation for a 95 % CI from a simple random sample (((upper – lower)/3.92)^2). The variance of PDUs was adjusted by the square of the proportion of PDUs who were POUs in treatment to obtain the variance of POUs and CIs were calculated. The proportion of POUs in treatment who were problem heroin users was applied to the upper and lower values of the POU estimates, as above. Ideally this chain of approaches should not have been used, but the nature of the original calculations only became clear at the end of the process. This will be addressed in the next iteration of the results.

In the cases of both Bulgaria and Denmark it was decided not to add any OST clients in the estimates, since it was not clear if OST clients were included in the PDU estimates and it was felt this would introduce extra bias. As before, the number of clients in OST was taken as the number of heroin users in treatment and subtracted from the overall problem heroin user estimates obtained to give the number out of treatment.

Other countries

For the remaining four countries (Belgium, Estonia, Romania and Sweden), the only recent estimates available were for IDUs. The EMCDDA had attempted to estimate the number of problem heroin users in Romania in 2011, based mainly on data on IDUs in Bucharest (the estimated figure was around 11 000). However, changes in the drug scene in Bucharest (a drop in the IDU estimate in Bucharest, plus a move from heroin to stimulants and back to heroin) made an update of this

estimate desirable, which was done as follows. In 2014, it was estimated that there were 7 189 IDUs aged 15–49 in Bucharest, according to data provided for the PDU indicator. For the same year, the proportion of heroin users among all injectors in Romania was estimated based on TDI data reported to the EMCDDA (96 %). Also according to the same source (Reitox, 2015), 86 % of current users live in Bucharest, so 14 % do not live in Bucharest. Applying these proportions to the initial IDU estimate for Bucharest provides the number of heroin IDUs in the country as a whole (n=8 042; (7189*0.96)/0.86). The percentage of injectors among heroin users in treatment in 2012 in Romania was reported as 97.7 %. Applying this to the estimate of injecting heroin users provides an estimate of the total number of heroin users (injectors and non-injectors, 8 231; 8042/.977). No attempt was made to further adjust the estimate to match the 15–64 age group, due to a lack of available data to allow for this adjustment. Regarding OST clients, the entire OST case registry was included in the initial IDU estimation, so no further adjustment for this was necessary.

In Estonia, only trends in IDUs until 2009 were available, and significant variations across years were apparent. An average of the last three years of data (2007–09) was therefore used instead of a single year. The IDU estimates include heroin, fentanyl and amphetamine injectors. According to experts, in 2011 some 28 % of injectors in Estonia were amphetamine users, suggesting 72 % were opioid injectors. More recently, the report to the EMCDDA from the Estonian Focal Point in 2015 said: 'Heroin has practically disappeared from the drug market and the main opioid on the drug market is illegally produced fentanyl. Minority of drug users has reported some poppy liquid injecting', and a recent study in the city of Narva in 2014 (Salekešin, 2015) found that 78 % of injectors injected fentanyl and 20 % amphetamines, so heroin injection accounted for less than 2 %. Treatment data reported to the EMCDDA show the proportion of heroin users among those in treatment for opioid problems ranged from 25 % in 2005 to 3.5 % in 2013, providing additional evidence of heroin disappearing from the market. Given that pattern, the use of older TDI data (2009 or earlier) to obtain the proportion of heroin users among opioid users was not deemed appropriate and the 2013 treatment data were used instead. However, given the low prevalence of heroin use and the comparatively small population, any deviations from assumptions will have a limited impact on the total EU drug market estimates.

In Sweden, where amphetamines are the second most-consumed drug after cannabis, only an old (2007) PDU estimate was available (around 26 000 users). Other drug data show an increase in amphetamines seizures until 2006 and a slight drop afterwards. It is likely that problematic heroin use has decreased, especially with the increasing availability of treatment. It was therefore felt that the 2007 PDU estimate was no longer appropriate and more recent IDU estimates covering the period 2008 to 2010 ([2]) (~7 500 users) should be used as the basis for estimates instead. No clear information on drugs injected is available but they are assumed to be mainly heroin and amphetamine. TDI data on route of administration were used to estimate the expected percentage of heroin injectors among heroin and amphetamine injectors. Data were obtained on the average proportion of heroin users among all people receiving treatment for heroin or amphetamine problems who were injecting users for 2008–10. This suggested that approximately 37 % of injectors are heroin injectors. Applying this proportion to the IDU estimate gives an estimate of the number of heroin injectors. To estimate the non-injecting heroin-using population, the proportion of heroin

([2]) An estimate for 2011 was also available, but as this was based on data from prisons it was not included.

users in treatment who were injectors was obtained for the same period and used to estimate the number of heroin users in total. Overall, the updated 2008–11 estimate is much lower than the oldest (2007) estimate by approximately 2 000 users. The other estimate required (for application to the OST figures to obtain the estimate of heroin users in treatment) is the proportion of heroin users among those in treatment for opioid problems, and for this the average of the TDI data for the same three years (2008–10) was used.

Finally, for Belgium, the IDU estimate was based on ever injecting; it was therefore considered inappropriate to base estimates on this figure. No additional information on opioid or heroin use in Belgium is available, apart from data on OST and TDI. To estimate the OST coverage in Belgium, the average coverage in Europe estimated from countries with coverage >30 % was used (coverage <30 % is considered low according to the World Health Organization and it is unlikely to reflect the situation in Belgium). This figure was 55 % and it was applied to the number of OST clients in Belgium (17 026 in 2014) to provide an overall estimate of POUs. Treatment data from Belgium indicate that 75.6 % of people in treatment for problem opioid use are heroin users. Applying this to both the overall POU estimate and the number in OST allows the number of heroin users both in and out of treatment to be estimated.

Once problem heroin estimates had been finalised for all countries, the next step was to estimate the proportion of heroin users in OST treatment by multiplying the proportion of heroin users in treatment (from the TDI) with the number of OST clients. The figure obtained was taken as the estimate of the in treatment heroin population, which was then subtracted from the total problem heroin users estimates to give the out of treatment population as well. This distinction was necessary since the in and out of treatment population are assumed to consume different quantities of heroin. Again, all estimates (OST, TDI and PDU) were based on the same collection year, as described above. This was not possible for Finland, where the OST estimate used was from the year before the PDU and TDI figures (2011 instead of 2012) (the other exceptions were described above).

Table 15: Estimated number of problem heroin users in and out of treatment

Country	Year of problem heroin use estimates	Problem heroin use estimates				
		Central	Low	High	In treatment	Out of treatment
Austria	2013	**22 412**	**21 815**	**23 009**	13 336	9 076
Belgium	2014	**25 743**	**25 743**	**25 743**	12 872	12 872
Bulgaria	2009	**30 655**	**20 930**	**40 381**	2 904	27 751
Croatia	2010	**10 608**	**9 492**	**11 723**	4 980	5 628
Cyprus	2014	**843**	**674**	**1 087**	137	706
Czech Republic	2014	**4 100**	**3 700**	**4 499**	1 864	2 236
Denmark	2009	**7 232**	**6 811**	**7 652**	3 338	3 894
Estonia	2007–09	**200**	**131**	**412**	36	164
Finland	2012	**152**	**140**	**166**	27	125
France	2013	**110 000**	**90 000**	**125 000**	109 059	941
Germany	2013	**89 697**	**82 008**	**97 384**	44 448	45 250
Greece	2013	**26 062**	**24 058**	**28 430**	9 315	16 747
Hungary	2010–11	**3 244**	**2 910**	**3 577**	568	2 676
Ireland	2006	**20 021**	**17 465**	**22 704**	7 338	12 683

Italy	2014	**203 000**	**179 000**	**227 000**	74 597	128 403
Latvia	2014	**3 709**	**2 669**	**5 942**	312	3 397
Lithuania	2007	**5 070**	**4 937**	**5 207**	485	4 585
Luxembourg	2007	**1 818**	**1 539**	**2 357**	1 045	773
Malta	2014	**1 614**	**1 500**	**1 759**	1 078	536
Netherlands	2012	**9 800**	**8 890**	**11 410**	6 343	3 457
Norway	2013	**12 213**	**10 460**	**15 984**	5 362	6 851
Poland	2009	**14 030**	**9 692**	**18 369**	644	13 386
Portugal	2012	**31 476**	**27 105**	**35 847**	23 739	7 737
Romania	2014	**8 231**	**6 156**	**11 116**	579	7 652
Slovakia	2008	**4 277**	**3 470**	**8 559**	525	3 752
Slovenia	2013	**4 732**	**4 323**	**5 223**	2 968	1 764
Spain	2013	**65 648**	**52 122**	**79 173**	56 626	9 022
Sweden	2008–11	**4 727**	**4 488**	**4 993**	2 073	2 654
Turkey	2011	**11 969**	**10 458**	**24 945**	7 590	4 379
United Kingdom	2010–11	**284 852**	**279 329**	**295 294**	127 932	156 920

Note: Yellow highlights denote values derived from estimates of a different problematic user group and OST values (see Table A.5).

Table 15 shows the numbers of heroin users in and out of treatment obtained by the methods detailed in the text that were taken forward into the market size estimation process. The year of the problem heroin use estimate is the year of the underlying data.

5.2 Amounts of heroin used in and out of treatment

Most data available on the amounts of heroin used by people when in and out of treatment come from treatment outcome research studies available for a few countries but using different methods. The available data were reviewed by McSweeney and Skrine (2013) in the *Further insights* study and, once again, that study was drawn on for the estimation process here.

McSweeney and Skrine establish estimates of the number of days and amounts used for those prior to entering treatment and the reduction in both the number of days and amounts used during treatment based on published data and face to face interviews with a small sample of heroin users in four member states: the Czech Republic, England, Italy and the Netherlands. In combination these data provide a range for the estimated amounts of illicit heroin used on a typical day prior to entering treatment ranging from 0.5 to 1 grams per day so the mid-point of 0.75 grams per day was used for the calculation of quantities used out of treatment. Similarly, for frequency of heroin use among this group a 'best' estimate of 24 days of use per month was used based on consideration of the data obtained from a range of studies. The amounts of heroin used for those in OST were calculated using the middle estimate of the reduction in heroin use for those retained in treatment given in Table 14 of the report (McSweeney and Skrine, 2013). The amounts used per year obtained in this way that were used in these estimates are shown in Table 16.

Table 16: Amount used per year by heroin users in and out of treatment used in the estimates

	Out of treatment	In treatment
Amount used per year (grams)	216	67

As with the other drugs, the shortage of data on the amounts used is a major limitation; here, the breakdown required was in and out of treatment. In addition, we have not included purity in the calculations given the difficulties in obtaining data and linking prices to purity. This remains an area to be considered in the future.

5.3 Calculating the value of the market

The data on prices were drawn from the EMCDDA's annual data collection; the rules followed to select a price when more than one was provided are as described in Section 3. The price for 'brown' heroin was used, as this is the most common form, and 'unspecified' was assumed to be brown. The prices were collected as retail prices and were not adjusted for purity, given the shortage of information and difficulty in linking the two data sources.

For Denmark, a 2012 value was used in the absence of more recent data. Estonia and Ireland did not report, and the average of the final selected prices was used.

Table 17: Selected prices for heroin, 2014

Country	Price EUR/gram	Country	Price EUR/gram
Austria	60.0	Latvia	71.0
Belgium	27.7	Lithuania	59.1
Bulgaria	23.8	Luxembourg	33.3
Croatia	60.0	Malta	58.0
Cyprus	100.0	Netherlands	34.6
Czech Republic	42.5	Norway	125.0
Denmark	83.5	Poland	37.5
Estonia	57.8	Portugal	25.6
Finland	150.0	Romania	39.6
France	35.0	Slovakia	50.0
Germany	49.1	Slovenia	40.0
Greece	21.0	Spain	57.3
Hungary	38.3	Sweden	158.0
Ireland	57.8	Turkey	35.2
Italy	41.2	United Kingdom	62.7

Note: Yellow highlights denote estimated data; the blue highlight denotes data for 2012 rather than 2014.

5.4 Market size estimates obtained for heroin

The estimates of market size obtained following the above procedures, in terms of both quantity and monetary value, are shown in Table 18. It needs to be borne in mind that we have not adjusted for purity (which is known to vary quite markedly between countries and over time) in these estimates, so the quantity represents heroin of street level purity, whatever that may be.

Table 18: Market size estimates for heroin

	EU			EU + Norway + Turkey		
	Amount (tonnes)			Amount (tonnes)		
Heroin users:	**Mid**	**Low**	**High**	**Mid**	**Low**	**High**
In treatment	34.2	34.2	34.2	35.1	35.1	35.1
Out of treatment	104.2	87.2	128.3	106.6	88.9	134.3
Total	**138.4**	**121.4**	**162.5**	**141.7**	**124.0**	**169.4**
	Value (EUR millions)			Value (EUR millions)		
	Mid	**Low**	**High**	**Mid**	**Low**	**High**
Total	**6 782.7**	**6 041.6**	**7 845.6**	**7 064.0**	**6 264.1**	**8 327.3**

6 Overall size of the EU drug market

The overall size of the EU drug market was obtained by summing the individual estimates for cannabis, stimulants and heroin. On the basis of the assumptions made, the gaps in the data, under-coverage of data sources, and under-reporting, the estimates are believed to be underestimates and can be interpreted as minimum values. Similarly, the overall size of the EU drug market will be an underestimate and also does not take into account the other illicit drugs, for example hallucinogens, consumed.

Table 19: Estimates of the overall size of the EU drug market

	EU			EU + Norway + Turkey		
	Amount (tonnes)			Amount (tonnes)		
	Mid	**Low**	**High**	**Mid**	**Low**	**High**
Cannabis	1 288.5	1 154.2	1 789.7	1 303.4	1 167.3	1 811.1
Cocaine	91.0	72.2	110.2	91.7	72.7	111.0
Amphetamines	76.3	52.1	101.6	78.0	53.1	104.6
Ecstasy ([1])	86.6	78.9	94.0	87.1	79.3	94.6
Heroin	138.4	121.4	162.5	141.7	124.0	169.4
	Value (EUR millions)			Value (EUR millions)		
	Mid	**Low**	**High**	**Mid**	**Low**	**High**
Cannabis	9 313.4	8 405.6	12 851.2	9 484.1	8 555.3	13 097.1
Cocaine	5 742.2	4 545.9	6 962.5	5 815.6	4 603.1	7 056.1
Amphetamines	1 828.1	1 210.3	2 497.3	1 892.7	1 248.9	2 608.9
Ecstasy	666.1	607.0	723.1	675.0	615.2	732.8
Heroin	6 782.7	6 041.6	7 845.6	7 064.0	6 264.1	8 327.3
Total	**24 332.5**	**20 810.4**	**30 879.6**	**24 931.4**	**21 286.5**	**31 822.1**

Note: ([1]) Ecstasy amounts in millions of tablets.

7 Limitations of the estimates and future developments

Despite the many limitations in the estimation process, and the valid concerns these raise, the importance of market size estimates to policymakers and more generally to understanding the drug situation, both in terms of supply and demand, means that it is imperative to attempt such estimates, with the prospect of improvement over time. Improvements will result from further

consideration of the method applied and the development of expertise, and from targeting obvious data anomalies and gaps. The exercise brings into focus the areas that require improvement and suggests future developments.

The intention of this programme of work is to develop a method of estimating market size that uses data monitored by the EMCDDA as far as possible, and that can be repeated regularly, with changes or improvements in method and data documented.

The aim has been to provide an overall EU estimate. The assumptions and imputations made in order to obtain figures for all countries, and issues on the comparability of the underlying data, have prompted us not to provide specific country-level estimates. As improvements are made in the method and data this may change.

It is clear that the limitations result in an underestimate of the total market size. It should also be recognised that in the short to medium term improvements in method and data availability will influence the results, making it difficult to quantify trends immediately. Many of the limitations have been discussed above but the key areas of concern are summarised in this section.

7.1 *Numbers of users and user groups*

General population survey data

GPS data were used to establish the main number of users for all the drugs other than heroin. Prevalence of use was established for the various user groups, and combined with population levels to obtain the numbers of users.

Data from GPS are available for almost all countries, and many are updated regularly; however, there are inherent limitations in GPS data that will influence the market size estimates, and also issues specific to the individual country surveys that affect comparability. Inherent to the use of GPS are the issues of under-coverage (some users being missed by this data source) and under-reporting (self-report of use underestimating actual use), as described in the introduction. Both are likely to result in a substantial underestimation of the total market size.

To partially address under-coverage, the GPS estimates were supplemented with estimates of secondary drug use by problem drug users of cannabis, cocaine and amphetamines, and problematic use of amphetamines. A further development would be to extend this to problematic use of cocaine.

One possible course of action to address under-reporting would be to adjust the final estimates by a correction factor, as Kilmer and Pacula (2009) did. However, it is likely that the under-reporting varies by country, and at present there is no systematic collection of information on under-reporting across the countries. A further development would be to investigate and collect the available information and promote the extension of these types of studies to more countries. In this iteration of the market size estimates, no correction factor has been applied, but this can be reconsidered in future iterations.

Issues related to specific country surveys that will influence the market size estimates are varied, and may inflate or deflate the estimates. First it should be noted that the surveys stem from different years, and for a small number of countries are quite old. Second, looking back across time, there is within-country variability in the reported prevalence levels, which could in part be a result of

survey method, small sample size or low response rates. Third, for specific countries, coverage of age and geography are not standard.

In terms of further developments relating to the specific country surveys, using the available data has been the guiding criteria and continues to be the working model. The EMCDDA continues to encourage the regular completion of general population surveys and the reporting of frequency of use data. However, some consideration can be given to how the estimates would change if a greater level of imputation was used rather than using all data. Further work can be undertaken to establish the most appropriate survey results to adopt, and how to incorporate confidence intervals around the prevalence levels into the estimation. At the moment, data on confidence intervals are collected as part of GPS but are not available for all countries. In the existing estimates no adjustments have been made for variations in coverage of age and geography. These affect relatively few countries, and it was assumed it would not dramatically influence the results, though again this can be reconsidered in the next iteration.

Finally, it was not possible given the available data to construct as many user groups for stimulants as it was for cannabis. Four user groups were established for cannabis, with seven countries without the necessary data. The data requirements were reduced for stimulants, requiring only last year and last month prevalence to construct two groups. On that basis five countries did not have complete data. In the absence of additional data, this limitation is likely to persist.

Problem opioid users

The contribution of problem opioid users to the consumption of cannabis, cocaine and amphetamines is one area for which under-coverage of the GPS has been compensated. However, the available estimates of the numbers of problem opioid users vary in terms of population covered, method and year across countries. For almost half the countries, the age of some of the estimates raises concerns as to whether they reflect the situation in more recent years. Missing data, both for numbers of problem opioid users, and for secondary drugs reported by opioid users entering treatment, weaken the estimates. In a limited number of estimates the necessary metadata are not available, resulting in further assumptions being made. It is not possible to anticipate whether these data gaps will inflate or deflate the estimates.

The EMCDDA continues to promote the estimation of the numbers of problem opioid users with the national focal points, and encourages full completion of the TDI. Improvements in understanding the content of the data and establishing metadata may be achieved in the short term

Problem heroin users

No single, directly comparable estimate of the number of heroin users is currently available for the countries across Europe. Specific procedures to obtain these values were necessary for a number of countries, using estimates of problem drug use, problem opioid use, injecting drug use, opioid substitution treatment, and secondary data. Concerns remain about the comparability of the problematic user estimates given the broad range of years and methods. The impact of the underlying data sources on the estimates is not always clear. In addition, incomplete information on the role of OST in the estimates resulted in assumptions being made to establish the numbers of users in and out of treatment.

However, seven countries provided direct estimates of problem heroin users, and a further 17 provided estimates of problem opioid use, from which the application of the proportion of heroin clients amongst entrants into treatment for opioids provides an estimate of problem heroin use. In terms of further developments, the EMCDDA will seek to clarify the questions around the data and so better evaluate their use. It will also continue to encourage the countries to provide estimates of problematic use on a regular basis, with the necessary metadata. It is hoped that this exercise and the benefits of improving knowledge on market size will act as encouragement to that end.

Problem amphetamine users

Estimates of use from GPS were complemented with estimates of problem amphetamine or methamphetamine use provided by six EU member states (Cyprus, the Czech Republic, Finland, Germany, Lithuania and Slovakia) and Norway. A further set of countries provide estimates of problem cocaine use and, having established more clearly the content of the estimates, it should be possible to calculate a similar correction in the next iteration. In terms of further developments, different stimulants dominate in different countries, and it should also be possible to better identify the countries where a particular stimulant drug is dominant, and seek information on problematic use of that stimulant accordingly with the national focal points, to improve this part of the estimation.

7.2 Amounts of drugs used

The absence of data on amounts used by user group in most EU countries is a major weakness in the estimations. By necessity we have had to apply the information on amounts used in a limited number of countries from secondary sources to the majority of countries. In order to address this issue, the EMCDDA has embarked on a pilot project with seven countries to conduct web surveys amongst drug-using populations specifically to obtain information on the amounts used of cannabis, cocaine, amphetamines, and ecstasy. A similar methodology to that used by Trautmann et al. (2013) has been adopted, with three of the countries having participated in the original study. If the pilot proves successful, it is hoped that this survey will be adopted more broadly by the national focal points and be repeated to collect data on other topics.

7.3 *Cannabis resin/herb split*

We recognise that seizures data are likely to be a poor proxy for split at retail level in some countries where seizures are mainly at higher levels of the market but we think there is insufficient other data to provide an alternative. The EMCDDA has started to collect numbers of seizures sub-divided by weight bins to reflect the different levels of the market, which may improve the estimates of the cannabis resin/herb split in the future.

7.4 Price data used to estimate the value of the market

As indicated above, the way in which prices are collected is very variable and may reflect different levels of the market. In addition, the central estimate provided by the national focal points varies between countries, further adding to the complexity. The collection of price data is currently being reviewed at the EMCDDA, with the help of an external contractor and the national focal points, with the intention particularly of clarifying which level of the market reported prices refer to. This should improve the price estimates in the medium term.

In terms of year, the most recent price data (mainly 2014) were used although, since the estimates of market size were for 2013, this should have related to the previous year, 2013. The issue of the

year of price data will be addressed in the next iteration and, given the variability and uncertainty around the data, a further consideration is whether to use an average of the past three years.

8 Concluding remarks

Future developments have been suggested alongside the discussion of limitations above. Broadly, they involve reducing data gaps where possible by encouraging or clarifying the reporting of the standard EMCDDA indicators or by investigation with the national focal points of specific topics such as under-reporting and amounts used. There is scope for improving the execution of the estimation process, which can be developed within the EMCDDA with the help of the expert group of advisors by reconsidering the various assumptions, decisions and imputations made in the process.

Despite the many limitations, the exercise represents the first attempt to establish a regular and repeated estimation of market size for the EU and Europe of cannabis, heroin, cocaine, amphetamines and ecstasy, using available monitored data as far as possible. This estimation process will be elaborated and improved, and hence estimates are likely to be variable for some time. However, it should be possible relatively quickly to identify major sources of change, focus on improvements in these areas and, as a result, better understand the various markets.

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ANNEX

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Table A.1: Cannabis users — number and proportion of last month users for each user group (GPS)

			Number of users						Proportion of last month users		
Country	Year	Sample size	Last month	1–3 per month	4–19 per month	20 + per month	Not known	Valid last month	Occasional	Frequent	Intensive
Austria	2008	3 761	56	26	24	6		56	0.46	0.43	0.11
Belgium	2013	4 931	125	51	48	26	0	125	0.41	0.38	0.21
Bulgaria	2012	5 325	129	43	74	11	1	128	0.34	0.58	0.09
Croatia	2012	4 756	136	63	46	22	5	131	0.48	0.35	0.17
Cyprus	2012	3 500	39	23	10	6	0	39	0.59	0.26	0.15
Czech Republic	2012	2 108	90	43	40	7	0	90	0.48	0.44	0.08
Denmark	2013	10 470	275	185	44	40	6	269	0.69	0.16	0.15
Estonia	2008	1 401									
Finland	2014	3 128	75	30	26	8	11	64	0.47	0.41	0.13
France	2014	13 488	899	301	294	291	13	886	0.34	0.33	0.33
Germany	2012	9 084	235	119	49	62	5	230	0.52	0.21	0.27
Greece	2004	4 351									
Hungary	2007	2 710	30	14	10	6		30	0.47	0.33	0.20
Ireland	2011	5 128	143	68	54	20	1	142	0.48	0.38	0.14
Italy	2014	6 590	280	106	114	60	0	280	0.38	0.41	0.21
Latvia	2011	4 491	71	29	29	10		68	0.43	0.43	0.15
Lithuania	2012	4 831	34	18	10	0		28	0.64	0.36	0.00
Luxembourg											
Malta	2013	1 869									
Netherlands	2014	5 867	291	115	94	83	0	292	0.39	0.32	0.28
Norway	2014	1 790	30	15	10	5	0	30	0.50	0.33	0.17
Poland	2014	1 135	64	36	22	3	3	61	0.59	0.36	0.05
Portugal	2012	5 355	91	23	39	27		89	0.26	0.44	0.30
Romania	2013	7 200	72								
Slovakia	2010	4 055	57	34	21	2		57	0.60	0.37	0.04
Slovenia	2012	7 514	172	86	50	34		170	0.51	0.29	0.20
Spain	2013	23 136	1535	412	527	597		1536	0.27	0.34	0.39
Sweden	2014	6 523	3								
Turkey	2011	8 045									
United Kingdom	2014	20 080	613	743	217	98	55	1058	0.70	0.21	0.09

Table A.2: Cannabis prevalence rates and population data used by country (GPS)

Country	Year	Sample size	LTP	LYP	LMP	Infrequent	Occasional	Regular	Intensive	2013 population aged 15–64
Austria	2008	3 761	14.2	3.5	1.7	1.8	0.79	0.73	0.18	5 705 240
Belgium	2013	4 931	15.0	4.6	2.6	2.0	1.06	1.00	0.54	7 303 916
Bulgaria	2012	5 325	7.5	3.5	2.0	1.5	0.67	1.16	0.17	4 899 092
Croatia	2012	4 756	15.6	5.0	2.9	2.1	1.39	1.02	0.49	2 852 460
Cyprus	2012	3 500	9.9	2.2	1.2	1.0	0.71	0.31	0.18	609 642
Czech Republic	2012	2 108	27.9	9.2	4.4	4.8	2.10	1.96	0.34	7 188 211
Denmark	2013	10 470	35.6	6.9	2.7	4.2	1.86	0.44	0.40	3 625 231
Estonia	2008	1 401	21.2	6.0	1.4	4.6	0.94	0.46	-0.00011	875 302
Finland	2014	3 128	21.7	6.8	2.5	4.3	1.17	1.02	0.31	3 517 089
France	2014	13 488	40.9	11.1	6.6	4.5	2.24	2.19	2.17	41 886 952
Germany	2012	9 084	23.1	4.5	2.3	2.2	1.19	0.49	0.62	54 280 665
Greece	2004	4 351	8.9	1.7	0.9	0.8	0.40	0.36	0.14	7 214 352
Hungary	2007	2 710	8.5	2.3	1.2	1.1	0.56	0.40	0.24	6 776 258
Ireland	2011	5 128	25.3	6.0	2.8	3.2	1.34	1.06	0.39	3 024 424
Italy	2014	6 590	31.9	9.2	4.4	4.8	1.67	1.79	0.94	38 697 060
Latvia	2011	4 491	12.5	4.0	1.5	2.5	0.64	0.64	0.22	1 351 725
Lithuania	2012	4 831	10.5	2.3	0.7	1.6	0.45	0.25	0.00	1 993 131
Luxembourg			17.5	4.7	2.4	2.3	1.12	0.86	0.40	370 749
Malta	2013	1 869	4.3	0.9	0.4	0.5	0.20	0.16	0.03	287 767
Netherlands	2014	5 867	24.3	8.0	4.6	3.4	1.81	1.48	1.31	11 077 308
Norway	2014	1 790	21.9	4.2	1.6	2.6	0.80	0.53	0.27	3 333 277
Poland	2014	1 135	16.2	4.6	2.1	2.5	1.24	0.76	0.10	27 248 972
Portugal	2012	5 355	9.4	2.7	1.7	1.0	0.44	0.74	0.52	6 904 482
Romania	2013	7 200	4.6	2.0	1.0	1.0	0.47	0.41	0.12	13 622 267
Slovakia	2010	4 055	10.5	3.6	1.4	2.2	0.83	0.51	0.05	3 870 038
Slovenia	2012	7 514	15.8	4.4	2.3	2.1	1.16	0.68	0.46	1 408 581
Spain	2013	23 136	30.4	9.2	6.6	2.6	1.77	2.26	2.57	31 375 814
Sweden	2014	6 523	14.4	2.9	0.7	2.2	0.46	0.25	-0.012	6 115 751
Turkey	2011	8 045	0.7	0.3	0.2	0.1	0.07	0.09	0.04	51 088 202
United Kingdom	2014	20 080	29.2	6.7	3.7	3.0	2.60	0.76	0.34	41 664 581

Note: Yellow highlights denote estimated values; red highlights denote estimates out of bounds, replaced with 0.

Table A.3: Stimulant prevalence rates by country (GPS)

			Cocaine			Amphetamines			Ecstasy		
Country	Year	Sample size	LTP	LYP	LMP	LTP	LYP	LMP	LTP	LYP	LMP
Austria	2008	3 761	2.2	0.9	0.6	2.5	0.5	0.2	2.3	0.5	0.2
Belgium	2008	6 792		0.5	0.16	0.0	0.2	0.06	0.0	0.3	0.11
Bulgaria	2012	5 325	0.9	0.2	0.1	1.2	0.6	0.3	2.0	1.2	0.4
Croatia	2012	4 756	2.3	0.5	0.3	2.6	0.8	0.2	2.5	0.4	0.2
Cyprus	2012	3 500	1.3	0.3	0.1	0.7	0.3	0.1	0.9	0.3	0.2
Czech Republic	2012	2 108	2.3	0.4	0.1	2.5	0.4	0.2	3.6	0.6	0.1
Denmark	2013	10 470	5.2	0.9	0.3	6.6	0.6	0.2	2.3	0.2	0.1
Estonia	2008	1 401	0.0	0.7	0.1	0.0	1.1	0.5	0.0	1.2	0.2
Finland	2014	3 128	1.9	0.5	0.2	3.4	1.1	0.2	3.0	1.1	0.3
France	2014	13 488	5.4	1.1	0.36	2.2	0.3	0.09	4.2	0.9	0.34
Germany	2012	9 084	3.4	0.8	0.3	3.1	0.7	0.4	2.7	0.4	0.2
Greece	2004	4 351	0.7	0.1	0.0	0.1		0.0	0.4	0.2	0.0
Hungary	2007	2 710	0.9	0.2	0.2	1.8	0.5	0.3	2.4	0.5	0.2
Ireland	2011	5 128	6.8	1.5	0.5	4.5	0.4	0.1	6.9	0.5	0.1
Italy	2014	18 898	7.6	1.1	0.3	2.8	0.2	0.0	3.1	0.4	0.1
Latvia	2011	4 491	1.5	0.2	0.1	2.2	0.3	0.1	2.7	0.4	0.0
Lithuania	2012	4 831	0.9	0.2	0.0	1.2	0.2	0.1	1.3	0.2	0.0
Luxembourg				1.09	0.41		0.49	0.19		0.72	0.26
Malta	2013	1 869	0.5	0.09	0.03	0.3	0.04	0.01	0.7	0.12	0.05
Netherlands	2014	5867	5.3	1.6	0.6	4.6	1.3	0.5	7.6	2.5	0.7
Norway	2013	1 790	4.2	0.9	0.29	3.7	0.6	0.18	2.3	0.4	0.15
Poland	2014	1 135	1.3	0.2	0.0	1.7	0.2	0.0	1.6	0.4	0.2
Portugal	2012	5 355	1.2	0.2	0.1	0.5	0.0	0.0	1.3	0.3	0.2
Romania	2013	7 200	0.8	0.2	0.0	0.3	0.1	0.0	0.9	0.2	0.1
Slovakia	2010	4 055	0.6	0.2	0.1	0.5	0.1	0.0	1.9	0.5	0.2
Slovenia	2012	7 514	2.1	0.5	0.1	0.9	0.3	0.1	2.1	0.3	0.1
Spain	2013	23 136	10.3	2.2	1.0	3.8	0.6	0.3	4.3	0.7	0.2
Sweden	2014	6 523	3.3	0.6	0.1	5.0	0.7	0.2	2.1	0.5	0.1

Turkey	2011	8 045									
United Kingdom	2014	20 080	9.8	2.4	0.9	10.3	0.6	0.2	9.2	1.7	0.7

Note: Yellow highlights denote estimated values

Table A.4: Stimulant prevalence levels used in the estimation process by user group and country

			Cocaine		Amphetamines		Ecstasy	
Country	Year	Sample size	Infrequent (LYP-LMP)	Frequent (LMP)	Infrequent (LYP-LMP)	Frequent (LMP)	Infrequent (LYP-LMP)	Frequent (LMP)
Austria	2008	3 761	0.30	0.60	0.30	0.20	0.30	0.20
Belgium	2008	6 792	0.34	0.16	0.14	0.06	0.19	0.11
Bulgaria	2012	5 325	0.10	0.10	0.30	0.30	0.80	0.40
Croatia	2012	4 756	0.20	0.30	0.60	0.20	0.20	0.20
Cyprus	2012	3 500	0.20	0.10	0.20	0.10	0.10	0.20
Czech Republic	2012	2 108	0.30	0.10	0.20	0.20	0.50	0.10
Denmark	2013	10 470	0.60	0.30	0.40	0.20	0.10	0.10
Estonia	2008	1 401	0.60	0.10	0.60	0.50	1.00	0.20
Finland	2014	3 128	0.30	0.20	0.90	0.20	0.80	0.30
France	2014	13 488	0.74	0.36	0.21	0.09	0.56	0.34
Germany	2012	9 084	0.50	0.30	0.30	0.40	0.20	0.20
Greece	2004	4 351	0.10	0.00	0.00	0.00	0.20	0.00
Hungary	2007	2 710	0.00	0.20	0.20	0.30	0.30	0.20
Ireland	2011	5 128	1.00	0.50	0.30	0.10	0.40	0.10
Italy	2014	18 898	0.80	0.30	0.20	0.00	0.30	0.10
Latvia	2011	4 491	0.10	0.10	0.20	0.10	0.40	0.00
Lithuania	2012	4 831	0.20	0.00	0.10	0.10	0.20	0.00
Luxembourg			0.68	0.41	0.29	0.19	0.46	0.26
Malta	2013	1 869	0.06	0.03	0.03	0.01	0.08	0.05
Netherlands	2014	5 867	1.00	0.60	0.80	0.50	1.80	0.70
Norway	2013	1 790	0.61	0.29	0.42	0.18	0.25	0.15
Poland	2014	1 135	0.20	0.00	0.20	0.00	0.20	0.20
Portugal	2012	5 355	0.10	0.10	0.00	0.00	0.10	0.20
Romania	2013	7 200	0.20	0.00	0.10	0.00	0.10	0.10
Slovakia	2010	4 055	0.10	0.10	0.10	0.00	0.30	0.20
Slovenia	2012	7 514	0.40	0.10	0.20	0.10	0.20	0.10
Spain	2013	23 136	1.20	1.00	0.30	0.30	0.50	0.20
Sweden	2014	6 523	0.50	0.10	0.50	0.20	0.40	0.10
Turkey	2011	8 045	0.00	0.00	0.00	0.00	0.00	0.00
United Kingdom	2014	20 080	1.50	0.90	0.40	0.20	1.00	0.70

Note: Yellow highlights denote estimated values

Table A.5: Problematic user estimates and other data from which the number of problem heroin users (PHU) was derived

Country	Year	Type of problematic user data available[1]	Central estimate	Low estimate	High estimate	% of heroin among opioid users in TDI	OST clients	OST clients in PROBLEMATIC USER ESTIMATE
Austria	2013	POU	28 550	27 790	29 311	78.5	16 989	OST clients are fully included
Belgium	-	-	-	-	-	75.6	17 026	Not applicable
Bulgaria	2009	PDU	31 316	23 050	42 920	99.1	2 930	Not clear if OST clients are included or not
Croatia	2010	POU	10 726	9 598	11 853	98.9	5 035	OST clients are fully included
Cyprus	2014	POU	1 094	874	14 10	77.1	178	OST clients are fully included
Czech Republic	2014	PHU	11 300	10 200	12 400	46.6	4 000	OST clients are fully included
Denmark	2009	PDU	33 074	31 151	34 997	45.2	7 384	Not clear if OST clients are included or not
Estonia	2007–09	IDU	8 012	5 242	16 486	3.5	1 021	Not clear if OST clients are included or not
Finland	2012	POU	13 836	127 00	15 090	1.1	2 439	OST clients are fully included
France	2013	PHU	211 000	180 000	300 000	66.6	163 752	OST clients are fully included
Germany	2013	POU	155 994	142 623	169 364	57.5	77 300	OST clients are fully included
Greece	2013	PHU	16 162	14 158	18 530	93.4	9 973	New OST clients counted but not continuing clients
Hungary	2010–11	PHU	3 244	2 910	3 577	79.4	715	Not clear if OST clients are included or not
Ireland	2006	POU	20 790	18 136	23 576	96.3	7 620	OST clients are fully included
Italy	2014	PHU	203 000	179 000	22 7000	98.2	75 964	OST clients are fully included
Latvia	2014	POU	6 151	4 427	9 854	60.3	518	OST clients are fully included
Lithuania	2007	POU	5 458	5 314	5 605	92.9	522	Not clear if OST clients are included or not
Luxembourg	2007	POU	1 900	1 608	2 463	95.7	1 092	Not clear if OST clients are included or not
Malta	2014	PHU	1 614	1 500	1 759	100	1 078	OST clients are fully included
Netherlands	2012	POU	14 000	12 700	16 300	70.0	9 062	OST clients are fully included
Norway	2013	POU	9 015	6 708	13 977	76.0	7 055	OST clients are fully **excluded**
Poland	2009	POU	15 119	10 444	19 794	92.8	694	Not clear if OST clients are included or not
Portugal	2012	POU	31 858	27 434	36 282	98.8	24 027	OST clients are fully included
Romania	2014	IDU	7 189	5 377	9 709	97.7	593	OST clients are fully included
Slovakia	2008	POU	4 888	3 966	9 782	87.5	600	Not clear if OST clients are included or not
Slovenia	2013	POU	5 200	4 750	5 740	91.0	3 261	OST clients are fully included
Spain	2013	PHU	65 648	52 122	79 173	91.4	61 954	A subset of OST clients are included
Sweden	2008–11[2]	IDU	7 590	7 206	8 016	59.7	3 472	Not known if OST clients are included or not
Turkey	2011	POU	12 733	11 126	26 537	94.0	8 074	Not clear if OST clients are included or not

United Kingdom	2010–11	POU	330 455	324 048	342 569	86.2	148 413	OST clients are fully included

Notes: Yellow highlights denote imputed values

1. PDU = Problem drug user; POU = Problem opiate user; PHU = Problem heroin user. A range of different methods were used to obtain problem heroin use estimates based on the available initial problematic user estimates and information on OST. Details appear in the body of the text by country.
2. Data available on 31 January 2016. Sweden subsequently updated the number of IDUs from 7 590 to 8 012. This will be corrected in the next iteration of the estimates.