European Monitoring Centre
for Drugs and Drug Addiction

EMCDDA
MANUALS

Guidelines for collecting data on retail drug prices in Europe: issues and challenges

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for Drugs and Drug Addiction

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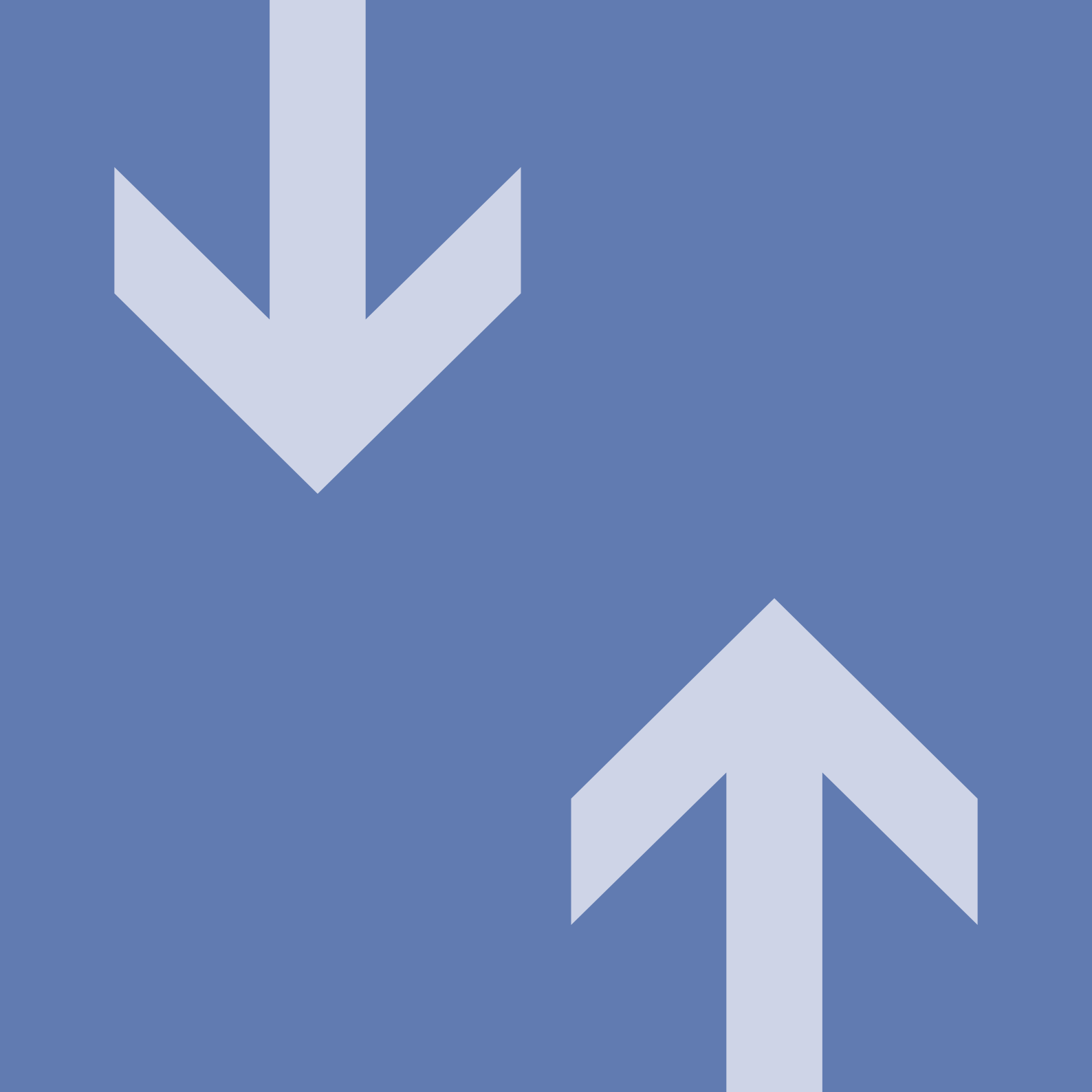

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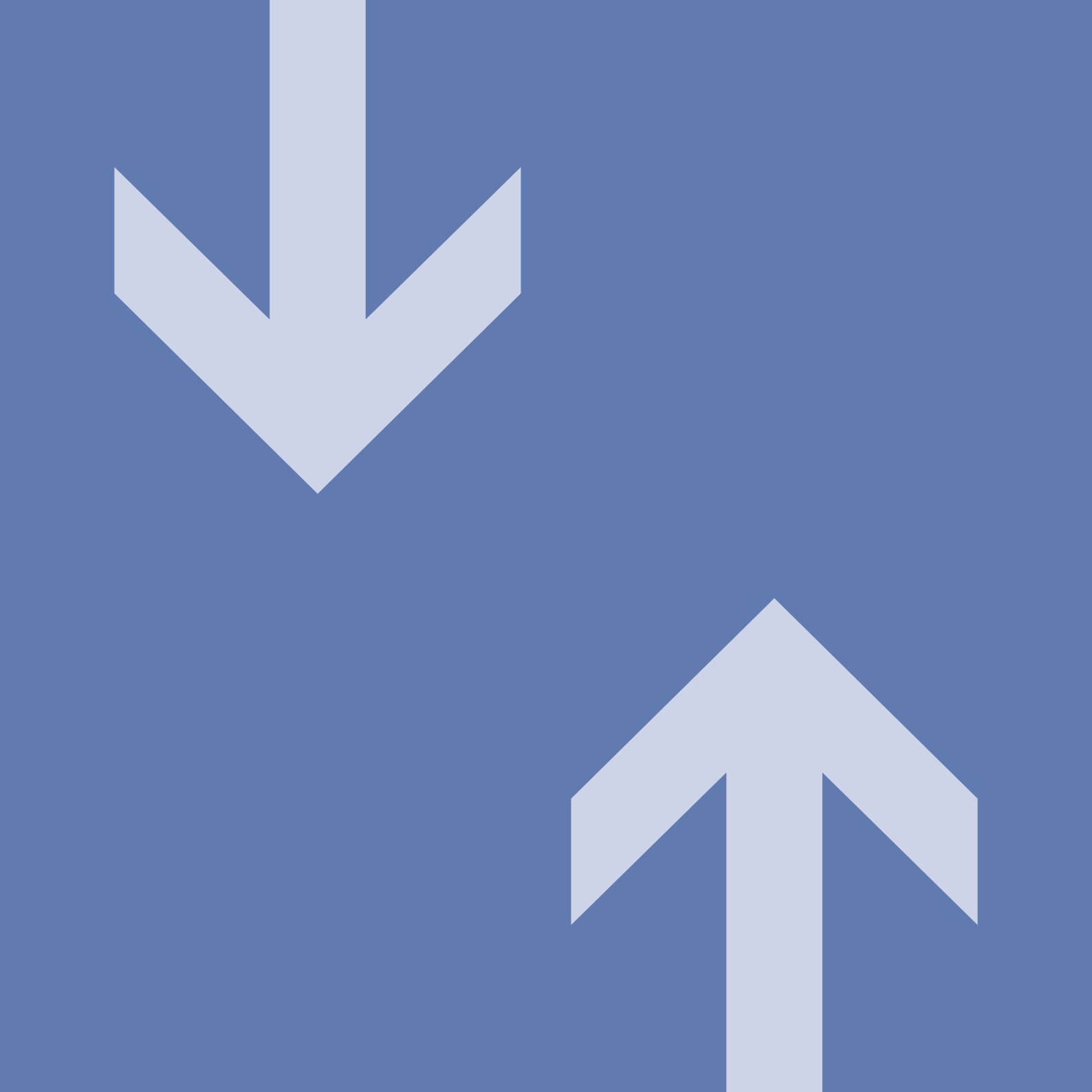


Preface

This is the fourth publication in the EMCDDA's Manuals series, and after those on the evaluation of drug demand reduction practices, it is the first to address issues related to the illicit drug market. Prices are an essential element of the drug market, from both a demand and a supply perspective.

Drug prices, together with information on drug purity, may be used as indicators of drug availability, and as contextual information for the epidemiology of drug use. There is in general an assumed relationship between retail drug prices and drug use, as prices may influence the level and incidence of drug consumption, either directly or via the mediation of other factors. Drug prices, combined with other market indicators, are also an important tool for understanding the workings of drug supply and distribution mechanisms; they are fundamental to estimating the value of drug markets and their potential impact on the legal economy. They may, in particular, be used to help target law enforcement resources and review supply reduction strategies. Lastly, drug prices are also used in many countries by criminal justice agencies to assist with decisions related to prosecution and sentencing, for example in cases of assets recovery.

The EMCDDA has been collecting information on retail prices via its Reitox network of national focal points for the last 15 years. Although considerable progress has been achieved and aggregated annual data are now made available from all reporting countries, there is still substantial variation in terms of the methods of data collection both between and within countries. This raises concerns over the reliability and comparability of data on retail prices across Europe.

This Manual builds on initial discussions held at an expert meeting organised by the EMCDDA in October 2007, which examined differences in national reporting practices of retail drug prices data in Europe. Disseminating information on issues relating to the recording of retail drug prices was identified as a method of helping local and national information providers improve their data collection strategies.

The main objective of the Manual is to raise awareness on a series of key issues related to collecting data on retail drug prices and provide useful general suggestions. The target readership comprises all those involved in the data collection of drug prices, specifically at the retail level, in Europe.

The first issue the Manual addresses is the difficulty in obtaining an operational definition of 'retail' prices. The next difficulty discussed relates to sampling and the challenge of obtaining

a representative sample of illicit, and therefore hidden, transactions. The factors that can affect drug prices, e.g. drug quality, transaction size, setting and buyer's experience, are outlined and suggestions made for a minimum set of variables to be recorded for each observation.

The guidelines provide a review of the main methods of data collection in Europe. This encompasses both the tactics set up by law enforcement agencies with price data being provided via the use of covert purchases, confidential informants, or even arrestees; and research methods that may allow price data to be obtained via overt purchases, key experts, or directly from users. Whenever possible, examples from current national practices are provided.

The Manual also addresses some practical issues relating to data collection, management and analysis. In particular, it discusses the need for defining cut-off points as a way to select only those transactions that are deemed to be retail. Some basic advice is provided for data recording, data cleaning, construction of the matrix and validation procedures. Standard descriptive measures are suggested, and feedback to data providers and publication of the results is encouraged.

Although reference is made to 'best practice' throughout the text, it does not comprise an exhaustive study, or a strict prescription to be applied in every context; particularly in relation to technical issues such as sampling, consideration of the specific circumstances of the data collection and reference to the literature is required.

CHAPTER ONE

Chapter 1
Introduction

Following a brief introductory discussion of the different uses of drug price data, this chapter reviews the activities carried out by international organisations to collect such data, the data collection methods used in Europe and beyond, and the objectives of the present document.

Why collect data on (retail) drug prices?

Retail drug prices are an important element in assessing the availability of illicit drugs at user level, and have been often used together with data on purity and potency as contextual information for the epidemiology of drug use.

First, there is in general an assumed relationship between drug use and retail drug prices, as prices may influence current drug consumption and incidence (new persons starting to use drugs). However, the nature of this relationship is not universal, and may depend on a range of factors such as price levels, income, the availability of alternative products, the type of drug consumed, and the stage of the user's drug career.

There is a considerable volume of research analysing the link between drug use and prices but it focuses mainly on licit drugs such as alcohol and tobacco (e.g. Cook et al., 2005; Chaloupka and Wechsler, 1995). There is also some evidence that illicit drug users' reactions to increases in retail drug prices are consistent with evidence from demand for licit addictive substances. Studies show that changes in illicit drug use are inversely related to changes in retail prices, both in the short and the long run (Nisbet and Vakil, 1972; Saffer and Chaloupka, 1995; Rhodes et al., 2002; Caulkins, 1995b; Chaloupka and Pacula, 2000; Bretteville-Jensen and Biørn, 2003, 2004; Dave, 2008).

As has also been shown for tobacco (Chaloupka et al., 2000), drug users' reactions to drug price changes may depend on the price level itself – i.e. increases in a fairly low price may not have any significant impact on current use; or slight decreases in prices that are already quite high may not lead to a corresponding increase in the number of new users.

Drug users' available income also has an impact on the extent and patterns of drug use, i.e. sensitivity to changes in retail drug price may depend on the share of individual disposable income that is spent for buying illicit drugs or tobacco. The greater the share, the greater

the sensitivity to price increases. Similarly, the price of each drug in relation to the price of substances that the user considers to be alternative products (e.g. alcohol) will affect drug use (Bretteville-Jensen, 2006).

The type of drug may also influence the relationship between drug prices and drug use, different psychoactive substances leading to different addiction patterns and therefore to different responses to price changes. It is interesting to note that prices may also influence the route of administration of the drug – users in Norway have claimed, for example, that cheaper heroin would make smoking a more attractive alternative since they would need three times as much heroin to get the same 'high' if they smoked the drug instead of injecting it (Bretteville-Jensen, personal communication).

In addition, empirical evidence points to different behaviours in relation to prices depending on the stage of the user's drug career. It has been shown that in the initiation phase, when they are not yet dependent, drug users may be more sensitive to drug prices than in later stages when they are using regularly and are addicted to the drug (Bretteville-Jensen, 2006). New users may be particularly influenced by drug prices (Caulkins and Reuter, 1996), in that they may be attracted to use certain products because they are relatively affordable, while high prices may have a deterrent effect on potential new entries into the drug using population. While the arguments why non-dependent users are price responsive are persuasive, dependent users typically spend a large share of their disposable income on drugs, suggesting that they may also be influenced by price. But while the arguments why non-dependent users would be more price responsive sound persuasive, there are strong arguments why dependent users would be more price responsive than non-dependent users (dependent users typically spend a greater share of their disposable income on the drug).

Studies have shown that dependent drug users may commit income-generating crimes (e.g. property crimes, drug dealing) as a means of supporting their drug habits, and therefore although the relationship between drug use and crime is neither simple nor universal (EMCDDA, 2007), it is likely that, faced with drug price increases, some users might increase their involvement in criminal activities while others would rather reduce their consumption by seeking treatment (MacCoun et al., 2003).

Second, drug prices are an important tool for understanding the workings of drug distribution mechanisms. They can provide an indication of user and supplier groups. Contextual data may allow the identification of influencing factors, and analytical comparisons between regions

may allow the identification of particular trends, 'hot spots', communities, and groups within communities. Retail price data, combined with other market data, may help us compare different market stages or levels, identify drug supply structures and their degree of competition, and also may allow us to estimate drug dealers, intermediation margins, intermediation costs and eventually profits.

Third, retail prices are fundamental to estimating the value of drug markets, which in turn is essential in evaluating the potential impact of the drug business either on other illegal activities, such as money laundering, or on the functioning of the legal economy.

Fourth, drug prices may help target resources and evaluate interventions. Indeed, some governments and agencies may use drug prices as the benchmark data against which to review their supply reduction strategies. We refer here in particular to increasing law enforcement and controls against the drug supply chain, in order to drive drug prices upward and therefore reduce drug demand. Within this perspective, prices are sometimes used as key indicators of success (DiNardo, 1993).

Finally, drug prices data have been extensively used by criminal justice agencies, in a number of countries, to assist state prosecutors and judges in helping them to decide matters relevant to prosecution and sentencing policies, and confiscation, and/or forfeiture hearings (assets recovery). They are also utilised by defence lawyers to challenge decisions made by prosecutors and judges. As such, price data provide fertile ground for expert witnesses.

Although good progress has been made in the last 15 years towards a better understanding of the nature of the relationships between drug prices on the one hand, and demand reduction, supply control, and enforcement activities on the other, these are still not fully understood. The collection of reliable and complete price data should be considered a necessary (but not sufficient) step in order to understand the complexity of these relationships in any detail.

European and other international data collection systems on drug prices

The EMCDDA has been collecting data on retail drug prices since it became operational in 1995, with a view to complementing information provided with other indicators on drug availability at user level and retail drug markets. Instruments to collect data on drug prices have evolved through the years. The current version (Standard Table 16, see Annex 1) requests minimum, maximum, mean and modal annual prices at retail level (per gram or per unit) for a range of illicit drugs (cannabis resin, cannabis herb, heroin, cocaine, crack, amphetamine, methamphetamine, ecstasy

and LSD). This table also asks for methodological details regarding the type of data collection system used, sampling methods, potential biases, etc. All EMCDDA reporting countries (27 EU Member States, Croatia, Turkey, Norway) are able to report on retail drug prices, although the information reported is not always complete and it may not always be fully comparable from one year to the next (mainly due to changes in the method of data collection).

Since 1995, Europol has been collecting information on both retail and wholesale drug prices via the Europol network and the Europol National Units. A standardised template (updated in 2001) allows Europol to collect minimum, maximum and average prices of cannabis (resin, herbal), cocaine (including crack), opiates (opium, morphine, brown and white heroin), amphetamine-type stimulants (amphetamine, methamphetamine, ecstasy), LSD, psilocybin, fungi, khat and other substances deemed to be of interest. Member States are requested to provide for each drug type the price per weight (1 gram, 1 kilogram) or per unit (1 000 tablets, 1 tablet, 1 strip). Europol and the EMCDDA have recently agreed to cooperate and exchange expertise and information on wholesale drug prices, with the aim of setting up a mechanism to collect these data. Therefore, the current data collection practice at Europol is under review. It is expected that Europol will collect wholesale prices at least once a year.

The United Nations Office on Drugs and Crime (UNODC) has been collecting data on drug prices – both retail and wholesale – since the implementation of the Annual Report Questionnaire developed by the Commission on Narcotic Drugs. The collection of both retail and wholesale drug prices was also maintained in the latest (1999) revision of the Annual report questionnaire, which was geared towards reviewing the progress made in meeting the challenges set out in the Political Declaration adopted by the General Assembly in 1998, and aimed to monitor and increase global understanding of the extent and nature of drug abuse. Countries are asked to provide minimum, maximum and average/typical annual prices for a range of illicit substances. What is generally not known, however, is the way in which the data are collected and whether they are representative of the country as a whole (UNODC, 2008).

Methods of collecting retail drug prices data in Europe and beyond

A review of the retail prices data submitted to the EMCDDA in recent years shows that different methods of data collection and sources are being used, although most data are generated by the police. For example, of the 29 European countries reporting 2005 retail price series in 2007, more than half (18) provided routine data on retail drug prices generated in one way or another

by the police, with some variation in the specific data collection methods used (e.g. intelligence, covert drug purchases, police informants); while five countries provided data based on both police sources and other sources, and seven provided series of retail prices data obtained from non-police sources, for example via methods such as user surveys. Details of the different methods used in Europe are provided in Chapter 3 below.

Outside Europe, a number of countries have also developed systems for recording retail drug prices. Australia, for example, has been collecting data on retail prices via several information systems covering various aspects of the drug phenomenon. Both the Illicit Drug Reporting System (O'Brien et al., 2006) and the Ecstasy and Related Drugs Reporting System (Dunn et al., 2007) of the National Drug and Alcohol Research Center analyse trends in retail prices from the late 1990s onwards. Prices of different illicit drugs are reported by drug users interviewed for repeated surveys among injecting drug users and regular ecstasy users. These surveys were designed to provide information on a large range of topics, including drug use and patterns of use, risk behaviours, drug use related harms, and health problems, but also on issues related to drug markets such as drug availability, perceived purity, purchasing patterns, drug prices and changes in drug prices.

In the United States, there is a long tradition of drug price reporting, as seen in the reports from the National Narcotics Intelligence Coordinating Committee or the Regional Information Sharing System, including the Western States Information Network and the Middle Atlantic-Great Lakes Organized Crime Law Enforcement Network, although explanations of the methodology used is often lacking (Caulkins, 2007).

The US Drug Enforcement Administration (DEA) has also been recording information on drug prices, through its System to Retrieve Information from Drug Evidence (STRIDE), database, since the 1970s (Arkes et al., 2004; Arkes et al., 2008). This database was originally designed to control the inventory of drug acquisitions in the laboratories and provide data regarding the quality and quantity of the substances collected for judicial processes. Data are obtained from seizures, purchases, and other drug acquisition activities conducted by undercover agents and informants from federal and, in some locations, local law enforcement agencies. Information on the nature of the transaction (a purchase or a seizure), its date, the total amount paid (in the case of a purchase), the type of illicit substance, the quantity involved, the packaging and markings, and for most drugs its purity, is reported. One of STRIDE's major strengths is that it contains a large number of 'transaction-level observations across the country', 'recorded in a more or less

consistent manner over many years' (Caulkins, 2007). However, it mainly includes samples sent to DEA laboratories for analysis, and therefore excludes most of the very large number of undercover purchases made by state and local police agencies. Since data in STRIDE are not collected for research purposes, they are likely to reflect law enforcement priorities and activity.

The Heroin Domestic Monitor Program, set up in the United States by the DEA, surveys street prices in a number of selected cities (28 in 2006). Throughout the year, law enforcement agents and their informants conduct street purchases of heroin (DEA, 2007). Samples collected are sent to a laboratory for analysis. The purpose is to get a picture of what is currently available (quality) on the street and at which price. Recorded information includes location, time of day, amount purchased, packaging, drugs mixed in, purity and chemical signature.

Why the present guidelines?

The analysis of the different international information systems on retail drug prices, and in particular of information provided by different European countries, shows that there is substantial variation in terms of methods of data collection on retail prices both between and within countries. This raises concerns over the comparability of data across Europe.

In order to address these issues, an expert meeting was held by the EMCDDA in October 2007. At the meeting, the experts – including representatives of Europol and the UNODC – examined the approaches used by 10 European countries (Belgium, Germany, Hungary, France, Ireland, Lithuania, Malta, Poland, Turkey, and the United Kingdom) in monitoring retail drug prices and differences in national reporting practices. They also discussed key issues related to data collection, including factors that can affect drug prices and on which systematic data collection is practically non-existent (e.g. drug quality, transaction size, setting, buyer's experience). Moreover, the participants highlighted the need to draft guidelines for those collecting data on retail drug prices in the different European countries, so that data providers at the local/national level are more informed about the issues relating to retail drug prices, with a view to improving their data collection strategies and procedures. A number of participants volunteered to take part in further discussions and provide more detailed information on the data collection methods used in their own countries as case studies for these guidelines.

The structure of this Manual is as follows. Chapter 2 outlines the issues identified as important for data collection and analysis of retail drug prices at the October meeting of the EMCDDA,

and provides the context for the case studies presented in Chapter 3. Chapter 4 reviews some practical issues relating to data collection, management and analysis.

These guidelines are an instrument for all those involved in the data collection of drug prices, specifically at the retail level, in Europe. They provide useful general suggestions and review the main methods of data collection in Europe. They do not comprise an exhaustive study, or a strict prescription to be applied in every context. Particularly in relation to technical issues such as sampling, consideration of the specific circumstances of the data collection and reference to the literature is required.

CHAPTER TWO

Chapter 2

General data collection issues

After providing a tentative definition of 'retail drug prices', this chapter addresses issues related to the sampling of retail drug prices, both geographically and over time. It then discusses the various factors influencing retail price observations, both those related to the characteristics of the retail drug markets and those related to the characteristics of the products and the purchases. It concludes by suggesting a minimum set of variables to be included in any information system on retail drug prices.

Definition — retail drug prices

Retail drug prices refer to those transactions in which the buyer is the end user – the consumer – of the product.

However, operationalising this definition is fraught with difficulties. The weight of the drug is not necessarily a good indicator of a retail transaction. The fact that the drug has been sold/bought in a 'user-unit', for example a 'dose' or a 'wrap', might be a better indicator. Having said that, analysts will need to know what the 'typical' wrap size is before they can make an informed judgement as to whether the information under consideration constitute retail transactions. Clearly there are grey areas, and the following examples highlight some of the inherent difficulties:

1. A mother buys 0.2 g of crack for her teenage son.
2. A wealthy businessman buys 28 grams of cocaine for his own use.
3. A teenage student buys a gram of amphetamine with the intention of selling it at a profit, to four friends.
4. A middle-aged male crack dealer gives two rocks of crack to a young woman (which she consumes) in exchange for sexual favours.
5. An undercover police officer buys 0.1 g of heroin from a street dealer.
6. A young man buys six ecstasy tablets, which he consumes over a weekend.
7. A dealer buys 2 grams of heroin, with the intention of selling half at profit and keeping the other half for his own use.

In examples 1, 3, 4 and 5, the weight of the drug (or, more accurately, the weight of the powder containing the drug) indicates that they are retail transactions but the definition proffered indicates

otherwise. In example 2, the weight strongly indicates that this is a 'wholesale' ([1]) transaction but the circumstances fit nicely into the definition of a retail transaction. Example 2, whilst not concerning a majority of buyers, is certainly not unrealistic. In example 6, the 'doses' could indicate either a retail or wholesale transaction. But again, given the circumstances, this particular transaction falls within the retail definition. Example 7 is confusing as the weight of the drug could indicate either a retail or wholesale transaction, and the buyer is both the end-user and would-be seller.

As shown in examples above there is clearly a grey area in instances where users buy for a group of fellow users, or where user-dealers re-sell to their friends, and questions will arise as to whether these should be recorded as retail transactions.

Perhaps retail drug prices may be defined along the following lines:

Retail drug prices describe those transactions where the buyer has purchased a drug:

(a) for his own consumption; or

(b) for the consumption of another, free of charge; or

(c) for the consumption of another without profit; or

(d) as part of a test purchase or overt drug purchase operation intended to mimic (a), (b) or (c).

An additional difficulty is that some data collection methods, for example covert purchases, may not specifically target the retail level of the market, and therefore may not allow the researcher to distinguish between transactions destined for end users, low-end sellers or mid-level sellers. Such a distinction may have to be done at the analytical stage, by choosing a cut-off point of a quantity below which the recorded observations are categorised as retail transactions. A further discussion of cut-off points can be found in Chapter 4, where some examples are also provided.

([1]) 'Wholesale' is used here as a way of simplification to refer to transactions that are not retail. It should be noted, however, that the market does not have just two levels, and that there are many levels in between. It would be misleading to lump together observations from the ounce level wholesale and the kilogram level wholesale, as it is to lump together ounce level and gram level.

Sampling retail drug prices

A set of innovative methods used to collect data on retail drug prices is described later in the guide. The application of formal sampling methods to the collection of retail drug prices is difficult if not impossible given the nature of illicit drug transactions. It is clear that the practical methods used to obtain estimates of retail drug prices rely on techniques that diverge from the theoretical or ideal methods of obtaining a representative sample. Nevertheless, it is worth considering a sampling benchmark against which the practical methods adopted can be referenced in order to evaluate possible biases.

The starting assumption in this section is that a single estimate of the retail price of an illicit drug is required for a country for a period of time. The estimate would take the form of a summary (or 'average' measure), and the exercise would be repeated over time to establish trends. Ideally, a method of sampling would be selected that ensures the sample is representative of the population in the sense that it is a microcosm of the population in terms of all characteristics that influence the price of the drug.

Sampling theory shows that probabilistic or random sampling provides a basis for constructing a representative sample. The simplest form of probabilistic sampling, simple random sampling, would require a full list of all members of the target population, without duplicates, from which the sample is drawn according to a random process. More complex sampling methods may reduce the need for a full enumeration of the population, for example by grouping the population into clusters, though all require some level of enumeration of the population and the application of a selection process where the probability of an element being selected is known.

In evaluating a sampling strategy it is useful to consider the relationship between the population from which the sample is drawn (the sampling population), and the population that it is intended to represent (the target population). By necessity, the sampling population will commonly be a subset of the target population. For example, the target population might be all illicit retail drug transactions within a country during a specific time period. However, a random sample is drawn from the retail prices paid by users in treatment, who are identifiable and available for study. In statistical terms, the sample will not be representative of the population as a whole if users in treatment differ systematically from the target population in ways that affect the prices they pay. Take as a second example a representative sample drawn from a single city. The sample will not be representative of the country if the city and the country differ in characteristics that influence drug prices.

The literature suggests a range of factors that might influence prices, many of which are elaborated in the following sections. The question arises whether a single national representative retail price for each illicit drug is appropriate, or whether factors such as quality or purity of the drug, location of the purchase, access to price information, the relationship between buyer and seller, and season are important enough to favour a different summary price for each of a set of circumstances.

In ideal terms, to evaluate whether a set of prices is appropriate, data would be collected to allow the statistical comparison of prices. The sampling frame would be stratified according to the factors considered important, and random samples of a sufficient size drawn from each strata. This implies a more complex sample frame than for simple random sampling, making it an equally unlikely proposition. However, within the framework of possible data collection methods, it does highlight the need to consider a range of characteristics of the purchase and the purchaser other than price, and the importance of collecting this additional information. The collection of the additional information would allow comparisons to be made, which would provide interesting information even though they might not meet the strict sampling criterion.

As an example of how the method of data collection could influence the data, consider the differences between undercover purchases made by law enforcement agents and those made by users and ex-users. The former may target street suppliers and the purchasers might lack detailed market information, whereas the latter are likely to be able to reach less accessible suppliers and have a clearer understanding of the price structure of the market. These characteristics could lead to a systematic difference in the prices obtained by each group. If it were possible to compare prices obtained from each group useful working premises might be found despite the limitations in sampling methods.

Within probabilistic sampling, increasing the sample size leads to improvements in the precision of the estimates. It is, however, important to understand that where the sampling population differs from the target population, or a non-probabilistic method is adopted, increasing the sample size does not necessarily increase the level of precision. The sample may be drawn from a homogeneous sub-group of the population, the different factors that have an impact on retail drug prices in the population being ignored. Drawing a larger sample may simply generate more of the same type of observation, doing little to improve the estimate. The lesson here is that a large number of one type of observation is of less value if major sources of variation are neglected.

The sampling/data collection methods described in Chapter 3 do not pretend to obtain statistically representative samples of retail drug market transactions. Each method may favour

(privilege/ignore) specific subpopulations. In practice the task is to understand what the data collected within each sampling method represent in terms of the spectrum of retail drug market transactions. Contrasting the practical methods adopted to an ideal benchmark can be useful in highlighting areas of possible bias and for future investigation. Given the complexity and hidden nature of the retail drug market, this in itself would be a major achievement.

Geographical coverage

It is important in any data collection strategy to be as representative as possible of the different types of location of retail drug markets, and at the same time ensure there are sufficient elements in the sample from specific geographical areas of interest. Indeed, national data will not necessarily be of use in characterising a local drug market and vice versa.

On the one hand, if one wants to be able to use data on retail drug prices to characterise specific markets or communities or as strategic data for law enforcement responses and evaluation, national data are not sufficient. Indeed, data broken down by region or smaller administrative geographical units are then necessary. But being able to end up with such breakdowns means that they need to be collected with this objective in mind and sufficient elements drawn from the geographical areas of interest.

On the other hand, there are issues related to the unequal geographical distribution of retail drug markets on the national territory. For example, specific types of retail outlets for illicit drugs may be concentrated in specific locations in a few large cities only, while others may be typical of suburban or small towns.

Attention should be paid to main trafficking routes, and to border issues, in terms of importation flows and drug tourism (crossing a border to get a better quality or a better price), as these may have an impact on the geographical distribution of retail points of sale for illicit drugs. Geographical distribution of retail outlets may also vary depending on the type of substance analysed.

Since retail drug markets are by definition local, there is a need to be selective geographically. If the goal is to monitor retail drug markets and track retail drug prices only, focusing on a selected number of cities and getting relatively high frequency data from a few sources in each may provide better information than getting relatively less data for more areas, which may not provide data as rich and might be too expensive to implement.

Sampling over time

Trafficking flows and retail drug markets evolve over time, together with criminal group associations and supply reduction strategies and practices, all of which interact with one another in a positive or negative fashion. Drug supply and drug availability at retail level may also observe seasonal variations linked to variation in drug use patterns, for example at music festivals or particular holiday destinations. It is therefore important to be able to track changes in retail drug prices over time.

Although final data may be presented as an 'annual summary' measure which is then compared over the years at national level or against any other geographical breakdown, it is important that there are as many as possible data collection points within the year to ensure that changes in the retail price over a given year are integrated into the 'annual' measure. Before designing any scheme for data collection in terms of sampling over time, it could be useful to review the potential seasonal variations and take them into account.

If the goal is to use price data to evaluate the responsiveness of drug markets to variations in law enforcement, policies, or other factors, it is important to collect data at a high enough frequency that short-term effects can be shown.

It is difficult to recommend an ideal repetition scheme for data collection on an annual basis, as it depends on the resources available. Monthly data collection would be ideal, although it may be unrealistic in many countries. Quarterly would probably be feasible for most data collection methods, and would provide much more valuable information than a simple annual measure. An option could be for example to carry out a complete data collection exercise twice a year in numerous sites over a high number of transactions, while for every month in between recording only a few observations from a limited number of sentinel sites. However, it is very important that the methodology (e.g. interview with 10 first arrestees held at police station for questioning every month) remains identical over the years so that data series may be constructed and comparisons made possible.

Factors influencing retail price observations

It is possible to identify a number of factors that might influence the retail drug prices observed. This again raises the question of whether a single, summary average retail drug price is a reasonable goal or whether a typology or set of drug prices under different conditions would be

more realistic. Depending on the viewpoint, these factors might be considered as the outline of this typology.

It is important to remember, however, that obtaining adequate data to estimate prices for all of the factors of the typology is difficult if not impossible.

Determinants of drug markets

From an economic perspective, the availability and price of drugs are a result of the interaction between drug demand and drug supply. Changes in the number of drug users, drug use patterns, the incidence of new users, and the average quantities consumed per user, may all influence the demand for drug products and so their price. Similarly, supply factors, especially the unpredictability surrounding the availability of an illegal product, can influence the price. Proximity to main international trafficking routes, the relative influence of organised crime groups, the technical know-how and capacity of clandestine laboratories, traffickers' strategies to create new markets, attract new users or shape existing markets by conquering new shares of the business, may all have an impact on how much of a substance is available on the drug market, and consequently affect its price. The technology of how trades occur between buyers and sellers is also important, as technological change in this regard can influence both sides of the market and hence price. In addition, law enforcement interventions against the supply of illicit drugs may also have an influence on drug prices, whether at retail or at a higher level in the distribution chain, particularly when they result in seizures of illicit drugs, the discovery of production sites, or the dismantling of organised crime groups.

Determinants of drug markets

Changes in determinants of drug markets – such as different aspects of the demand for illicit drugs, supply side forces including traffickers' strategies and organisation, exchange practices, and law enforcement activities – may prove difficult to link directly to changes in drug prices. However, it is important that information on such aspects is collected and analysed, to better inform the interpretation of any price data at the analytical stage.

Characteristics of the retail drug markets

Besides these more contextual factors, other characteristics of the retail drug markets would be worth recording together with drug prices data, as they may have a substantial impact on price setting.

Date and location

Festive, seasonal, day and time variations may influence price directly or through other supply or demand factors. The exact location of the transaction is also an important variable to consider, as studies have shown that there is geographical variation in retail drug prices (e.g. Cadet-Taïrou et al., 2008; Caulkins, 1995a), linked probably to distribution networks and to the lack of integration observed in drug markets. Even with smaller regions or cities, several studies have revealed that price dispersion is wide. This fact has been explained by the illicit nature of the business, which leads to syndicates composed of a small number of drug dealers. This market organisation may be explained by the need to reduce the risk of being caught by law enforcement agencies (Desroches, 2007). It is therefore desirable to record both the date and place (by a postcode area, for example) of each transaction.

Market structure, market levels, and settings

Information that would allow the researcher to distinguish between different markets and different market levels would be very important to collect. Information, for example, on the type of dealer, whether s/he is selling various products, the typical transaction size of this dealer, whether other dealers are used to sell smaller quantities in the same local market, or whether this is the most typical retail sale point that can be found in the vicinity would be extremely valuable.

It is also important to record information on the setting itself, for example whether the transaction was made in an open drug scene, in a street market, or in a more hidden location such as a private house, and information about the type of access and delivery, and even information on the characteristics of a dealer's typical clients (whether marginalised drug addicts, those in treatment, partygoers, the general population, etc.) would be worth collecting so that price data can be related to a certain type of market and those that are obviously not obtained from retail sale points be taken out at analytical stage.

Buyer's knowledge and relationship between seller and buyer

Finally, an issue that has been described in qualitative studies as having some substantial influence on prices paid at retail level, and on which information would be highly valuable, is the

Characteristics of retail drug markets

The standardised collection of a list of variables along with price data implies a quasi-survey, which is not the objective here. Nevertheless, the literature suggests these elements have a substantial influence on drug prices, which makes it important to consider their collection. Even if it is not possible to collect information for each transaction, it would be useful to characterise the most common purchases obtained from an information system. For example, if the data is always collected from an urban centre at night, by an ex-user, it would be useful to record that information.

involvement of the purchaser/user in the market itself and their experience as a buyer, in particular the strength of their 'connection into the distribution network' (Johnson and Golub, 2007) – their knowledge of the actors, relationships with the dealers, knowledge of the expected quality of the product, ability to negotiate prices, whether they use particular selling points regularly, etc. (Berg and Andersen, 1993; Reuter and Caulkins, 2004; Costa Storti and De Grauwe, 2008).

Products and purchases

As for any licit goods, prices of drugs depend on the type and quality of the products themselves, and on the quantity being sold.

Products

It is essential to define carefully the drug purchased. It may be important to distinguish between types of a single drug, such as brown and white heroin, which usually originate from different sources, and differ in terms of purity and route of administration. Data providers should be aware of the confusions that may arise from the physical similarity of different products. For example, powder ecstasy may be taken for amphetamine, or crushed crack for cocaine hydrochloride, or brown heroin for white heroin because of a change in the colour. Confusion may also arise from logos or identification marks, or even from the street names used for different substances, in particular in the case of synthetic drug tablets. Some purchases may also involve mixed drugs. All of these confusions may result in errors in recorded drug prices and should be avoided as much as possible.

Quality and purity

Issues related to the quality of the products sold at retail level, whether in terms of the presence of cutting agents such as diluents and adulterants, or in terms of percentage of pure substance effectively contained in the final product (or THC content in cannabis products), may also be of importance when it comes to prices. The issue of the quality and purity (or potency for cannabis products) of illicit substances is, however, fraught with problems: first, there is very rarely any systematic analysis of drug purity and of the quality of the products sold at retail level; second, there is probably a difference between perception and objective analysis in terms of the quality or purity of the product; and third, it is not always clear whether quality and purity are a factor in the price paid at retail level. It seems, however, that in some cases at least, expected purity is a factor in the retail price paid.

There is not much evidence that dealers and purchasers have a precise knowledge of the drug purity (or potency) of the illicit substances sold at retail level (Johnson and Golub, 2007). Researchers have suggested that since the quality of a drug cannot be readily assessed until it is consumed, which generally occurs after it has been bought, then it is not the actual purity of the product that governs the negotiated price, but the perceived or expected one (Arkes et al., 2004; Goudie et al., 2007). For these reasons, illicit drugs are usually considered 'experience' goods. Reuter and Caulkins (2004) add that even at the time of their consumption the purity (or potency) of illicit drugs may not be estimated accurately; reasons for this may include for example the effects of cutting agents and/or the variability in individual responses to the drug, but also the particular expectations of the consumer and the context of use.

Although the role a drug's purity plays in price-setting mechanisms is not entirely understood, it is still useful to collect this information. In particular it may be used to a) evaluate the health risks related to drug users, b) uncover patterns of supply and c) inform law enforcement interventions. It also allows comparisons with other markets, for example internationally, based on prices adjusted for the purity content of the substance.

Some countries, where there may be good information available on the retail purity of illicit drugs, may argue that there may be less need to analyse each transaction for purity (or potency). In addition, law enforcement officials in some European countries have reported that the purity data obtained from the analysis of large seizures – which is carried out on a regular basis – holds for illicit drugs sold at retail level as there is not much cutting between different distribution levels and therefore drug purity would remain relatively uniform across these levels. This was confirmed

Purity (and potency) — standard measures

The purity of heroin, cocaine, amphetamine and methamphetamine is the percentage of pure substance the sample contains. For amphetamine, white heroin and cocaine it is important to mention whether this percentage has been determined to the base or to the salt (a conversion from one to the other is then always possible with a view to standardising different data sets).

For ecstasy tablets, purity should be expressed in terms of content in milligrams of MDMA base per tablet.

The potency of cannabis products is determined by their content of Δ9-tetrahydrocannabinol (THC) expressed as a percentage.

by research findings in the US and the UK, for example (Coomber, 1997, 1999). However, if this were the case it would need to be verified on a regular basis, in order to detect any change in drug suppliers' practices. In some European countries, however, significant differences seem to exist between the 'wholesale' and 'retail' purities, as reported in the UNODC's Annual report questionnaire (Pietschmann, personal communication).

However, good data on drug purity (independent of price data) in a country, even if it may provide for adjusting prices in an aggregated form at national level, falls short when it comes to analysing price variations. Indeed, drug purity is a critical element for standardising drug prices, as is the size of the transaction, and without information on the purity of the product bought, it is difficult to assess whether variation may be due to market factors, transaction-level factors or to the quality of the good itself. The only way to get purity-adjusted prices is to uniformly collect (for at least a few small geographical units) information on price, amount and purity. Ideally, purchased products should be brought to a laboratory for analysis.

Transaction size

Other elements may determine retail drug prices, in particular issues related to the packaging of the products and the size of transactions, both in terms of currency units and quantities of product bought.

The fact that retail transactions of illicit drugs are illegal in most countries means that they often take place in a hurry, to diminish the time of exposure to law enforcement. Consequently, they

are commonly priced in round figures, because giving someone change takes time (Reuter and Caulkins, 2004). For example, someone may buy a '20 euros bag', and the content of the bag may vary both in terms of quantity and quality. They may also buy a '1 gram bag', although it is not usually a weighed gram, but a 'street gram', which may vary, for example, between 0.4 and 0.8 grams. Retail sellers and purchasers are not likely to know precisely how much product is in a retail purchase, or to weigh it; indeed, they 'do not think about the amounts in scientific terms' but rather use argot terms to describe the quality of the product, often on the basis of the effect obtained (Johnson and Golub, 2007).

Therefore, as much as on the nominal price paid for the product, it is crucial to record data on what was actually purchased – i.e. the content of a bag or a wrap in terms of quantity (and wherever possible, in terms of actual purity) so that more information is available on the distribution of retail purchases in terms of size. This data may also allow to account for quantity discounts at analytical stage.

The issue of 'group buying' is also worth considering. Many users prefer this strategy since it allows them to obtain quantity discounts (Johnson and Golub, 2007) and, at least in theory, means that only the buyer is at risk of arrest ([2]). We suggest therefore that any price data that is linked to group buying is recorded and analysed separately from other retail price data.

Mode of payment

Research has shown that for certain products in certain types of markets, purchasers may pay not only in cash but also pay a part in cash and the rest in kind, either in services or in goods, or may exchange drugs for goods (e.g. stolen goods) or services (e.g. sexual favours, drug distribution services) without any transfer of money (e.g. Caulkins, 2007; Ingold et al., 1994; Murphy and Rosenbaum, 1997; Telfair Sharpe, 2001). Since it would be extremely difficult to suggest a standardised method to value services and goods offered in payment for drugs, it is recommended that those transactions for which the payment was not solely made in cash are excluded from data analysis. However, in order to assess the extent of such practices, it remains important to record these observations, even if they are then excluded from analysis later and do not count toward the target number of observations.

([2]) Of course, 'group buying' often means 'bulk buying' and so could attract additional police attention, which in turn could increase the likelihood of the buyer being arrested. In such circumstances, the buyer may feel compelled to provide the police with the names of the rest of the group in an attempt to reduce the risk of being prosecuted as a drug trafficker.

Variables to record for each transaction

The discussions above point to a long list of information that one would wish to collect in order to analyse drug prices and drug markets. Such an extensive data collection might fit well in a specific survey carried out on an ad-hoc basis or every n years, but may be difficult to insert into a routine monitoring system on drug prices, mainly because of resource limitations. It will be up to those implementing such a surveillance approach to determine, depending on why the data is being collected and how it will be used, what information should be systematically collected in addition to a minimum set of variables (see box). It is important to note at this stage that the choice of data collection will determine the type of information that can be reasonably obtained and monitored.

Additional information on the setting of the transaction, the seller, the relationship between the buyer and the seller, the method of contact for the buy, the experience of the buyer, etc. could also be collected in a systematic way, depending on the data collection method.

Minimum set of variables

The following variables should be recorded for each transaction:

- location;
- date;
- time of day;
- substance names (may record both the real name after analysis and the street names of primary (and secondary) psychoactive substances);
- physical form (e.g. powder, tablet);
- unit and/or packaging (e.g. 1 gram bag, 1 dose, EUR 20 bag);
- real weight (based on subsequent analysis);
- amount paid in local currency;
- whether payment was made in goods or services (for subsequent exclusion from the sample);
- purity/potency (based on subsequent laboratory analysis);
- whether it is bought for a group.

Legal issues related to data collection

There are a number of legal issues to consider when collecting data on drug prices, in particular when carrying out overt drug purchases (see Chapter 3), as procuring and subsequent possession of illicit drugs may be unlawful in many European countries if not performed by duly authorised and appropriately trained law enforcement agents. Covert drug purchases (see Chapter 3) also carry legal risks, as law enforcement agents must be careful that they do not incite someone to commit an offence which that person would not otherwise have committed ([3]).

In some countries, provisions in the legislation may be utilised to enable medical staff or other authorised individuals to possess and transport illicit drugs for other purposes than the medical ones stated in law, and in particular for research purposes. These provisions would be applicable in cases where non-law enforcement personnel have purchased samples, or are provided with samples purchased by drug users, and wish to take them to a bona fide laboratory for analysis. In some countries, in the absence of any specific legal provision, researchers have made special arrangements with the police and prosecuting authorities that enabled them to buy drugs (either directly, or via an intermediary from drug users) and have them analysed. Such arrangements are usually dealt with on a case-by-case basis.

([3]) The landmark case of *Teixeira de Castro v. Portugal* (1998) 28 EHRR 101 is of particular relevance here. In this case consideration was given by the European Court of Human Rights to issues pertaining to entrapment and undercover policing in the context of a conviction for drug trafficking.

CHAPTER THREE

Chapter 3

Principal methods of data collection in Europe

This chapter provides a brief description of some of the data collection systems for retail drug prices that are currently in use in Europe, with a view to better understanding their specific objectives, the details of the methodologies employed, and their strengths and weaknesses. It also highlights examples of implementation.

Overview of the principal methods currently in use in Europe

A review of the retail prices data submitted to the EMCDDA in recent years shows that although most data are generated by law enforcement agencies, particularly the police, other methods of data collection and other sources are also being used. Indeed, some countries systematically collect data from non-police sources such as drug users or professionals working in drug treatment services, for example, or via surveys, or using qualitative methods such as focus groups. In addition, ethnographic methods based on direct observation by researchers have been used to collect data on drug prices. A number of countries use a combination of different sources and methods. While many countries have set up monitoring systems that are especially focused on drug prices, it is not unusual to find countries using data collection instruments that collect various types of data, amongst which are drug prices.

Overall, our intention in this chapter is not to recommend one particular data collection method over others, but rather to better understand what the observations recorded within each method represent. Indeed, none of the methods described below pretends to be able to provide a statistically representative picture of prices on the retail drug markets at a national level, and for that reason it is helpful to better understand what type of population they are more likely to reflect. In particular, it would be useful to try and identify the types of biases that might result from the data collection and sampling process. For example, in the case of covert drug purchases, we may assume that law enforcement agents systematically pay more than typical market participants as they are not among the dealers' usual clients, but we may also assume that they pay very nearly the market price, otherwise the other parties to the transaction would realise who they are. Transactions targeted by law enforcement agents are often specific in terms of location, for example taking place in street drug markets that are more accessible, rather than indoor (private flats, nightclubs, etc.). Equally, surveys of drugs users, whatever the mode of approach, and key

experts' opinions, may reflect only a segment of the population of buyers and be very specific in terms of the type of retail drug markets from which data on retail prices are obtained.

Different data collection methods (or tactics) may resort to different sources of information. Table 1 summarises methods currently in use in Europe to obtain routine data on retail drug prices. These methods are described in more details in the remaining part of this chapter.

Table 1: Data collection methods and sources of information for retail drug prices

Main methods/tactics		Main sources					
		Drug users and traffickers ([1])				Law enforcement agents (LEAs)	Drug demand reduction professionals
		Not in contact with drug services	Clients of drug services	Arrestees and prisoners	Informants working for LEAs		
Participant observation	Research	X	X				
Questionnaires	Surveys		X	X			
Interviews	Research, surveys	X	X	X	X	X	X
	Interrogations by LEAs			X			
	Intelligence reports by LEAs based on interviews with users and traffickers			X	X		
Seizing documents	Documents recording drug sales and purchases seized by LEAs			X			
Eavesdropping	Monitoring of drug traffickers conversations by LEAs			X			
Covert drug purchases	Conducted by LEAs and intermediaries acting on their behalf				X	X	
Overt drug purchases	Conducted by researchers and intermediaries acting on their behalf	X	X				

([1]) The term 'trafficker(s)' is used throughout the document for drug suppliers, including street-level sellers and traffickers acting in the upper levels of the drug distribution system.

Covert drug purchases (by law enforcement agencies): test purchases

For many years now, law enforcement agencies have been using a number of approaches to systematically track retail and wholesale drug price data in an attempt to improve their understanding of how international and national drug markets function and whether enforcement activity influences drug prices. Covert drug purchasing is one of these approaches, although its main purpose is not to obtain price data but to secure evidence against drug traffickers ([1]). Two categories of covert drug purchases may be distinguished: test purchases, which for the most part generate data on retail prices; and undercover buys, which generate data on wholesale prices.

Undercover buys are not described in detail in these guidelines as this tactic is usually applied when law enforcement agencies are required to infiltrate a criminal enterprise in order to buy drugs in wholesale quantities. Moreover, they are generally considered to be a far more controversial tactic than test purchases because their defining feature is that through covert means law enforcement agencies create, or at least facilitate, a serious offence for which the defendant is prosecuted. Usually, an undercover buy involves significant effort and cost to set up, and because of the inherent legal risks often requires hands-on supervision from lawyers or highly trained and experienced law enforcement agency personnel. This is particularly the case in countries that recognise the legal defence of 'entrapment' ([2]).

Objectives

Test purchasing is a well-established tactic, which law enforcement agencies use to obtain evidence against retail drug traffickers (i.e. suspects committing offences that involve the supply, offer to supply, or possession with intent to supply a controlled drug, or offences akin to these). It is usually used in circumstances where other tactics (e.g. 'stop and search'([3])) have been shown to fail or are likely to fail. As such, the retail prices data that is obtained may be considered a by-product of this tactic.

The tactic is used in many countries and has a long history. In the UK, for example, excise officers were granted the power to conduct test purchases of tobacco as long ago as 1842, while test purchasing of drugs by police officers can be traced back to 1869, following the enactment

([1]) It is interesting to point out that law enforcement in some other countries (e.g. the US) do engage in drug purchases that are not directly related to a legal proceeding or an arrest; this introduces the concept of law enforcement engaging in a monitoring activity, rather than just an enforcement role.
([2]) See the glossary on page 103.
([3]) See the glossary on page 103.

of the 1868 Pharmacy Act. This Act placed restrictions on the sale of a number of drugs – described as Schedule A poisons – such as opium, cocaine and laudanum and the police, often in the absence of any specific powers, used test purchasing as a means of identifying those shopkeepers, chemists and druggists who were flouting the law. For their part, UK pharmacists have long been empowered to conduct test purchases. The Pharmacy and Poisons Act of 1933 authorised the Pharmaceutical Society of Great Britain to appoint 'inspectors' – registered pharmacists – for this purpose. These inspectors were empowered to enter the business premises of a registered pharmacist or an authorised seller of poisons and purchase poisons for the purpose of detecting offences relating to their sale and supply.

Test purchases are also referred to as 'controlled buys', 'verification purchases', 'test buys', and 'buy-bust operations'. In the context of these guidelines and in the absence of any satisfactory definition in the research literature or in the legislation of EU Member States, we may define the term as follows:

> *'The authorised purchase of any articles, controlled drugs, medicines or other substances, by an appropriately trained law enforcement officer (or agent acting on his/her behalf), whose true identity is disguised or concealed, for the purpose of determining whether or not an offence has been committed.'*

The above definition takes account of the fact that law enforcement officers and their agents also purchase drugs paraphernalia (e.g. cannabis or crack pipes, and 'cocaine kits' often comprising a small pouch containing a metal tube, a razor blade, and a glass vial), medicinal products, intoxicating substances (e.g. solvents), alcohol, and tobacco from shops and pharmacies to determine whether or not they are complying with the various pieces of legislation that prohibit or otherwise control the sale of these items. The word 'agent' covers children and young persons. In the UK, children and young persons are often used to make test purchases of tobacco and alcohol from retail outlets.

Details of the method

Briefly, test purchases involving controlled drugs are made by a specially trained law enforcement officer posing as a drug user. The officer's involvement is authorised by a senior officer – in UK police forces, an officer of at least the rank of superintendent. Based on intelligence reports, the officer, pretending to be a genuine buyer, approaches the 'target' – a retail drugs trafficker – and buys a small amount of drug from him or her. The transaction, which takes only a few minutes to complete, is usually photographed and/or video recorded by a surveillance team. In light

of technological advances, it is now common practice in some countries for officers to wear concealed miniature cameras and audio devices to record the transaction. The benefits of this practice in terms of evidence gathering are obvious, but the practice is also risky since officers are sometimes frisked by suspects (Maynard, 1996). In the majority of cases, a 'back-up' team, will be located nearby to render assistance to the officer in the event that s/he is robbed, assaulted, or the intended transaction is otherwise jeopardised. In cases where the decision has been taken to arrest the trafficker immediately following the transaction, the arrest will be carried out by officers located nearby. Conversations between the officer and the trafficker will usually be kept to a minimum, and will invariably involve slang or even code. For example, in London, if the officer wanted to buy one rock of crack and one wrap of heroin, s/he will ask for 'One white (the crack), one brown (the wrap of heroin)'. In Moscow, an officer wanting to buy a wrap of heroin will ask for a 'check' (чек) – a small wrap containing around 0.5 grams. Often, the test purchases will be carried out by law enforcement agencies from areas or regions far away from where the targets operate in order to reduce the risk of the agents being recognised (Maynard, 1996). Having secured the necessary evidence, law enforcement agencies can then choose to arrest those targeted at a time and place convenient to themselves. This reduces the risk of public disorder and injuries to arresting officers.

Against the backdrop of community concerns over the problems associated with highly visible street drug markets where drug selling is often blatant, and the growing recognition that traditional enforcement tactics such as 'stop and search' have little impact in terms of disrupting these markets, the UK police are now making greater use of test purchasing. In the last two decades, test purchase operations against street level drug traffickers, particularly those selling heroin, cocaine, and crack, have proven to be highly effective in terms of securing quality arrests and subsequent prosecutions and convictions. For example, test purchases conducted in the course of *Operation Welwyn*, which was run by Metropolitan Police Service (MPS) officers in the London Borough of Islington from 1991 until 2001, generated hundreds of arrests, the vast majority of which resulted in convictions for one or more drug trafficking offences. On a cautionary note, opposition may be voiced to test purchasing on the basis that the tactic may disproportionately target members of ethnic minorities or may infringes civil liberties (Jacobson, 1999).

It is worth noting that in the UK there is still a lack of specific powers to conduct test purchases for controlled drugs. This is despite the fact that legislation dating back to the early 19th century recognises test purchasing as a viable enforcement tactic, and statutory powers dating back to the 1930s and the late 1960s have provided pharmacists and trading standards officers with

the means to use test purchasing to detect offences relating to the sale of alcohol, fireworks, intoxicating substances (e.g. glue), medicines, poisons and tobacco. The Misuse of Drugs Act 1971, the UK's principal drug control legislation, provides no such powers to the police. Nor did the Police and Criminal Evidence Act of 1984, which gave new investigative powers to the police, including the power to search body orifices for controlled drugs, or the Regulation of Investigatory Powers Act 2000, which regulates covert investigations, or, for that matter, the Serious Organised Crime and Police Act 2005, which again provided new investigative powers to the police and Serious Organised Crime Agency (SOCA) staff. The same observations hold for the tactic of undercover drug buys. As such, covert drug purchasing by the police, customs officers and SOCA staff has yet to be placed on a statutory footing.

Collecting price data from test purchase operations may be carried out through the use of a standard form designed to record information on the transaction itself and contextual information on the offender. This form may be filled in electronically by any of the law enforcement agencies involved in the case back at the police station, so that information is automatically compiled in a central database from which analysis can be easily carried out.

Strengths and weaknesses

Test purchasing appears to be a viable method for obtaining objective and reliable retail drug price data. Law enforcement agencies are able to collect key information (drug type, weight and price) as well as other important variables, such as purity, location, time, and even information on buyer/seller relationships, which can be incorporated into any subsequent analyses.

However, if countries decide to use test purchase data to track retail drug prices they need to ensure that their law enforcement agencies (primarily the police) have the capacity to conduct test purchases in quantities large enough to generate sufficient data for meaningful analysis. For example, in MPS test purchase records, only limited data is available for drugs other than heroin and crack cocaine. This is a reflection of the law enforcement priorities inherent in test purchase operations, but in principle other drugs could have been included. Indeed, it is essential to remember that test purchases reflect the priorities of law enforcement agencies in terms of illicit products but also in terms of the types of markets and actors targeted. For example, data on prices collected through this method may not all refer to the retail level of drug markets and this may have to be sorted out later on at the analytical stage.

A further consideration is that test purchase operations are expensive to run (at least in the short term). Having to deploy surveillance teams and having arrest teams on standby means that initial

expenditure is high. However, since available data (in the UK) suggest that arrestees are more likely to plead guilty, law enforcement agents are less likely to be injured, and there are fewer opportunities for the traffickers to make spurious allegations about fabricated evidence, it is possible that test purchase operations may break even or prove to be less expensive in the long term compared to other enforcement tactics.

Finally, it is essential to bear in mind that such operations require a lot of preparation and planning, identifying observation points, securing specialist equipment, and obtaining the necessary authorisation from senior officers.

An example — National Covert Drug Purchase Database, United Kingdom

Currently, there is no standardised procedure in place for collecting price data from test purchases in the UK. In part, this is due to the fact that the country does not have a national police service; instead there are over 50 separate police services. However, some of them, Avon and Somerset Constabulary and the MPS, for example, have developed efficient collection systems.

In the summer of 1998, following some exploratory work using data drawn from test purchases conducted in the course of *Operation Welwyn*, the first Test Purchase Database was designed in the UK (re-named the National Covert Drug Purchase Database in 2001) by the MPS

The database itself was developed in Microsoft Access format, and records were converted to Microsoft Excel for subsequent analysis. Each record, comprising four tables with over 100 fields, was designed to record the details of up to four purchases, (drug type, weight, purity, and price), the date the drug was purchased, the location of the purchase, details of the offender (full name, date of birth, age, place of birth, nationality, ethnic appearance, sex, home address and a summary of her/his criminal history), and additional details relating to the offender's arrest, prosecution, conviction and sentencing. The database was located in the Strategic Analysis Unit (SAU) of the Criminal Intelligence Branch of the MPS at New Scotland Yard, London.

Since details of all test purchase operations are recorded centrally at New Scotland Yard, it was possible to identify which Operational Command Units – police stations – had run these operations and therefore readily locate the prosecution files that they had prepared.

The files contained a wealth of information in the form of witness statements by arresting and investigating officers and forensic scientists, arrest and charge sheets, interview records, personal details of the defendant(s), and copies of court papers recording the verdict and sentence. Missing or incomplete data (usually relating to the defendant's nationality, full criminal history,

or whether s/he was a drug addict or otherwise using drugs), could be obtained by recourse to other databases, such as the Police National Computer.

Based on the analysis (King, 2004) of 538 records, comprising nearly one thousand purchases, it was possible to describe trends in the mean unit price (price per gram) of heroin and crack cocaine over the period 1992 to 2003. Figures 1 and 2 show a decrease in both over the period. For comparison, unit prices of heroin and crack cocaine obtained by the MPS and two other sources (NCIS, the former National Criminal Intelligence Service; and IDMU, the Independent Drug Monitoring Unit) are shown. Whilst some of the NCIS data were gleaned from test purchases, the IDMU data relied on other sources, such as interviews with drug users.

Figure 1: Mean unit price of crack cocaine (1992–2003)

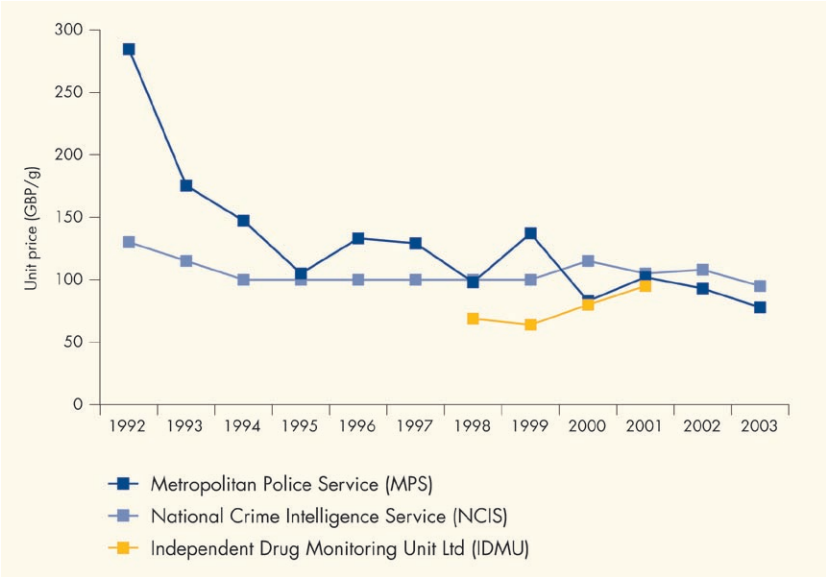
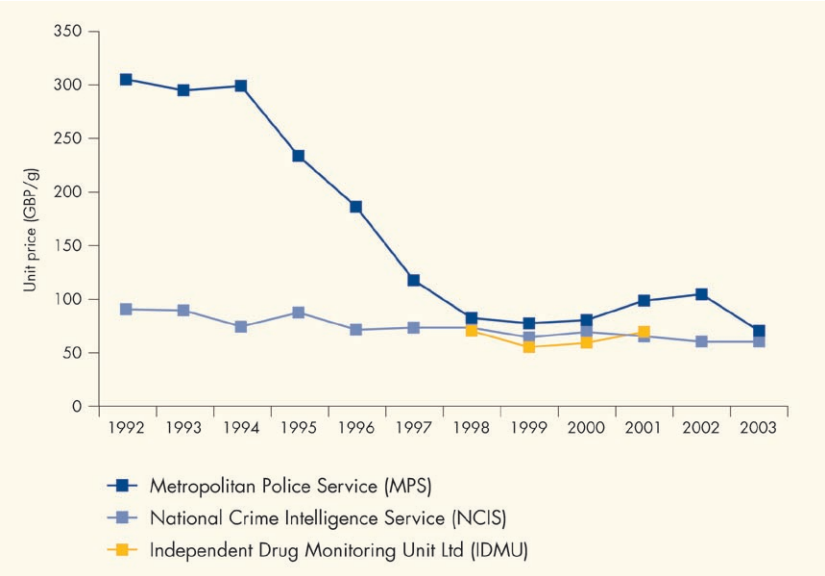


Figure 2: Mean unit price of heroin (1992–2003)



The current MPS system, originally devised in 1998, refined in late 2005 and formally introduced in January 2006, is based on data drawn from a single form – the Covert Drug Purchase Form (CDP Form or Form 916) (see Annexes 2 and 3). This form is designed to capture information relating to drug type, price, and weight and purity (if applicable). Contextual information, such as the age, sex, nationality, ethnicity, and place of birth of the offender, and the date, time and location of the purchase, is also recorded. The electronic version of the form is completed by the Exhibits Officer (an experienced police investigator) whose task is to keep a detailed record of all exhibits (drugs, documents, money, etc.) seized by the police in the course of the test purchase operation. The completed form is then sent to New Scotland Yard where researchers or analysts scrutinise and validate the information recorded by cross-referencing to other databases and documents. Data is then entered into the Covert Drug Purchase Database.

Informants run by law enforcement agencies

Informants (known as CIs, confidential informants, or as CHISs, covert human intelligence sources in law enforcements circles) provide a good deal of drug price information to their law enforcement agency handlers, much of which finds its way into the agency's intelligence bulletins and other in-house publications.

Objectives

Many law enforcement agents, particularly those working on drug squads or similar dedicated units, regularly ask their informants to provide them with up-to-date information on drug prices. Since many, if not the majority, of informants are drug users and drug traffickers, they are well placed to provide reliable information covering both the retail and wholesale levels.

Details of the method

In some law enforcement agencies, officers complete a structured or semi-structured questionnaire covering drug prices when they meet with their informants. This approach has certainly been used by police officers in the UK, particularly by the MPS. In the absence of a questionnaire, handlers will often include information on drug prices in the intelligence logs or reports that they are obliged to complete after meeting their informant. Although the identity of the informant is confidential, if not secret, the information relating to prices is often accessible to other police officers. As such, intelligence reports are potentially a rich source of information on drug prices. However, trawling intelligence reports for this purpose is laborious and costly.

Strengths and weaknesses

For reasons given above, informants are well placed to provide information on drug prices. However, it has to be recognised that while many of them routinely provide reliable information to law enforcement agencies, a significant number are unreliable and are likely to give misleading or false information in an effort to obtain payment, either on a pro-rata basis or 'lifestyle' payments or in the form of a reward, or as a trade-off for the law enforcement agency helping them to avoid prosecution or a stiffer sentence, or simply to ingratiate themselves with a particular law enforcement agency. Thus they may give misleading information as to where a trafficker sits in the hierarchy of an organised crime group or criminal network – in general terms, if the informant is able to convince his law enforcement agency handler that the trafficker is near the 'top' of the hierarchy, then s/he increases the likelihood of receiving more money. Having said this, we are not aware of anything in the research literature that shows that informants are likely to give misleading or false information relating to either retail or wholesale drug prices. In fact the reverse seems to be true – police officers briefing test purchasers rely heavily on informants for information relating to prices, and based on practical experience and research this information appears to be reliable.

Interrogation of arrestees

Law enforcement officers obtain a lot of information on drug prices in the course of their interviews – interrogations – with arrestees. While this information is readily found in prosecution files and crime reports in a number of countries, and often serves to inform decisions relating to the prosecution and sentencing of drug users and traffickers, it is largely unknown to what extent it is routinely collated and analysed by law enforcement agencies to add insights to their understanding of prices and accompanying trends.

Objectives

As with test purchasing, drug prices data elicited in the course of interrogations is often a by-product of the investigatory process. These data can prove to be a rich source of information and, if recorded on crime reports in electronic form, are easily accessible for systematic extraction and analysis.

Details of the method

In some countries, information relating to drug prices is often included in either the arrest notes and/or interrogation records, and in many cases this information is then transferred to crime reports and other documents forming part of the case/prosecution file. In London, for example, this approach means that it is possible to compile drug prices data drawn from the Metropolitan Police's CRIS (Crime Report Information System) reports, which can be readily accessed and searched by police analysts and researchers as they are in electronic form. Although there is no requirement for the arresting/investigating officers to record the information on prices on the CRIS (there is no specific field for this), officers often include the information on the DETS (details of the investigation) screen. Searching this screen and extracting the information is easy, although admittedly laborious. In addition, since details relating to the forensic analysis of the seized drug (type, quantity, and, where relevant, purity) are systematically recorded on the DRUG screen, it is possible to validate the information provided by the arrestee. As such, the system enables police analysts and researchers to conduct quantitative and qualitative analysis. Since it is possible to electronically access archived CRIS reports, drug prices can be monitored over many years. The system described has been used on many occasions to obtain price data on cannabis, ecstasy and amphetamine and arrangements are in hand to use CRIS to generate price data on illegally diverted methadone.

It may be envisaged also that, as a specific means of data collection, the law enforcement officer in charge of the interrogation of the suspect fills in a form with information on retail prices obtained from the suspect. Forms would then be collected and analysed centrally. Although this approach would mean that law enforcement agency analysts and researchers were able to avoid the laborious process of having to access and trawl crime reports or prosecution files, it may be difficult to implement as law enforcement officers may not have the necessary time during interrogation for such data collection, and would have to be motivated and trained to collect price information.

Strengths and weaknesses

Law enforcement agencies in many countries use arrestees as a main source of drug price data and generally it is considered to be reliable. However, consideration should be given to the following points; first, under interrogation, some traffickers, wary of asset confiscation, forfeiture laws, prosecution or sentencing guidelines, may lie about the wholesale or retail value of drugs in their possession. Second, in some cases where buyers suspect that they might have been cheated – 'ripped off' – as to the weight or purity of the drug, they may lie about the price they paid because they do not want to look naive or foolish in front of their interrogators. Third, sometimes arrestees, believing that they have bought a particular drug at a bargain price, later learn from investigating officers that they have been tricked into buying some other drug that has a lower market price. On occasions, arrestees realise that they haven't bought a drug at all but rather some innocuous substance. Novice users hoping to buy ecstasy in clubs often fall for this ploy. At this juncture, it is worth stressing that these situations are not particular to arrestees under interrogation and may affect any data collection method described in this document. Fourth, retailers and wholesalers sometimes use an intermediary to buy drugs on their behalf and in some cases the intermediary may have duped them into paying more than the local market price. Fifth, on occasions, in 'joint possession' cases ([4]), some arrestees, covering up for their spouses, siblings, or friends, may elect to admit to possessing drugs which they didn't buy and so have little or no knowledge of the price paid. It is very important to note that, unlike researchers, law enforcement agencies may have opportunities to validate price information given by arrestees in the course of interrogation. For instance, in cases where an arrestee provides information as to

([4]) For example, whilst searching a house occupied by three people, police find drugs, but it is not clear to them whether the drugs belong to one, two or all three suspects. Taking into account the circumstantial evidence, the police might well decide to arrest all three people on suspicion of possessing the drugs, in anticipation that additional evidence (e.g. fingerprints on packaging or confessions) will be forthcoming.

the price s/he paid for, say, 10 grams of amphetamine during interrogation and the subsequent analysis shows that the purity is exceptionally high, s/he could be challenged as to the reliability of the original price given ([5]).

Overt drug purchases (purchases by non-law enforcement agents)

While test purchases are conducted in a covert manner by law enforcement agencies (see above), they can also be conducted in an 'overt' manner by non-law enforcement agents, such as researchers. In these cases the person buying the drug does so for research purposes. Accordingly, there is no need for him or her to conceal their identity from the seller. But, as underlined below, overt drug purchasing is rarely used to obtain price data on illicit drugs. Legal difficulties compounded by the barriers researchers encounter when trying to access illicit drug markets go some way towards explaining why this is the case. However, this may be regrettable considering the type of information and the quality of the data which can be collected in this manner.

Objectives

As already stated, overt drug purchases are rarely carried out. Nevertheless, academic researchers such as ethnographers or sociologists have already implemented this kind of data collection with the aim of understanding the 'cutting' practices and the chemical content of the substances found on the street (Wendel et al., 2003). This method of data collection is more common for licit drugs, namely tobacco and alcohol. For example, some researchers carried out surveys on the illegal sale of tobacco and alcohol to minors (Arday et al., 1997; Willner et al., 2000), in order to evaluate the facility with which underage consumers can obtain these products.

In overt purchases of illicit drugs the objectives are quite different, although gaining a better understanding of the availability of the product may be one of them. Nevertheless, the main purpose is usually to obtain the toxicological characteristics of the substances used in the area under study, which presupposes that the products purchased in this manner are then brought to

([5]) One of the present authors (Monaghan) investigated such a case in the late 1980s whilst serving as a detective at Southwark Police Station in South London. Analysis showed that the purity of the amphetamine was way above the average street purity of the drug, and when the suspect was re-interviewed he admitted that he had paid around twice as much for the drug than previously stated. Chemical profiling of the high purity amphetamine – referred to as 'base' – linked it to batches that had been seized at the point of importation.

a laboratory for analysis. It can also be used to gather information about new and previously unknown substances.

Price data for illicit drugs may be collected through these overt purchases, but once again it must be underlined that obtaining this information may not be the main objective of the method.

Details of the method

There is no standardised method for carrying out overt purchases. In the case of licit drugs, namely tobacco and alcohol, the methodology used to perform such purchases is quite simple: youths are sent into stores to test whether they are able to buy tobacco or alcohol or not; or, more precisely, to check whether sellers ask for their ID card and whether they sell the tobacco or alcohol to them. Some ethical considerations surround the fact that minors are sent to buy these items, but one study showed that, a few years after having participated to the surveys, the minors-collectors were less keen to smoke than others (Alcaraz et al., 1997).

In the case of illicit drugs, the situation is more complex. The difficulty of the method rests on who is in charge of the data collection. If a researcher (or a team of researchers) carries out the data collection, they must have a good knowledge of the context, i.e. of the drug use and drug markets in the area. This method of data collection is relatively similar to participant or direct ethnographic observation. Indeed, in that case, the ethnographer is often accompanied by an informant who helps them to collect samples of substances.

If someone other than the researcher carries out the data collection, a strict protocol must be written. These people could be medical staff, social street workers or even illicit drug users. Consequently the protocol has to be very precise about the information to be collected on location, the time, the area, the product, its weight, its price, some characteristics of the sellers, and so on, with data on the price of the illicit drug bought being only one element of the data collection exercise. This type of method may prove very useful to gather information on the contextual elements surrounding the drug purchases themselves.

A final, but crucial, methodological point must be underlined here. If one of the aims is to link price data obtained via overt purchases to the toxicological analyses of the substances bought, then all specimens have to be analysed with the same method of gas chromatography and mass spectrometry.

Strengths and weaknesses

Due to the multiplicity of cases and the lack of a strict methodological framework for the implementation of such overt purchases, the strengths and weaknesses of this method to obtain data on drug prices may prove difficult to assess. Nevertheless, we can highlight the following points.

In particular, one of the strengths of this kind of collection resides in the fact that as price data are collected in the pure context of a purchase, they may correctly reflect the result of the bargaining game. What may also prove an asset of this method is that, in addition to price data, information may be obtained on the context of the determination of the price: location, time, characteristics of the seller, and so on. Last but not least, this method may allow toxicological analyses to be performed and data on prices linked with data on the real weight, purity and quality of the product.

The weaknesses inherent in this kind of data collection method are numerous but to be expected. It should be stressed that, depending on the sample, the dataset obtained is often not representative of the national picture; time trends can rarely be analysed, mainly because these data collection strategies are rarely repeated in time; and mobilising resources to obtain a large sample of price data can be time-consuming and consequently expensive.

An example — SINTES information system, France

Launched in 1999, the French National Identification System for Drugs and Other Substances (SINTES) is an innovative scheme for gathering information on synthetic drugs based on both police/customs seizures and drug samples and questionnaires collected directly from users by social outreach workers (Giraudon and Bello, 2007). This system, coupled with the TREND network of the French Monitoring Centre for Drugs and Drug Addiction (OFDT), has recently extended its focus to all illicit drugs. TREND is an information system organised around a network of local coordination points in seven French cities spread over the national metropolitan territory (Bordeaux, Lille, Marseille, Metz, Paris, Rennes, Toulouse), using a common strategy for collecting and analysing information on drug trends.

The SINTES/TREND system carries out ad hoc surveys on illicit drugs in order to monitor the toxicity of the substances found on the national territory and gain a better knowledge of drug users' characteristics and contexts of use. The protocol of data collection is quite strict.

TREND local coordinators are in charge of recruiting surveyors for SINTES following an agreement with the OFDT. Surveyors come from a range of backgrounds – social street workers, people involved in techno events, students, volunteers in charities dealing with prevention and harm reduction, nurses and doctors working in needle exchange programmes – in order to ensure that data collection is carried out in a variety of locations and settings.

The selection process ensures that those employed fit the aims and goals of the study. Training and briefings are provided both by the local coordinator and by the OFDT. Surveyors purchase the drugs from drug users. When a surveyor has to purchase drugs, the local coordinator delivers a daily (or longer) mission letter, specifying the date, the place, and the maximum number of samples to collect. The OFDT provides each surveyor with an official card that is valid for six months. Surveyors are registered by the Inter-ministry Mission for the Fight against Drugs and Drug Addiction (MILDT). In the case of an arrest, these documents may protect surveyors from potential prosecution, once police have verified their status.

Each time a surveyor purchases a sample from a user, s/he fills in a questionnaire which, depending on the product and on the location and setting of the transaction, includes different items: characteristics of the product (price, amount purchased, origin, context of purchase and location), characteristics of the users, expected effect, how the drug is taken, potential health problems following consumption, etc.

The OFDT finances the surveys carried out by SINTES/TREND. Each time a surveyor provides her/his local coordinator with a sample of a purchased substance and its associated questionnaire, s/he receives a fixed amount of money. Note that this payment is a lump sum so this is not a 'pure' test purchase: it is only the questionnaire that provides information about the price and the quantity bought during the last purchase of the user. The main benefit of this data collection method is that we are able to cross-refer information on price and quantity with information on purity. Indeed, all samples collected are then sent to a laboratory for analysis.

As an example, the results of a survey that used this data collection method to get a better knowledge of the potency of cannabis products used in France in 2004 are summarised here (for a more detailed report see Bello et al., 2005). The fixed amount of money given to the surveyor upon submission of a cannabis sample (herb or resin) was EUR 25. The size of the sample was set at a minimum of one gram in order to allow proper toxicological analysis. The price for one gram of cannabis was lower than the fixed amount of EUR 25, but this sum allowed the surveyor to be reimbursed for any other costs (e.g. transport costs) as well as motivate the cannabis user

to provide a sample of her/his product by paying them above the market street price for a gram of cannabis. For other products such as cocaine or heroin, the fixed amount is up to EUR 60 to EUR 90. In these cases, surveyors are supposed to collect a sample of 0.1 gram minimum for toxicological analysis (that means that the user providing a sample always received more than the expected market street price).

In 2005, 392 samples of cannabis were collected in six cities. Of these, 371 questionnaires were exploitable. User reports show that 46 samples were home-grown, 52 were received as a gift and 273 were purchased (of which two samples presented too many missing values). Figure 3 provides the price paid by users for their last purchase by type of cannabis product and class of weight. The sample was split into two classes to differentiate between purchases of less than 12 grams and those over 12 grams. Indeed, on the French cannabis market it is usually considered that 12 grams is the cut-off point to differentiate between purchases for personal consumption (under 12 grams) and purchases to be shared with friends or to be re-sold later on (dealing in order to reimburse this purchase).

Figure 3: Price per gram of cannabis in France in 2005 by type of product and class of weight

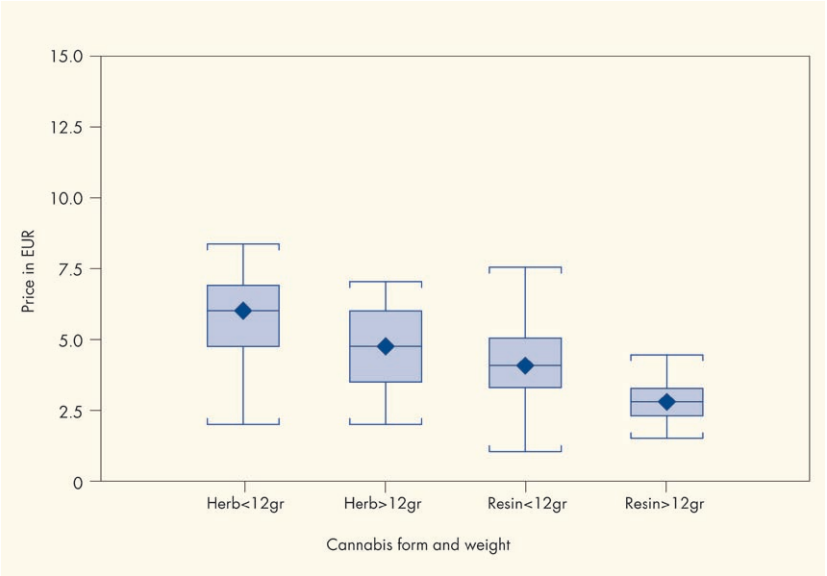
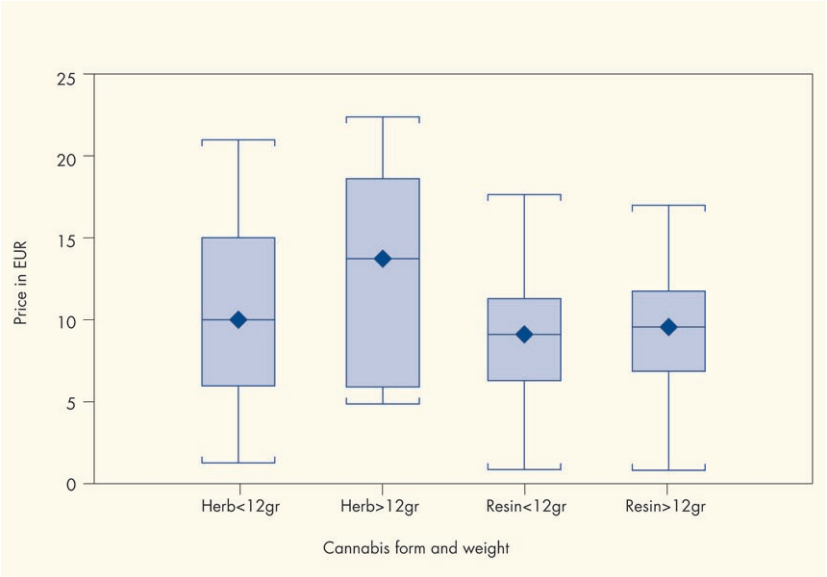


Figure 4: Potency of cannabis in France in 2005 by type of product and class of weight



The median price per gram (black point on the figure) of herbal cannabis for a purchase of less than 12 grams was about EUR 6 (n=56) while for purchases over 12 grams it fell to less than EUR 5 (n=17; range of weight=20–200 grams). This discount effect (Caulkins and Padman, 1993) has also been shown for cannabis resin: while the median price per gram for purchases under 12 grams is about EUR 4 (n=123), the median price for purchases over 12 grams fell to about EUR 2.5 (n=75; range of weight=15–500 grams).

Figure 4 shows the potency of the cannabis collected during this survey. The sample was split into the same classes of weight as for the price analysis. The median potency of the cannabis available on the illicit market in France was shown to range between 8 and 14 %. Note that herbal cannabis is more potent than resin and finally that the higher potency of herbal cannabis in purchases of over 12 is not statistically different to that found in herbal samples of less than 12 grams (due to the small sample of herbal cannabis purchased in quantities over 12 grams).

Surveys of drug users

It may seem obvious to directly ask drug users about prices paid at the retail level for illicit drugs. In practice, however, this is rarely done and surveys among drug users are not a common way to obtain information on retail drug prices. Some limitations inherent to user surveys on illicit drugs prices are outlined below and may explain why this data collection method is not often used although it can produce very interesting information.

Objectives

Surveys among drugs users usually address health, social and legal issues or take place in order to evaluate the health and social services targeting drugs users (McLellan et al., 1992), and therefore information on drug prices is not usually the priority of these surveys.

The objectives of such surveys may be multiple. User surveys are usually set up to obtain information on the health situation of drug users, in particular in terms of infectious diseases and whether they are infected by blood-borne viruses such as HIV or hepatitis, but also the degree of social marginalisation of the users and whether they have been involved with the legal system and how often, etc. As previously emphasised, user surveys can also be carried out as a tool for evaluating drug treatment services. In this case, they may describe trends in the particular targets the drug policies set up.

In other words, specifically dedicated surveys on price data or the economic behaviour of drug users are rare. To our knowledge, in addition to the Antenna monitoring since 1993 in Amsterdam (Benschop et al., 2009; Nabben et al., 2008) and the French ENa-CAARUD survey carried out in France in 2006 (Toufik et al., 2008), only Bretteville-Jensen and Biørn (2003, 2004) have carried out a user survey in Europe to obtain data on retail drug prices – it addresses the economic behaviour of heroin users in Oslo. The three of them are described below.

Details of the method

Surveys of drug users can be differentiated depending on the way they approach their sample of users. Users can be surveyed through self-reported questionnaires, or through interviews carried out by professional interviewers who will then fill in a questionnaire for each participant.

Usually, the greater the sample of users included in a study, the better it is ([6]). There is not enough space in this guide to discuss issues surrounding sampling methodology, but readers can refer to Dorofeev and Grant (2006) or Turner, Lessler and Gfroerer (1992) for further discussion. In the same way, the formulation of the questionnaire is an important aspect to consider and requires some caution; for an overview of questionnaire theory, Foddy (1994) may be consulted.

Nevertheless, it is important to mention that questionnaires specifically dedicated to illicit drug prices are sensitive and must be well formulated. Indeed, questions related to economic issues and access to drugs (e.g. price, quantity) are relatively badly perceived by users, and sometimes also by professionals working in the field, for a variety of reasons. Users may be reluctant to provide information about their activities in the illicit drug market. For example, questions referring to the quantity of drugs bought last time and the price paid may seem extremely suspicious to illicit drug users and they may be reluctant to answer them. And drug professionals may also have their reasons for being suspicious about questions on drug prices and other economic issues in user surveys. Indeed, they may often be worried about the future use of the data collected. So to maintain the trust they have built up with drug users, they may be reluctant to ask them questions on drug prices, the quantities bought, etc.

A crucial point when questionnaires are elaborated is to avoid being too ambitious in the number of questions included in a survey and to keep the questionnaire to a reasonable length. Indeed, a long questionnaire may put respondents off, increase the risk of a low response rate, and may even provoke reluctance to participate in the future.

([6]) See Chapter 2 for a discussion of sampling issues and sample size.

Strengths and weaknesses

One of the main strengths of this kind of data collection is that it is those people most concerned with the price of illicit drugs at the retail level – the users – who answer the questions. The information can therefore be considered as relevant. So, if the sample size is sufficient, the information can be robust. Another advantage is that surveys are usually carried out according to a survey protocol ([7]) that then facilitates any replication of the survey in the future. Therefore if the survey is repeated over time according to the same protocol, comparisons may be made and trends over time analysed.

Most of the weaknesses of surveys to obtain data on retail drug prices from drug users are of course dependent on the quality of the methodology used. For example, a small sample may lead to a lack of robustness in the data obtained. A questionnaire that is not well organised, with questions formulated in a non-appropriate way, may mean a low return rate. This may be the case if the questions about the prices paid (and quantities bought) are viewed as 'too intrusive', and respondents become reluctant to provide answers; or if, in the same way, surveyors consider these questions to be intrusive and become reluctant to interview users. A further limitation is that these surveys do not usually allow a sample of the substances bought to be taken for subsequent purity (or potency) analysis, and therefore the quality of the products bought cannot be objectively related to the price paid.

An example – ENa-CAARUD Survey, France

The ENa-CAARUD survey was carried out in France at the end of 2006 and may provide an example of what can be done in terms of user surveys to obtain retail price data, and of the problems that may arise (Toufik et al., 2008).

ENa-CAARUD is a survey carried out among drugs users recruited from drug treatment centres and harm reduction facilities (CAARUD). The survey was carried out in 114 centres across France during one week, and its protocol ensured that all drug users meeting the selection criteria and attending the 114 facilities during this week were included. The staff of the CAARUD had to interview all new users met for the first time during the given week and fill in a questionnaire. A total of 4 651 questionnaires were returned to the French Observatory on Drugs and Drug Addictions, which was in charge of the implementation and analysis of the survey.

([7]) See the glossary on page 103.

A specific question was included about the price of the illicit drugs in addition to questions about respondents' socio-demographic characteristics (gender, age, housing, income resources, education level, employment, etc), drug use behaviour (substances, route of administration, etc), current treatment (e.g. opiates substitution), and infectious diseases (HIV, hepatitis).

The question was formulated as follows:

Table 2: Question on drug prices, ENa-CAARUD Survey 2006

If these drugs were used in 2006: price in euros of the last purchase (for licit products, it refers to purchases on the illicit market)

Heroin		Cocaine	Crack free base	Subutex®	Buprenorphine Arrow®	Methadone	Moscotin® Skenan®	Ecstasy
1 gram		1 gram	One-dose rock	1 pill	1 pill	1 bottle	1 pill or	1 pill or
Brown	White			8 mg	8 mg	60 mg	60 mg capsule	capsule
___	___	___	___	___	___	___	___	___

Note that the question asks about both licit and illicit drugs. Indeed, a lot of users sell the pharmaceutical drugs prescribed to them in the course of drug treatment (such as methadone and buprenorphine) on the illicit market (Fountain and Strang, 2003). In France, there is also a thriving black market for licit drugs such as Moscotin ([8]) or Skenan ([9]). This market is the result of these drugs being diverted from social security, physicians and pharmacists.

It should also be noted that the question sets up a standard quantity for each product bought at the last purchase. The reason for this is that users could have been very reluctant to answer if information on the quantity bought had been requested. This may lead to a potential bias in the answers: indeed, we do not precisely know if the user, when answering the question, responds on the basis of her/his knowledge of the price per gram or if s/he converts the quantity and the price of her/his last purchase into a price per gram.

Another difficulty raised by this formulation of the question is related to the units of quantity that are provided in the question. As regards licit drugs, several dosages exist: for example, Subutex ([10]) 4 mg, Methadone 80 mg, Moscotin 100 mg, etc. Consequently, prices on the illicit market may differ depending on the dosage available; this led to users having some difficulties in

([8]) The main active ingredient of Moscotin is morphine sulphate.
([9]) The main active ingredient of Skenan is morphine sulphate.
([10]) The main active ingredient of Subutex is buprenorphine.

answering this question. This problem was also raised in relation to cocaine in the form of crack or free-base. The unit of a 'one-dose rock' is rather unclear and several sources confirmed that the weight of a rock of crack was not standardised. Consequently, the answers about the price of crack obtained through this survey could not be used. The issue of the unit of quantity may also be raised for other illicit drugs: for example, a 'one-street gram' rarely weighs one gram, but instead about 0.8 g.

Of the 4 651 questionnaires returned, 2 617 did not provide any answer to the question on the retail price of licit and illicit drugs; therefore the response rate was 43.7 %. Among the respondents, the most quoted price was that of cocaine (50.7 %), brown heroin (37.5 %) and Subutex (27.9 %). The substances least frequently quoted were Buprenorphine Arrow (3.1 %) and methadone (7 %). Responses show that some users were able to provide a price for several products.

As mentioned above, the crack prices data could not be used: the answers gave a range from EUR 1 to EUR 300 for a 'rock for one go'. Some sources report that a rock of crack weighs 0.1 gram while others report that a rock may weigh up to 1 or 2 grams. The lack of standardisation (revealed by the data) did not allow us to use them.

Nevertheless, as an example of the results obtained, Figures 5 and 6 show the median prices (symbolised by a black point) of the drugs included in this survey. It should be noted that prices provided by users who specified that it was for another dosage (for example Moscotin 100 mg instead of 60 mg) have been included here. This inclusion did not lead to major changes in the results. However, absurd answers (outliers) have been removed from the sample, for instance when users were declaring that a tablet of Subutex® was worth EUR 300 while the median price in our sample was EUR 3.

The data collected show that the median price of brown heroin was EUR 40 and that of white heroin EUR 50, while that of cocaine was EUR 60. The median price of a tablet of Buprenorphine Arrow, Moscotin, Skenan and Subutex was EUR 3; that of a bottle of Methadone sold on the illicit market was EUR 5, and finally, that of an ecstasy tablet EUR 5.

Figure 5: Median retail price of brown heroin, cocaine and white heroin, 2006

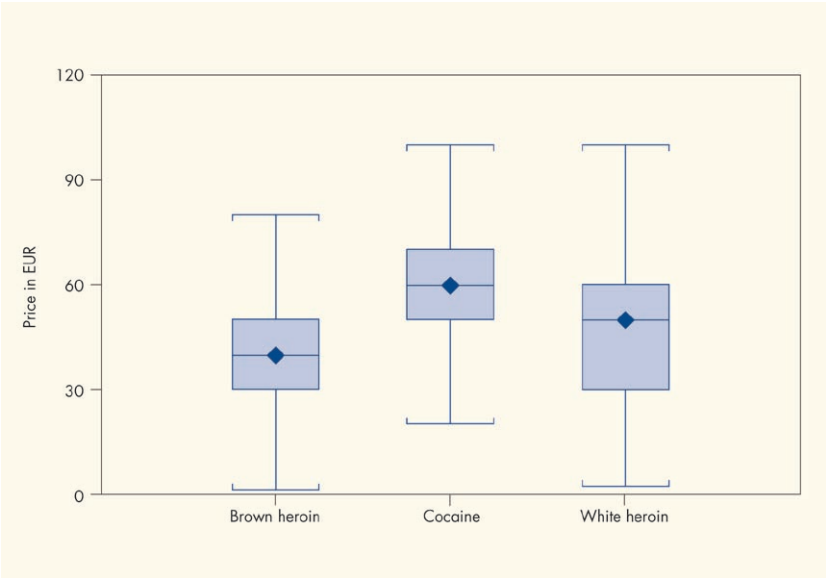
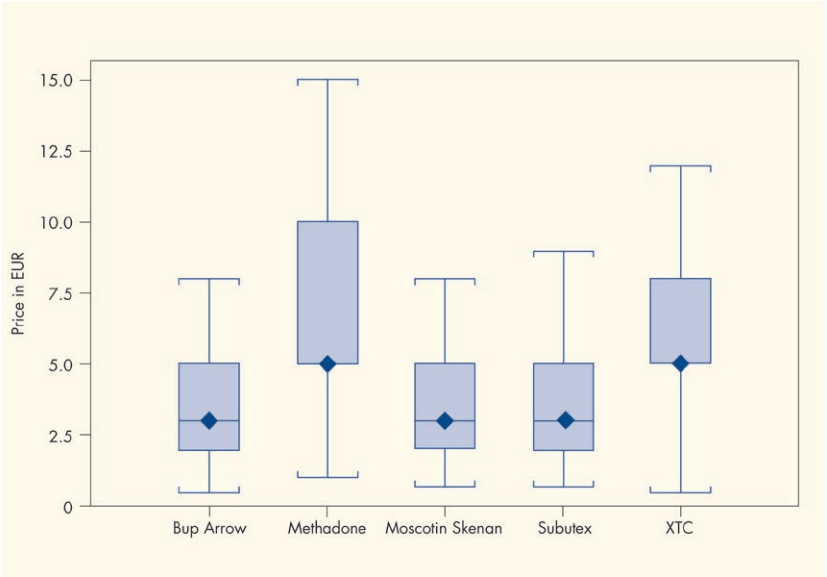


Figure 6: Median retail price of some pharmaceuticals sold on the illicit market, 2006



An example — The Oslo study, Norway

This ongoing study started in 1993 with the aim of analysing economic aspects of the use of hard drugs. Detailed information on drug use, income and drug prices from active hard drug users was wanted and the only needle exchange service, which had opened in Oslo in 1988, was chosen as the place for recruitment. The needle exchange service was chosen because information was sought from as broad a group as possible. Drug users in prison or in treatment institutions were assumed to be less representative than the group currently active in the drug scene. In addition, memories of last-month activities are likely to be reasonably accurate, whereas people outside the drug market at the time of interview are usually requested to consider life-periods considerably further back in the past than this. The needle exchange hands out free-of-charge hypodermic syringes and condoms as a preventive measure against HIV, and is centrally placed in an area of Oslo where a lot of drugs are also sold.

An interview session consists of two to three nights during which as many visitors to the needle exchange service as possible are interviewed. The sessions were first held on a monthly basis, then quarterly from June 1994 and currently there are two data interview sessions per year (March and September). People are approached for an interview after they have used the services provided by the needle exchange service. The interviews are anonymous, and it is not possible therefore to register the interviewees to help recognise them from one interview session to the next. Some individuals have probably been interviewed more than once during the whole study period, but not within the same interview session. Based on the high number of visits to the needle exchange service (on average more than 100,000 single visits and over 2 million syringes are handed out annually) and comparisons of sample characteristics to what is otherwise known about the target population, the sample's representativeness is deemed to be fairly good (Bretteville-Jensen, 2003). By the end of 2008 more than 4,600 questionnaires were completed.

The mean age for the whole sample is 32.7 years (30.4 for females and 33.8 for males), an increase of 3.5 years since the study started. The youngest person to be interviewed was 16 years old and the oldest was 62. Females constitute 31.4 per cent of the sample.

Price data are obtained by differentiating between types of drugs and quantities. Individuals are asked specifically about prices of street units, one gram and five grams of heroin, amphetamine and cocaine and also about prices of cannabis, methadone and various tablets. Self-reported data may represent the heterogeneity of prices within the market and reflect the price discount

available to buyers who regularly frequent the same dealer. Dealers are asked how much they paid for the last quantity of drugs they bought (at least partially) for dealing.

The market purity of drugs could be an important determinant of the price-responsiveness of drug consumption, and trends in market prices should ideally be presented in quality-adjusted terms to reflect the potentially important effects of purity changes on behaviour. Police seizures indicate that there is large variation in drug purity both on the retail and wholesale levels. The evidences of regular 'cutting' of drugs in the Norwegian drug markets are weak, however, as the average purities on the two levels are similar and seem, despite fluctuating trends, to follow each other over time. The purity is usually unknown to the buyer at the time of purchase so for some types of analyses quality-adjusted prices may not be very useful after all. In any case, it is not possible to collect purity data using this approach.

An example — The Antenna monitoring scheme, The Netherlands

Since 1993, Amsterdam Antenna has collected qualitative and quantitative data in order to document and analyse trends in substance use among adolescents and young adults in the city (Benschop et al., 2009; Nabben et al., 2008). Our qualitative panel study traces the latest developments by conducting individual, face-to-face interviews twice a year with a panel of avid nightlifers and professionals from various nightlife scenes. The focus is on trendsetters who try out new types of music, events, nightspots and drugs, or create new variations on older themes. They also lead the way as drugs or styles go out of vogue. Panel members report about consumption patterns, demand and supply within their own networks or scenes.

Our annual quantitative survey delivers quantitative data about substance use in specific groups: school-going adolescents, young clients of youth services, cannabis coffeeshop customers, pub goers and clubbers. Questions on retail drug prices were included in the 2003 and 2008 club surveys and the 2005 survey of customers of pubs and cafés.

Other statistics reported in the Antenna monitor derive from sources we call substance use prevention indicators. These provide quantitative data on the alcohol and drugs market from several sources: requests for information or advice received via a telephone help line and a website; substance use education contacts at dance events; and results from the testing of voluntarily submitted drugs. The two most recent editions (2007 and 2008) of the Antenna monitor also include information of prices of ecstasy tablets submitted for testing.

Panel study

In the panel interviews trendsetters are asked about the typical price of drugs within their network. The common price for one tablet of ecstasy is EUR 5. A 'wrap' of cocaine typically costs about EUR 50 to 60. These wraps are supposed to contain 1 gram of cocaine, but some indicate that the doses are rather 0.9 grams.

Table 3: Retail prices in Amsterdam, 2008

Substance	Quantity	Price range	Typical price
Ecstasy tablets	1 tablet	EUR 3–5	EUR 5
Ecstasy powder/crystals	1 gram	EUR 25–30	EUR 25–30
Cocaine	1 wrap (1 gram)	EUR 40–70	EUR 50–60
Amphetamines	1 gram	EUR 5–30	EUR 10–15
GHB	1 vial (5 ml)	EUR 1–10	EUR 5
Ketamine	1 gram	EUR 30–50	EUR 35–40

Survey

In the Antenna club surveys respondents were asked whether they had purchased ecstasy and/or cocaine themselves from couriers ('line couriers' or 'wrap services' deliver drugs to your front door), home dealers (dealers selling drugs from their own home) or dealers in nightlife settings in the past year. And, if so, how much they purchased at what price.

In the 2005 Antenna survey among customers of pubs and cafés in Amsterdam, respondents were also asked about ecstasy and cocaine prices. However, no distinction was made between categories of drug dealers.

At least half of the recent (last year) users of ecstasy among the customers of clubs in the surveys of 2003 and 2008 had purchased ecstasy themselves. Between 2003 and 2008 the proportion of club goers buying from home dealers declined, while the proportion of club goers buying from couriers grew. Average retail prices decreased in all three categories of dealers. Prices in 2008 varied between EUR 0.30 and EUR 10 per tablet; when one buys more tablets, one gets a quantity discount. Results show that the average prices are not very far apart. It is true that in 2008 ecstasy in nightlife settings (EUR 3.62) was on average about 30 % more expensive than ecstasy from a home dealer (EUR 2.70), and about 10 % more expensive than ecstasy from a courier (EUR 3.32); but compared to the costs of a night out, the difference may seem negligible.

Table 4: Retail prices of ecstasy (recent ecstasy users only)

	Club goers 2003 (n = 144)	Pub goers 2005 (n = 70)	Club goers 2008 (n = 238)
Purchased ecstasy last year			
Courier	16.7 %		22.2 %
Home dealer	44.4 %		18.9 %
Nightlife	18.8 %		17.6 %
Total	55.6 %	64.7 %	51.1 %
Average price per tablet			
Courier	EUR 4.24		EUR 3.32
Home dealer	EUR 3.51		EUR 2.70
Nightlife	EUR 5.52		EUR 3.62
Total		EUR 3.15	

Like ecstasy, more than half of the recent cocaine users had purchased cocaine themselves in the past year. And, even more than in the case of ecstasy, the proportion of those buying from couriers increased while buying from home dealers decreased. Average prices were in 2008 more or less comparable to 2003. Cocaine in nightlife settings appears to have become less expensive, but the number of club goers purchasing cocaine in nightlife settings is very small. When respondents ordered cocaine from a courier (the most common way of purchasing cocaine) they paid just under EUR 50 for 1 gram. The more they purchased, the lower the price per gram.

Table 5: Retail prices of cocaine (recent cocaine users only)

	Club goers 2003 (n = 101)	Pub goers 2005 (n = 66)	Club goers 2008 (n = 156)
Purchased cocaine last year			
Courier	28.7 %		40.9 %
Home dealer	44.6 %		14.2 %
Nightlife	18.8 %		4.8 %
Total	60.4 %	63.6 %	55.0 %
Average price per gram			
Courier	EUR 48.79		EUR 47.58
Home dealer	EUR 46.00		EUR 43.10
Nightlife	EUR 52.89		EUR 40.57
Total		EUR 48.81	

Test service

Consumers voluntarily submitting ecstasy tablets for testing with the Jellinek Prevention Test Service in Amsterdam are asked how much they paid for the drugs. About 80 % of the test service customers responded to that question. In 2007, prices varied between EUR 0.40 and EUR 7.50 per tablet (depending on quantities purchased); averaging EUR 2.80 per tablet. In 2008, prices were very similar: between EUR 0.20 and EUR 10, with an average of EUR 2.84 per tablet.

Interviews with key experts

Interviews of drug specialists may prove to be a useful method for obtaining routine data on retail prices. This approach is widely used in social sciences either as the main method of data collection, or combined with other methods, for example surveys through self-completion questionnaires or participant observation. We may distinguish between in-depth individual interviews and focus group techniques, but one of the most important features of any qualitative approach is that it is based on the direct interaction between the researcher and a respondent or a group of respondents. Indeed, during the discussion, interviewers can move the conversation in any direction of interest they wish. This allows them to prioritise certain topics of research and eventually get more in-depth insight on particular aspects of interest.

Objectives

Drug specialists – whether law enforcement or demand reduction professionals – can be useful sources of information on the retail prices of drugs in the illicit market. Different techniques may be used to collect information from them on drug prices. For example, the research methods might include: individual in-depth interviews, questionnaire interviews, focus group interviews or self-completion questionnaires. It might be useful to supplement any qualitative approach (e.g. individual in-depth interviews or focus groups) with self-completion questionnaires, which would allow the collection of data on retail drug prices per unit (per gram or per volume). This data could be analysed using quantitative techniques.

Quantitative data collection techniques (e.g. questionnaires) may provide information on the drug prices themselves, while qualitative approaches (e.g. interviews) are generally set up to help understand changes in the drug scene as well as mechanisms of the illicit market. Such qualitative approaches are usually used to supplement the analysis and the interpretation of changes in drug prices. Repeated measurements can reflect trends in drug prices, although it is then necessary that the methodology used in the first instance is replicated (for example, the data may be collected during the same month in the following year).

Self-completion questionnaires are a useful way to collect data from various sites and different settings when available resources do not allow interviewers to be sent everywhere. A questionnaire can be sent, together with instructions for its self-completion, to the targeted drug professionals.

Details of the method

Qualitative research methods are generally used to investigate the causes of a phenomenon. They are used to explain ongoing processes and obtain facts. They serve to answer questions such as Why? In what way? Much more rarely they address questions such as How many? or, How much? They are usually based on non-probabilistic sampling methods, and in particular may rely on a purposive selection of the sample – in general relatively small – that prevents the results from being statistically representative and precludes any extrapolation to the general population. The course of the interview is determined by the interviewer and the interviewee as it has an interactive character. In addition, it is important to note that the subjective approach of the researcher and their knowledge and experience are part of the data analysis process.

Individual interviews are a qualitative method based on a script that introduces topics to be discussed with an interviewee. The interview spontaneously reveals the interviewee's way of thinking. Individual interviews show the interviewee's individuality and eliminate group pressure. Individual interviews may be the only way to discuss the research issues with otherwise very difficult to access target groups.

A focus group is a type of group interview that revolves around a single topic. The interviewees, purposely selected, are led by a trained moderator. The group in such interviews is small (6–12) and relatively homogenous. The very specific feature of focus groups is the use of group interaction in order to obtain information and more deeply analyse the topic discussed, which is far more difficult to achieve when there is no interaction between interviewees (Morgan, 1997). It is, however, important to recall that focus groups do not generate quantitative data that can be extrapolated to the whole population.

Appropriate research tools need to be prepared for conducting interviews, whether individual or group ones. In the case of individual in-depth interviews there is a need to draft some interview guidelines, while for group interviews a scenario is usually prepared. Audio recording may facilitate the transcription of individual interviews, while video recording is generally used in group interviews in particular as it helps to identify who said what.

When setting out to collect data, a first step would be to list the institutions or agencies through which potential key experts may be reached. The drug specialists who are to be targeted need to have a relatively good knowledge of retail drug prices. One or more of these specialists should be identified in each of the listed institutions or agencies. Key experts or informants may come from one of the two following groups. Either they are drug demand reduction professionals acting in the field of drug prevention, harm reduction, treatment or rehabilitation – they may be therapists, medical service staff, prevention specialists or outreach workers. Or they are law enforcement agents working in the field of supply reduction and the prevention and reduction of drug-related crime – they may be officers from the police, customs or the military police who specialise in drug issues. Both groups can provide relatively similar information on drug prices. However, the thematic range of the interview might vary slightly. It is always better to interview key experts from both groups. Data on retail drug prices may be collected referring to the present but also to the past (e.g. last 12 months) and to the future (e.g. expected changes).

In general, collecting data on retail prices is best done during an interview that deals at some point with the issue of the illicit drug market. For example, collecting information on the functioning

of the illicit drug market and ways of obtaining drugs by users may be an important background for the key information, which in this case is information about retail prices. It may also be worth touching upon issues related to the availability of different products on the illicit market as complementary information. Some of the topics that might be discussed may refer to changes on the drug scene, user supply venues, access to different products and ways of purchasing them. Moreover, it is sometimes possible to find out a lot of information about the different mechanisms of the illicit market and how it functions. The type of information obtained through interviews may be used as context for the main goal of collecting data on retail prices. For example, it is common to consider retail prices as one of the indicators of substance availability on the illicit market, and in the course of the interview it may be possible to discuss factors that might have recently influenced the fall, rise or stability of retail prices. Purity/potency and its potential relationships with prices may also be discussed during the interview.

As has been said, retail drug prices may be discussed during an interview, and in particular it may be the only way to get information on the typical amounts that are traded on the retail market for example. However, it may also be considered good practice to collect quantitative data on drug prices through the use of a questionnaire that is filled in by the interviewee(s).

It should be possible then to report several or even a dozen retail prices; one may ask for example about the latest 10 or 15 prices observations in a given period. It might be the last month, the last two months or the last year. If the interviews are conducted on different dates it is useful to ask not about the last month but a selected month, so that repeated surveys refer to the same month in the year. Data need to be entered into a database so that quantitative analyses may be carried out and measures of central tendency and indicators of dispersion may be calculated (see pages 94 and 95 for more details). Data can also be collected from different regions. But before data collection, one of the most important issues is to define clearly the unit of weight or volume that prices should refer to. Indeed, there may be a lot of misreporting occurring if this is not done and properly clarified with the key experts before data on retail prices is collected. For example, in Poland a panel of experts was asked to provide retail prices per gram. However, later on the analysts realised that the prices they got referred to the traditional trade unit – 'a bag' in the case of cocaine, which contains between 0.4 and 0.5 grams. It might therefore be very important to collect data in the unit that is usually traded at retail level rather than ask for a conversion into a standard unit, as the latter may lead to reporting errors. Having a clear understanding of retail transaction sizes is therefore key to any research using self-completion questionnaires and should be integrated into the research preparation phase.

Strengths and weaknesses

While conducting an interview and analysing the data one must keep in mind that the quality of the information gathered in that way is highly influenced by the interviewee.

For example in the case of the quality of the product discussed, it may be important to understand the basis of the interviewee's knowledge on purity or potency: from forensic scientists, or from users. In discussing price data it might also be relevant to discuss the origin of the data provided, and any potential bias that may arise. For example, users arrested by the police may be inclined to raise or lower the price of the drugs they bought, for whatever reason, including sentencing ones. These are only examples, but interviews may also be used to discuss any of the potential biases that may affect the information provided.

One of the main advantages of interviewing techniques is that they allow any doubts regarding the reliability of the information provided during the interview itself to be discussed. This is not the case in questionnaire surveys, where collecting additional information on the data provided is just not possible. Group interview participants might discuss each other's information as well as reliability issues. This may be seen as an advantage of group interviews over individual interviews. Group dynamics make it possible to obtain a wider range of data. On the negative side, group dynamics may also push towards an artificial consensus as some of the participants may be too constrained by social pressure to refer to diverging opinions or behaviours. This may particularly happen when the focus is on very stigmatised behaviours. However, focus groups on an issue like drug prices should not be affected by such a drawback, as they would not refer to highly stigmatised behaviours, and because the participants are likely to be experts rather than drug users or drug dealers.

In each focus group there might be representatives of one institution (e.g. policemen) or of different institutions (e.g. a police officer, a therapist, a street worker or a doctor). Whether they are based on a homogeneous or heterogeneous group of participants, both approaches have their advantages and disadvantages. Having meetings of different service representatives in one group interview may allow different views to be obtained, each person displaying a slightly different approach to the topic under discussion, while an homogeneous group consisting of representatives of one service or one institution might allow data on specific aspects of the functioning of the illicit market to be obtained in a more detailed manner. For example, police officers may be able to discuss between themselves issues related to the influence of the

intensification of police activities on the rise or fall in retail prices, which they would not discuss in the presence of experts from harm reduction services or outreach workers.

It is important to remember that the results of qualitative data analyses are influenced by the experience, the subjective approach and the knowledge of the researcher. That is why it is so important to refer to different sources and to be cautious when formulating conclusions.

An example — Project TREND, France

The TREND network of the French Monitoring Centre for Drugs and Drug Addiction (OFDT) — (described in more detail on page 55) uses an approach based on group interviews to obtain information on new trends in illicit drugs markets. In each site of the network, two groups of experts are gathered together on a bi-annual basis: one group includes health experts, the so-called 'health group', while the other includes law enforcement officers, the so-called 'repressive group'. With a view to guaranteeing the quality of the group meetings and the use of the same procedure, the OFDT has written short guidelines based on three publications (Bloor et al., 2001; Sharken Simon, 2000; PNUD/Banque Mondiale/OMS, 1995).

During the meetings, interview guidelines are used. Only the guidelines for the 'repressive' experts group include issues on illicit drugs prices. In particular, experts in the group are asked, substance by substance, about the minimum, the maximum and the mean retail price of illicit drugs. There are also questions on different products' availability and more general ones on the local situation of the illicit drug market. As the TREND network is composed of seven sites, a minimum of 20–25 groups' reports are received per year. Price data collected through these expert groups are used as complements to price data collected in other ways, such as through ethnographic observation and/or user surveys. The supplementary data are collected because the level of retail prices shown by data collected via 'repressive' expert groups are often higher than those obtained through other methods. (The regular reports of the TREND sites can be consulted at http://www.ofdt.fr/ofdtdev/live/donneesloc/trendloc.html; they include the contributions from these focus groups.)

An example — Central Bureau of Investigation survey, Poland

The retail price of illicit drugs is generally considered an important indicator of the availability of a substance on the illegal market. It is also one of the indicators mentioned in the National Programme for Counteracting Drug Addiction 2006–10 in Poland. That is why the Polish national focal point on Drugs started to work on developing a data collection system that would improve

the quality of data in this field and make it possible to apply a unique procedure. The previous methods of collecting data on drug prices made it impossible to fully meet the reporting criteria set by international institutions and, what is more important, did not allow the analysis of trends in the availability of drugs. In 2006, thanks to the active cooperation of the Central Bureau of Investigation of the Police Headquarters, data on drug prices were collected according to a new methodology. The information was collected by means of a simple questionnaire that was completed by all Central Bureau of Investigation branches. There was a maximum limit of 10 prices for each drug, and a minimum of zero.

The data collected concerned retail prices, i.e. prices as practised in the street, not on the wholesale drug market. The information came from operational data, investigations, or police informants. In order to allow for comparability the data were collected within one specific month, i.e. Central Bureau of Investigation branches were asked to provide the 10 first mentions of retail prices for each drug that came to their knowledge within that specific month. Regional branches of the Central Bureau of Investigation sent the questionnaires to the Police Headquarters, which in turn reported them to the national focal point. The data were then entered into a database. In the course of consultations, prices that were simply not credible, whether too high or too low, were eliminated. The analysis also excluded the six observations of prices of white heroin, which were all lower than the price of brown heroin and therefore judged unreliable. The above situation may be indicative of the low prevalence of white heroin on the Polish market, which is still dominated by 'kompot' (home-made poppy product) and 'brown sugar'. For the first time the modal price was calculated. It must be stressed that the exclusion of unlikely maximum and minimum prices from the database did not influence the modal and average values, which for most of the drugs remained the same.

Other methods

Other techniques are also used by law enforcement agencies, epidemiologists and social scientists that may prove useful in obtaining information on retail drug prices. They cannot, however, be put on an equal footing to those methods described above, since they may not provide routine and systematic data on retail drug prices.

Eavesdropping

Eavesdropping is the term used to describe the action of listening secretly to the private conversation of others. Eavesdropping can be done over telephones lines (known as telephone

intercepts or wiretaps), e-mail, instant messaging and any other method of communication considered private.

Telephone intercepts and other forms of eavesdropping are strictly controlled by laws and administrative directives and in most cases require interception warrants. The interception of drug traffickers' telephone conversations provides law enforcement agencies with a wealth of information on all facets of illegal drug markets, including retail and wholesale drug prices. The fact that this information, or indeed any information, was acquired through telephone intercepts is rarely, if ever, publicly acknowledged by governments or law enforcement agencies. Having said that, there are occasions when information gleaned from telephone intercepts finds its way into the public domain. By way of example, British law enforcement agency drug intelligence bulletins have for many years listed wholesale drug prices, some of which were obtained through telephone intercepts.

Given the legal restrictions on eavesdropping in terms of authorisation and subsequent public disclosure of the information obtained, we recommend that this tactic is used only to supplement price data drawn from other sources. Moreover, because the tactic is used to obtain intelligence on criminals involved in serious crime, including drug trafficking at the wholesale level, it has only limited value in terms of generating retail price data.

Documentation seized by law enforcement agencies

Since investigating officers often find arrestees in possession of documents detailing their drug sales and purchases, they are sometimes in a position to challenge price information obtained during interrogation by means of cross-referencing. Such documentation, sometimes in the form of a list of debtors, often provides the prosecuting authorities with evidence to support their allegations that the author is trafficking in drugs and not just using, or that s/he is a wholesaler, rather than a retailer, of drugs. Such documentation is sometimes adduced in evidence as part of asset confiscation or forfeiture hearings, but it is unlikely that prosecution files and crime reports are systematically updated with subsequent information that might contradict price information obtained at an earlier stage of the investigation.

Occasionally, law enforcement agencies will arrest traffickers in possession of detailed ledgers, diaries or other documents that record multiple drug transactions, but the authors usually go to some lengths to disguise the product, weight and sometimes even the cost, using abstruse or esoteric words or terms. For example, the following entry: *Butch 1/2 Whiz = 7* might well describe a transaction involving the sale of half a gram of amphetamine (Billy Whiz is a name for

speed) to a person named Butch (in all likelihood, a nickname or alias) for EUR 7. Or: 10 stones = 200 might refer to the sale of ten 'rocks' of crack cocaine for EUR 200. Obviously, deciphering transactions disguised in this way requires some expertise and investigating officers will almost certainly be obliged to persuade a prosecutor or a court that s/he has the requisite knowledge and experience to decipher such records before they agree that the officer's findings form part of the prosecution case.

While documentation of this type often provides law enforcement agencies with valuable information on drug prices, which can be utilised to bolster the prosecution case that the offender is a drugs trafficker or assist the court in confiscation or forfeiture hearings, as a source of routine drug price data it has limited value. First, deciphering the transactions requires a good deal of time and effort. Second, many of the words and terms used will be open to interpretation – e.g. the word 'blow' could refer to cannabis or cocaine. Third, the information is often limited to a handful of transactions, and such documents are very rarely seized. Fourth, the contextual information (e.g. buyer–seller relationship, date and location of the transaction), is nearly always missing. In summary, price data gleaned from documentation is best seen as an adjunct to the other methods described in these guidelines.

General population surveys

It is possible to use general population (or school) surveys as a source of data on the price paid by drug users. The aim of such surveys is generally to obtain comparable and reliable information on:

- the extent and pattern of consumption of different drugs in the population;
- the characteristics and behaviours of users; and
- the attitudes of different population groups towards drug use.

The information gained is then used to assess the situation, identify priorities and plan responses. National population surveys have been conducted in the EU Member States in recent years. Some countries have carried out population surveys focusing on drug issues, sometimes repeated over time to analyse trends; while other have integrated questions on drug issues in more general health surveys, which may also be repeated over time. In both cases, however, although it is theoretically possible to include some questions on the price paid by drug users for their product – either the usual price or the price paid at their last purchase – this is rarely done in practice.

Population surveys usually include a set of questions, also called a questionnaire, which respondents are requested to answer either by themselves via a pen-and-paper procedure or via the use of a computer, or orally by responding to an interviewer in a face-to-face or telephone interview.

Compared to the other methods described above, the main strength of population surveys is that they can address a large and representative sample of the general (or school) population. However, there are a number of weaknesses that make population surveys of quite limited use for obtaining routine and systematic data on retail prices.

First of all, population surveys are costly and there is generally only a limited number of questions that can be included. In terms of drug issues, questions on drug use prevalence and attitudes towards drug use are usually prioritised over issues related to drug availability and prices.

Second, population surveys are usually not carried out on an annual basis, and on average are repeated every three or four years. This means that data provided would have to stand as reference for quite a long time. This may not be an issue for products with a stable price, but might give a wrong or outdated overview of other drug prices, and would conceal annual changes in retail drug prices.

Third, questions on drug prices should only be addressed to those who have experienced a drug transaction recently. We can take as a proxy recent drug users, i.e. those reporting drug use in the last year, even if some of them may not have purchased the product they used. This points to the limitation of population surveys to capture uses that are not that prevalent in the general population. Indeed, although they may be able to obtain a reasonable sample of recent cannabis users, population surveys may not prove to be a good instrument for capturing a sufficient and representative sample of recent users of drugs such as heroin or cocaine. In other words, questions on price may only be relevant for drugs with a high number of last-year users.

Lastly, data on prices paid by users obtained through population surveys may also be rather limited in terms of the amount of contextual information collected. Indeed, the formulation of the questions may not allow information on the quantity bought to be obtained. This may prevent data on prices per unit of weight being produced, and will therefore limit comparisons with data from other data collection systems. In population surveys, the place and date of the transaction cannot usually be obtained either, meaning that the data on price cannot be qualified in terms of geographical distribution or variation over time.

Ethnographic observation

Ethnographic methods may also be used to collect data on retail prices. As a general rule, ethnographic observations attempt to understand the subjective meanings and social contexts of people's behaviour. In respect of drug use, or drug dealing, these observations allow the researcher to gain 'first-hand' experience of drug user (or dealer) behaviours and of the contexts in which these behaviours take place (Alvarez et al., 2003). In other words, Who uses? Who sells? Which drugs? How? In which context? are the main questions ethnographic research try to answer. The objectives of such ethnographic observations are usually very broad and therefore allow a wide range of issues to be covered.

Ethnographic observation may allow some information on the price of drugs in the illicit market to be gathered, but also will give a better understanding of the economic burden borne by drug users, the practices surrounding exchanges between buyers and sellers, and the strategies used by dealers.

There are different kinds of ethnographic observation methods: participant observation, direct observation and indirect observation. Participant observation is a period of intensive social interaction between the researcher and the subjects, which takes place in the subject's environment (Alvarez et al., 2003). As the observer has to consider everything as if it has happened for the first time, anything can be subject to inquiry. In practice, a participant observer tries to see the world from the subjects' point of view in order to understand their behaviour. As they are not regular participants of the environment, the observers must have a special training in observation techniques and sufficient knowledge of the drug phenomenon to be able to really understand what they are observing or what they are being told. Ethnographic observers must therefore be experienced in the field of illicit drugs.

Direct observation is either an open or an 'undercover' operation, and tends to be more focused than participant observation (Alvarez et al., 2003). It is a systematic and easy way of collecting data in order to understand drug-use and/or drug-dealing behaviours and the context in which such behaviours take place.

Indirect observation relies on the delegation of observation to some members of the population studied. These have to report both their observations and their experience to the ethnographic observer who then summarises them.

Although it is difficult to standardise the methods used in ethnographic observation, it is essential for example to define correctly the target user group (young males, drug dealers, syringes exchange participants, etc.), and specify the location of the observations (techno scene, urban areas, workplace, etc.). The clearer the environmental information dealing with the group is observed, the higher the quality of the data analysis is later on.

Ethnographic observation may be a good way to obtain price data on several illicit drugs and on different geographical locations, and if observations are repeated, it may highlight time trends. However, covering a large geographical area (e.g. a national territory) and repeating observations over time may prove to be very expensive (in particular in participant observation). Indeed, such methods are usually implemented on an ad hoc basis or as a one-off exercise to get in-depth information and answer questions related to how and why rather than provide routine systematic information on levels and trends. All in all, ethnographic observation methods are difficult to replicate. Indirect observation may provide rapid assessments of price trends and other information relevant for characterising the availability and the potential diffusion of different substances. It may provide, for example, additional information on the perception of users of the quality of the products bought. It is important to recall, however, that these types of methods are highly dependent upon the quality of the observation itself (or upon the reliability of users or dealers in the case of indirect observation), since this determines the quality of the data collected. All in all, ethnographic observation should be seen as an interesting way of getting retail price data, and may be particularly useful in obtaining qualitative information about several market factors that may have an influence on the price paid. However, it is rarely implemented on a routine basis, mainly due to its cost.

Ethnographic observation is being used, for example, by the TREND network of the French Observatory on Drugs and Drug Addictions, covering in 2008 seven cities across the metropolitan national territory, to obtain retail price data along with other information on drug use and drug markets. Ethnographic observations are carried out in urban areas and the techno music scene by regular surveyors. These surveyors are illicit drug users, so they are well informed about the issues relevant to the research. Each ethnographic observer usually works with three or four users going to different locations of interest. At least one surveyor has to be a female. Users working for the network can be paid, but this is decided by the local coordinator. The anonymity of users is guaranteed. A key condition for the quality of the observations reported by the surveyors is that surveyors must not know each other. This restrictive protocol is seen

as a guarantee of the quality of the observations collected, and also means that a short-lived phenomenon can more easily be assessed.

Here are some comments on the retail prices of cocaine collected during this project:

> *Currently, cocaine is sold at about 400 francs the retail gram. In two years the price was divided by two. The origin of the cocaine sold in Marseille is not clearly known. At present there is a problem resulting from cocaine availability: multiple injections ...*
>
> (1999, Marseille)

> *A wide range of prices is reported, depending on the substance, the quality and the quantity bargained for. Users have mentioned a lower price: 100 francs per gram for a standard quality from Spain. 'A yellow coke less than 200 francs'; 'a good coke for 250/300 francs on average, 400 francs maximum'. Cocaine, from Spain, brown, cut with amphetamines was reported in Toulouse in 2001. It is likely that cocaine coming from Spain is often cut with amphetamines.*
>
> (2001, Toulouse)

> *Cocaine from EUR 40 to 60 per gram. The price is independent of the quality. At wholesale level, EUR 350 for 10 grams.*
>
> (2004, Lille)

> *Among users frequenting needle exchange programmes, at retail level, cocaine is sold between EUR 50 and 80 per gram. The price can increase sometimes up to EUR 90.*
>
> (2004, Paris)

Results of these ethnographic observations – based on both the reports done by ethnographic observers and on all the verbatim collected – showed for example that the median price of cocaine decreased from EUR 90 in 1999 to EUR 60 in 2001 and has remained stable since then (up to 2005). This trend confirms the trends in cocaine prices observed in France via the use of other data collection methods, namely user surveys and law enforcement intelligence.

CHAPTER FOUR

Chapter 4

General data management, reporting and analysis issues

This chapter deals with more practical issues of data recording and data reporting. It addresses what should be recorded and how, and provides some guidance in terms of data management and analysis.

Study protocol

Planning is the most important stage in ensuring good quality data, and occurs well before a single data point has been collected. At a theoretical level, the questions to be addressed, the information necessary to answer these questions and how to operationalise the collection of this information are decided. The data collection method, the desired output from the study and, if possible, the expected analysis should be specified. Careful thought should also be given at this stage to what format the data will take, how it will be stored, and what computing tools will be used for manipulation.

The study protocol should define carefully and unambiguously the items to be collected. This is of particular importance where the data is to be collected from non-standard sources or a range of different sources. For example, clear definitions of the variables are needed if they are to be drawn from arresting records, interrogation records, or any other law enforcement agency intelligence documents (see page 75 for examples) where a level of interpretation will be needed on the part of the data collector. Consideration of the discussion above relating to the definition of retail drug prices indicates how difficult deciding on a definition can be. Careful training and instruction may also be necessary to ensure those collecting the data understand the definitions.

Products

A large variety of illicit drug products exist in the retail markets of Europe, with different names and brand names depending on factors such as chemical structure, origin, quality, and marketing strategies. The particular drugs available, used and trafficked in the local market, will determine which types and sub-types are recorded. However, for cross-comparability reasons, it is recommended that the substances for which retail prices are recorded, are at least classified under the following headings:

- cannabis resin;

- herbal cannabis (type unspecified):
  – sinsemilla;
  – other herbal cannabis (European/non-European seeded herbal cannabis);
- heroin (type unspecified):
  – brown heroin;
  – white heroin;
- opium;
- cocaine;
- crack;
- amphetamine;
- methamphetamine;
- ecstasy-type substances;
- LSD.

Although there are broad categories covering all types of herbal cannabis or all types of heroin, it is highly recommended that one distinguishes, as far as possible, between different types of herbal cannabis and between brown and white heroin. The broad, unspecified categories should only be reported as a last resort when no distinction is available between prices of sinsemilla and other herbal cannabis (including both European and non-European seeded herbal cannabis), or between brown and white heroin.

Given the increasing number of growing sites involved in the domestic cultivation of cannabis in Europe, it would be useful, where possible, to distinguish between herbal cannabis produced domestically and that which is imported.

For heroin, although the distinction between white and brown is widely accepted, subtle differences in colour (e.g. 'off-white', 'beige', 'grey') may confuse the picture.

As mentioned above, being able to classify all records under the suggested headings should not stop any country from using a more detailed classification where national or local interest support such an approach.

Selecting transactions from the retail market

All the cases recorded should, in principle, come from observations (or estimations) from retail drug markets, as defined at the data collection stage. However, where this is not the case, there may be a need at the analytical stage to define a threshold quantity, observations equal to or less

than the quantity price being considered retail purchases and therefore retained in the analysis. Such a threshold will differ depending on the product.

Defining such thresholds is a very arbitrary exercise as drug distribution structures and levels are not fixed. They may vary greatly over time but also depend on the product, the criminals involved, the country, and many other factors. The size of the transaction may be the only indicator available. Particular caution is required when defining the purpose of a purchase based on size or cost alone. For example, some consumers may buy large quantities for their personal use while end-selling dealers may buy smaller quantities that they would then divide further, for example in one-dose bags, to sell to end-users.

Arkes et al. (2004), in their analysis of the STRIDE data in the USA, defined different classes based both on reasonably round transaction amounts that were relevant in the data they had, and on the need to retain from their sample a large number of observations in each class (end-users, low-level sellers, mid-level sellers). They suggested the following cut-off points for retail level transactions: less than or equal to 2 grams for cocaine, less than or equal to 1 gram for crack and heroin, and less than or equal to 10 grams for methamphetamine and herbal cannabis.

For this exercise, for which we may only have information on the size of transactions, we suggest to consider the examples of cut-off points outlined in Table 6. They point to the maximum quantity (unadjusted for purity) threshold under which transactions would be considered as retail.

Table 6: Examples of cut-off points for retail transactions (in weight)

	Cannabis resin	Herbal cannabis	Heroin	Cocaine	Crack	Amphe-tamine	Metham-pheta-mine	Ecstasy	LSD
UK (police)	3.5 g	3.5 g	1 g	1 g		1 g		5 tablets	1 unit
France (police)	3 g	3 g	1 g	1 g		1 g		5 tablets	1 unit
Poland (NGOs)	Experts contacted agree that 12 g would be too high, but do not suggest other weight limit		1 g	1 g		1 g		5 tablets	1 unit
USA (Arkes et al., 2004, STRIDE data)		10 g	1 g	2 g	1 g		10 g		

These data are based on the reactions that experts participating in this project got from testing a list of cut-off points in their home countries: these were set at 12 g for cannabis, 1 g for heroin, cocaine and amphetamine; 5 tablets for ecstasy and analogues, and 1 unit for LSD. They all agreed on the cut-off points suggested, except for cannabis products.

The above-mentioned thresholds are indicative rather than definitive standards. They are based on the comments from drug law enforcement agents in France, Poland and the UK regarding the maximum quantity involved in transactions that can be considered retail. They are not based on an analysis of empirical data on retail drug transactions, nor do they necessarily reflect prosecution policy practices; and therefore they should be treated with great caution.

Such cut-off points may vary between countries, and in particular may be set at a higher amount where the supply of specific drugs is larger and retail prices are lower. It is recommended that each country defines the cut-off points for retail transactions that are most appropriate to its market, based on an assessment of the average size of retail transactions for each substance.

Dealing with non-standardised units

As suggested earlier, transactions may often be carried out in units or measures that are not standardised, in terms of both the amount of money paid and the quantity of substance bought, and conversion may be necessary. Whenever this occurs, it is always recommended that both the original measure in which the transaction was made and the standardised measure into which it was converted after applying a conversion rule are recorded. Conversion rules need to be clearly specified and applied in a systematic way across different data collection points and over time.

A further difficulty is that the quantity that is offered for sale (e.g. a 1 gram bag) is often different from the real quantity revealed by subsequent analysis. It is important to record both the quantity said to be sold and the true quantity, based upon subsequent analysis. For instance, both the price paid for a rock of crack or for an 1/8 oz of cannabis herb and the actual weight of the rock or of the 1/8 oz bag should be recorded if possible.

Although data should be initially recorded in the unit in which the transaction was made, there is a need at the analytical stage to standardise the different measures to allow comparisons across time and location. There is common agreement in Europe, and beyond, that retail prices data for cannabis products, heroin, cocaine, amphetamine and methamphetamine should be presented per gram, while retail prices of ecstasy-type substances and LSD are provided per unit (tablet, capsule, blot). Retail prices for crack are rarely collected in a routine way. Practices vary across

countries, with a few European countries providing prices per gram and a few others providing prices per rock. For comparison, it is highly recommended that retail prices for crack are reported per gram, since the size of a rock may vary substantially.

Data cleaning and construction of the data matrix

In this section we consider how the data should be cleaned and validated. This process takes place behind the scenes and commonly goes unreported; however, careful consideration of the accuracy and consistency of the data collected is essential prior to any analysis.

A variety of ways in which to gather data on retail drug prices have been described, including interviews with experts and drug traffickers, the analysis of documents, overt and covert test purchases and the use of surveys. Given the variety of methods and the range of types of data collected, the suggestions here remain general, and should be supplemented by careful consideration of the specific characteristics of the collection method adopted and by reference to the literature related to that method.

The focus here will be on quantitative methods, though some comments will be helpful in the management of qualitative data.

Construction of the data matrix

Once the variables to be collected are defined, consideration should be given to the nature of the likely responses and how they will be recorded in a data matrix. For quantitative analysis, commonly the data is transformed into a data matrix, rows representing observations and columns representing variables, with each intersection of row and column containing a data point. Ideally this data point should be a valid, in that it measures what it purports to, and reliable in that the measurement process generates consistent results, repeated measurement of the same or similar cases providing similar results. The data matrix is amenable to analysis using standard statistical or spreadsheet software. Once the matrix is formed, the data can be checked for inconsistencies within individual variables or for logical inconsistencies across variables.

The data in the data matrix will come from one of the many methods of data collection. It is crucial to maintain a link between the original data source and an observation or row in the data matrix. A method of allocating a unique identifier to each data source/matrix row combination is necessary. This identifier must appear on the original data source and as a variable in the data matrix.

Missing values should be considered prior to the collection of data. A large number of missing values suggest problems with generalising results. The characteristics of those observations with information may not be the same as those without information. It is useful to provide as much information on missing values as possible. Pre-definition of a set of causes for missing data is useful in some instances. For example, when entering data it would be useful to distinguish a) missing data in terms of no information on the data collection sheet from b) the question is not applicable to the person responding, and c) the respondent refused to answer. These values could be pre-coded and the codes applied to all variables:

99 – Missing

98 – Not applicable

97 – Refused to answer

The distinction between closed and open questions is useful in establishing the form of the likely responses. A closed question is one where the possible responses are limited and a set of options can be provided. For example, the variable gender will commonly have male or female as the set of possible responses. Closed questions are coded prior to any data collection. The researcher will decide how the set of responses are to be recorded, commonly replacing categories with numbers, e.g. male = 0 and female = 1. An open question is one where the respondent or data source is not limited in the information they provide. For example, in an interview a purchaser may be asked to describe where they purchase drugs and the response recorded verbatim. Open questions may be reported without coding, providing a qualitative response. Equally they may be coded after collection, a representative number of actual responses being used by the researcher to establish a set of categories in which all responses are placed, and which are then recorded in the data matrix.

Coding of questions provides a structure to the responses recorded in the data matrix. The coding of closed questions before the data is collected makes the data collection easier and can help avoid errors in the data entry process. However, it is important to realise that by pre-coding the possible responses recorded are limited, and information may be lost. Equally, coding is an example of how the researcher constructs data, and is a possible source of bias.

Consider an example of a closed question. It is decided in advance to differentiate between purchases made within a city and outside of the city. Purchase is defined or operationalised as the exchange of money. A question may be posed on the data collection form as follows: *Was money for the drug exchanged within the city?*

The data collection form would include codes for the response. This may be pre-printed boxes for Yes and No, or instructions on the form may specify that purchases made within the city be entered as a 1 and outside as a 0. (Note that some possible complications relating to this question are definitions of the city, if part or all of the money was paid at one point and in one location, and if goods and services were offered instead of money.)

The same information could have been collected as an open question. A decision is taken to try to gain as much information on the location of purchase as possible, without pre-defining the answers. An open question might have been asked in an interview as follows: *Where was the money for the drug exchanged*? The information is recorded verbatim. The respondent is free to provide as much or as little information as they wish, including whether the purchase was made in the city or not. The researcher may report the entire response. Alternatively, the researcher might analyse the responses and code the location of purchase according to the answers provided.

The question could be made even broader. For example in an interview situation the question might be as follows: *Describe the last time you bought drugs*. The interviewer would be instructed to probe for important factors in subsequent questions, such as type of drug, quantity, location and the nature of the payment – in kind, in total, or on credit. The results would be recorded verbatim, and the response interpreted and coded by the interviewer at a later date.

A middle ground is a combination of a closed and an open question, the set of pre-defined answers being augmented with the option 'Other', and a second question that is answered only if 'Other' is selected. Where the desired response is not in the list of options, the respondent selects the 'Other' category and elaborates in the second question.

Let us consider briefly how three variables of central interest – drug purchased, price and quantity – could be coded and recorded in the data matrix.

The information on drug purchased could be recorded in a text field in which the drug name is typed. The misspelling of entries and the use of non-standard slang or jargon would hamper the aggregation and comparison of the data. Statistical software would interpret the entries 'cociane' and 'cocaine' as two different categories, unless instructed that they were the same. Similarly 'speed' and 'amphetamines' would be interpreted as two different categories.

For example, generating a frequency count on the following misspelt text entries would not provide useful results.

Matrix entry	Frequency count	
Drug (text field)	Drug	Frequency
Cocaine	Cocaine	1
Cociane	Cociane	1
Hash	Hash	1
Hashish	Hashish	1
Resin	Resin	1

Alternatively, if drugs were pre-coded the data may be held in a numeric field, containing the numbers 1, 2, etc., each number linked to a drug through entries in a data dictionary. It is common in statistical and database packages to store entries as numbers, and link the numbers to a set of labels for output. The benefits are that entries take less space to store, that sorting can be completed faster with numbers than words, and there are no issues of misspelt entries being treated differently by the computer package. The cost is that labels have to be applied before the entries are understandable.

For example, the same data which appears above could have entered the data matrix as follows, in which case the frequency count would be valid.

Dictionary		Matrix entry	Frequency count	
Drug	Codes	Drug (Coded)	Drug	Frequency
Cocaine	1	1	Cocaine	2
Hashish	2	1	Hashish	3
		2		
		2		
		2		

Price and quantity should be considered together, as one without the other provides very little useful information. One solution for recording would be to enter the reported price paid and the reported quantity. The problem here is that where a range of sources have been used, the quantities reported may differ. For example, 10 grams, a half an ounce, a EUR 20 bag may all be reported quantities. To be comparable, a common quantity metric has to be found and the different values converted. Following the guidelines above, both the original unit and the converted values should be recorded in the data matrix.

As a general rule, if the original data can be recorded, any conversions can be made when necessary and checked. To make conversions and grouping easier, rather than using a single text field, split the quantity field into two parts, one for the amount and the second for the unit.

Price (EUR)	Quantity	Unit
20	1	bag
50	10	grams
70	0.5	ounces

For example, converting to grams:

Price (EUR)	Quantity	Unit	Conversion rate to gms	Converted quantity	Price per gram
20	1	bag	2	2	10
50	10	grams	1	10	5.00
70	0.5	ounces	28.35	14.175	4.94

As with any conversion, keep the original or most atomic data. For example, given a price per gram it is possible to allocate a price range to an observation. However, if we discard price per gram and kept only the ranges we could not reverse the process and construct the actual prices per gram for that observation.

Validation procedures

Care is needed when moving data from paper sources, such as questionnaires or interview transcripts, into a matrix in a computer file. Manual checks may be necessary to ensure the information is being correctly transferred to an electronic format. The first step is to review the rules for allocating a unique identifier to link a paper file to a computer record. Computer software can be employed to check for anomalies once the information collected is converted into a data matrix. It is important to maintain a record of how the data matrix has been constructed.

A data dictionary documents the structure of the computer file, listing the name and descriptions of each of the variables along with the labelling or coding scheme. Most statistical packages have the facility to print out this information once the data has been entered. The data dictionary is essential for anyone wishing to analyse the data.

A data diary, documenting the results of any quality assurance checks, along with details of any data conversions and generally any measures implemented to resolve problems in the data matrix, should be maintained. If different data sources are integrated, it is important to document how this was undertaken. The logs available in statistical software and the queries established in database software can be used as part of this diary. This meta-information data will be invaluable if unexpected problems occur later in the process and as a service to anyone who uses the data.

Validating entries in the data matrix can be done either as the data is entered, or once the data matrix is constructed. Most computer packages will accept constraints on what can be entered into a field, thus identifying error values early in the process. Alternatively, once in data matrix form, it is relatively easy to check for missing, duplicate, unusual and out-of-range values. For example, a constraint could be set to prevent duplicate values being entered into the field holding the link between the paper file and the computer record. Alternatively, once the information is entered into a data file most packages have the facility to search for duplicates.

For categorical variables, frequency distributions can be used to identify missing and out-of-range values. Contingency tables or cross-tabulations can be used to identify inconsistencies between related variables. For example, a cross-tabulation of drug and unit of collection might be used as a logical check to ensure that quantities reported match the type of the drug.

For continuous variables, such as price per gram, histograms or box plots are convenient methods of obtaining a summary of the information in a variable and identifying the presence of outliers.

Data quality assurance should be carried out by a professional analyst with subject matter expertise and IT skills who can fully understand the implicit rules of the data.

Cleaning drug price data

When cleaning drug price data, consider the following:

Manual checking of questionnaires, documents, records or transcriptions:

- Review and check inclusion criteria.
- Check missing data.
- Check data coding.

Database checking:

- Out-of-range values (data values that lie outside of the acceptable range).
- Missing values (omitted data).
- Errors (incorrect data values).
- Inliers (data value that lies within the acceptable range of values but is still an error).
- Outliers (data value that lies in the tail of the distribution of a set of data values).
- Duplications (the same record has been entered more than once).
- Inconsistencies (data values in different variables are contradictory).

Transformations checking:

- Check the data results after data recodes, conversion, weighting or other calculations.

Integrating different data sources

When integrating different data sources, consider the following:

- Check the database schemas (the structure of the different database and the ID of the records should match).
- Check for redundancy in the database (needless existence of attributes).
- Check for duplications (the same record has been loaded more than once, intersection of DB).
- Check for inconsistencies (data values in different attributes that are in contradiction).

Standard descriptive measures

Various descriptive statistics may be used to summarise price data, providing indications about the average, or central tendency, of the data set, and about the shape of the distribution of the prices in the sample. Care must be taken in selecting which summary measure to use as each of them has strengths and weaknesses, and provides different information.

Information on the number of observations used to construct a summary measure is essential. The number of observations on which published aggregated data on drug prices are based is rarely reported, perhaps due to the fact that in several cases such aggregated data are based on estimated prices by key experts (e.g. police) rather than on calculations derived from a number of observations. However, when disseminating final analyses on drug prices in a country, whether at regional or national level, it is crucial to always provide information on the total number of observations (or estimates) on which the results are based. Without this information it is impossible to judge, even informally, the scope of the data collection and whether there is any justification for extrapolating from the results to the nation as a whole.

The most common measures of central tendency of a data set (here a number of price observations) are the mean, the median and the mode. Descriptions of these measures and details of their calculation are available in Annex 4.

In general, price data is likely to vary widely, with extreme values, low or high. Of the common measures of central tendency, the mean is the most susceptible to the effect of extreme values or outliers. The median, or middle value, is not influenced by extreme values, and neither is the mode, which is simply the most frequently observed price. It is recommended that both the mode and the median are reported for retail drug prices.

Some monitoring systems may only provide the 'typical' price as a central tendency measure. Commonly, the typical price is a price that is perceived as typical by the respondent; it is an estimate, and is usually based on individual knowledge of the markets and even experience in general, rather than on a number of specific observations. It may be constructed on the basis of the most frequently observed price (the mode), but not necessarily. Where a 'typical' price is reported it is important to provide information on how this value was reached.

Although reported by some countries as a central measure, the value of the midpoint between the minimum and maximum price values is not useful and should be avoided, as it does not bring any new information (it is calculated as the sum of the minimum and maximum values divided by two).

Dispersion measures also allow characterisation of the distribution. Common measures of dispersion include the variance, the range, and quartiles. For measures of dispersion, again given the nature of the data, the minimum and maximum, along with measures of the lower (first) and upper (third) quartile would be useful. Descriptions and details of the calculation of these measures are provided in Annex 4.

Reporting – from local to national

In the sections above, there was no specific mention of whether the analysis of the data, including the construction of the sample and data checking, should be performed at local or national level. In fact, it can be at either level, and this will depend mainly on the strategy of data collection and analysis that has been adopted in each country.

If a coordinated national strategy of data collection on retail drug prices is preferred, then all instruments to collect the data (e.g. protocol) and analyse them should be developed centrally at national level. This avoids duplication of competences and resources, ensures that the same tools are used and a uniform methodological approach is implemented throughout data collection and analysis. In that case, data collected at local level should be reported to a central national unit, which then carries out the analysis for all local data collection sites. The central unit should define a format through which the reporting of raw data by the local data collection sites is going to take place. It may be a database or an Excel sheet, depending on the number of records to be reported. This local reporting to the central unit may take place once a year, or at repeated time intervals during the year, or even continuously each time a new record is registered. Local data, before being reported to the central unit, need to be anonymised so that the legislation on data protection is respected. It is up to the central analysis unit to define the type and number of variables to be reported for each record (observation), but it may be rather limited (e.g. five or six variables). These variables may include, for example: price, quantity, product, packaging, place of transaction, date of transaction, method of data collection, type of retail market, etc.

Conversely, it may happen that in some countries, raw data are being kept at local level and that part of the analysis is carried out at that level. This may be the result of a non-harmonised data collection system with various data collection strategies being implemented at local level and

being left to the local initiative. It may also be that a uniform data collection strategy is applied throughout all local sites but that these sites are reluctant to provide raw data to a central unit. Whatever the reason, in that case, only aggregated data are reported to the central unit. It therefore becomes important, at a central level, to promote a unique methodological approach for analysis and reporting, so that all local sites come up with the same standard measures (e.g. median, mode), calculated in the same way. The central unit needs in particular to develop a reporting tool (either electronic or on paper) through which local sites can report the results of their data collection and analysis for each substance over a specific period of time. The forms should request, for each product, a minimum of information including the number of records analysed (sample size), measures of central tendency (e.g. median, mode), measures of dispersion (e.g. minimum, maximum), information on the sampling strategy, the method of data collection, and a characterisation of the retail markets targeted (likely biases).

Analysis at national level

A plan for analysis and outputs should be designed fairly early in the setting up of data collection, as this may have an impact on data collection strategies. For example, if comparative tables with retail prices at local level are to be prepared, there is a need to ensure that sufficient cases are recorded for each local unit to be adequately represented. Similarly, data entry formats may be conditioned by subsequent analysis.

An important issue to consider is the geographic distribution of the sample and how representative it is of the retail market transactions in that country. The problem becomes more pronounced once larger countries and complex systems of municipalities, districts and provinces are concerned. Should information obtained from a small village of a few dozen people count as much as information from a metropolitan area of a few million people? Should information from some remote rural areas – where drug use is often significantly lower – weigh as much as information from urban areas, where drug use and trafficking are concentrated? Should the information from a small province count as much as the information from a highly populated province?

As most of the data collection methods discussed above would not ensure a statistically representative sample of the retail market transactions in the country, adjustments at national level may be necessary to correct the sample. Although this may be quite straightforward when applied to samples of the general population, such a technique is fraught with difficulties when applied to drug markets that are illicit and therefore hidden, and for which characteristics are not

well described. We may think, for example, of applying some weighting factors to correct for the geographic distribution of the cases recorded. Ideally, the weighting should reflect the distribution of drug transactions in a country. But the issue here is about the choice of the index to be used in this weighting perspective; indeed, we would need to know the geographic distribution of retail drug transactions on the territory in order to be able to correct for any bias in the sample selection regarding this issue. As a proxy, one could use the distribution of drug use in a country. However, estimating the prevalence (total number of drug users) of drug use for a given drug, because of its hidden nature, is already a difficult exercise as it requires data that are often not available. Therefore, being able to map out drug users geographically appears even more problematic. Correcting the sample obtained for any distortion in its geographic distribution seems then very difficult, if not impossible, given our current state of knowledge of the drug markets in many European countries ([1]). Alternatively, if a decision has been taken to treat all information equally, the sampling design could be adjusted so that more price information is collected from potential dealing or trafficking hot spots.

Another question relates to the methods of dealing with missing data. It could be highly misleading if national prices only increase or fall because information from one province is missing or information from another province is being added. These issues have to be addressed at an early stage in the development of a national price monitoring system. In order to avoid such artificial statistical effects, there may be a need to establish clear rules for dealing with missing data (e.g. use of last quarter's data as a proxy if new price data are not yet available).

A further issue relates to drug purity (or potency). Some may argue that the purity (or potency) of the drug products bought at retail level may vary greatly between retail outlets and that we may want to account for such variation. But in the absence of a monitoring system that records both the price of the product and its purity (or potency), current data on purity and potency are in most countries either not collected systematically or do not relate to the retail level of the drug markets. In general, price data at national level are not corrected for purity (or potency) as this is assumed to be quite uniform across the country – which is not necessarily the case. Thus, if systems exist in a country to determine the purity or potency of drugs, efforts should be made to link such data sets to price information.

([1]) Although less satisfactory, the use of arrest data could be also considered; and if none of these breakdowns (drug use, drug arrests) is available, the population breakdown may be still a potential solution.

Cross-validating the results obtained through different data collection methods and different sources should be carried out whenever possible. Indeed, it may allow data collection to be rationalised, i.e. knowing potential biases one could choose the most efficient method.

Feedback to data providers

Feedback to data providers working in the field is crucial for both the survival and the improvement of each monitoring system, whether on retail drug prices or on any other matter, as this is fundamental in motivating those working on the ground without whom there would be very limited data collection.

Data providers may receive regular feedback on the progress of data collection within the country during the year. They may be asked to provide comments on an early draft of the analysis, so that operational and qualitative insights may be integrated into the final analysis before publication. They may all be invited to an annual meeting in which final results may be presented and trends discussed. This meeting may also be the right forum to review methodological issues and agree on future improvements in the monitoring system.

Besides national results, data providers may also receive some feedback about the use of their data sets in the international arena, and in particular be informed about the international organisations to which national data have been provided. They may be interested in international analyses in order to see how their country compares with others. In this respect, access to published international comparative tables on drug prices may be advertised; the EMCDDA comparative tables on retail drug prices may be accessed in its Statistical bulletin on its website (http://www.emcdda.europa.eu/stats09), and the UNODC makes its series on wholesale and retail prices available in the statistical annex of its World Drug Report annual publication (http://www.unodc.org/unodc/en/data-and-analysis/WDR.html).

Publication

Publication of the data that has been collected and analysed – in an aggregate form – is crucial. It is often the only way that data on drug prices are made accessible for use in policy evaluation and for research purposes. Drug price analyses may also be used in court. Publication allows also information from different data providers to be shared and may prove to be essential in enhancing comparative analysis at both national and regional level.

Results may have to be presented in different ways depending on the audience and the purpose of each presentation. However, whatever the variations in their presentation and in the level of details reached, it is important to ensure that there is always a way to access information on the methodology used to collect and analyse such data, as well as indication of the individual sources for different data sets, so that parts of the audience who are interested in these issues may access more detailed and technical information.

The issue of the confidentiality of the data should be addressed within the national legislation on data protection. As a rule, monitoring systems should only record individual anonymised data, and published data should only be presented in an aggregated form. Nevertheless, some data providers may still be reluctant to make their data public. They may argue they want to protect their sources, or may be afraid that their data indicate issues with law enforcement practices. It is also sometimes argued that price information should not be published, in order that it can not be misused by criminals. The latter argument, however, misses a key point; criminals in the drug market are very well aware of drug prices while enforcement authorities and policy makers are usually far less well informed.

Cross-country comparative analysis

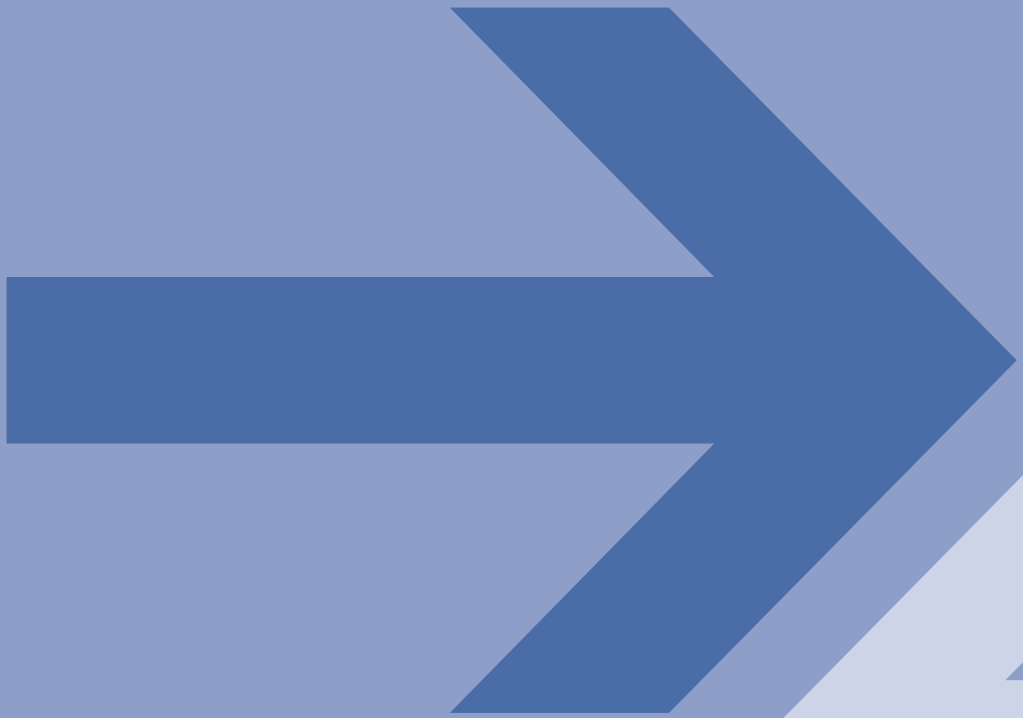
Although cross-country comparative analysis is not the focus of this document, a few issues related to drug price analysis at international level deserve to be addressed briefly so that national data providers may be better aware of such a challenge. Indeed, there are few adjustments that may be needed when carrying out cross-country comparative analysis.

Variation of purity levels in the products sold in retail drug markets, if usually not taken into account in national data, should be accounted for when carrying out cross-country comparisons. Indeed, research shows that although the origin of drug products may be similar, there may be a high variation between different countries in the purity (or potency) of drug products sold in retail markets, due to several factors linked to both supply and distribution networks and law enforcement strategies and practices. Such an adjustment would allow one factor in the differential change in drug prices to be eliminated. However, adjusting retail prices for retail purity across different European countries may prove difficult in practice, since the purity (or potency) data that are available may not reflect the average purity (or potency) of drug products available on the retail market in all countries. Indeed, some countries in Europe do not systematically analyse drug products for purity (or potency) as this is not required in court. And for those who

perform analyses of drug purity (or potency), most of them are not able to provide purity (or potency) at different levels of the distribution system (retail, wholesale) as most analyses relate to all drugs seized, and some, even, only analyse seizures over a certain quantity. In addition, there may be other problems related to measuring purity or potency. For example, sampling of cannabis plants for analysis may vary greatly between laboratories – due to non-standardised practices in the way a field is sampled, and then in how parts of the plants are selected for analysis – and may lead to major differences in potency data.

Building up an average for several countries, for example a European average, based on the summary (national) retail prices in these countries may raise issues about the weight to give to each of the national prices in the European average and about the index that should be chosen for weighting national data. Indeed, giving an equal weight to each national data would mean ignoring the huge differences between countries in terms of size of the territory, total population and number of drug users. It is indeed commonly agreed that an index should be used to apply some weighting factors to national data. The total population of each country is often used for such a purpose, the implicit assumption being that the number of retail market transactions in each country is proportional to the total population of the country. This is, however, arguable as different illicit substances may be differentially available across European countries. In the absence of any indication of the distribution of retail drug transactions in Europe, another option would be to use the number of drug users per country and per substance as the index to calculate weighting factors for national retail drug prices. Precise estimates of the number of drug users, which would cover all types of users for each substance, are however difficult to obtain as they are fraught with methodological issues related to sizing a hidden population.

Cross-country comparisons on trends over time may mean taking other precautions. For the purpose of building an international index, it is common practice to translate different currencies into a unique currency (here the euro), in order to make them comparable. However, when comparing indexes from several countries, it may be advisable to compare indexes based on prices in local currencies in order to avoid misinterpretations linked to variations in exchange rates. Adjusting for inflation is also a common practice when comparing trends in retail drug prices between different countries, so that one factor of differential change in prices may be eliminated.



Glossary

Entrapment

According to the American Law Institute's Model Penal Code, entrapment occurs when a police agent 'encourages another person to [commit an offence] by ... employing methods of persuasion or inducement which create a substantial risk that such offense will be committed by persons other than those who are ready to commit it.' (See Hay, 2003, p. 18). Entrapment is not a defence in English law; see R v Sang (1980) AC 402.

Law enforcement agents/agencies

Police officers (military and civilian), customs officers, and agents working for national drug enforcement agencies.

Stop and search

In the context of law enforcement agencies' tactics to arrest drug traffickers, it refers to stopping the supplier in the street in the expectation of finding them in possession of drugs in quantities sufficient enough to justify arresting them for a trafficking offence.

Survey protocol

A protocol specifies the objectives of a survey and the exact methodology to be carried out (e.g. sampling strategy, sample size, population, questionnaire, etc); it is a reference document for the implementation of the survey.

Value of the illicit drug market

It refers to the value of the total amount of illicit drugs consumed. This figure is usually obtained either by multiplying the estimated total amount consumed by the retail price, or by adding up the individual expenditures of drug users and the estimated retail value of the amount that is not sold. It is usually calculated as an annual measure and may be obtained for different illicit products separately.

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Annexes

Annex 1

Notes on how to fill in Standard Table 16:

General issues	
1.	Fill in one table (per file) for each routine statistic or ad hoc study providing data on prices of illicit drugs (do not report data from different sources in the same table); do not provide several tables in the same file, but one table per file.
2.	Provide data on prices of illicit drugs in euros at retail/street level, corresponding to street level purity/potency.
3.	In the absence of data collection and distribution of drug prices in your country, provide price estimates that may be available and mention how estimates were made in the methodological comments below.
4.	For countries outside the euro zone, use the exchange rate (ER) of the data collection period to convert drug prices into euros; provide in the table the value of the (average) exchange rates used (national currency x ER = euros). Prices for a certain date should be converted into euros using the exchange rate of that date. Prices for a certain period of time (weeks, months) should be converted into euros using the average exchange rate for that respective period. Annual prices should be converted into euros using the average exchange rate of that year. Monthly exchange rates can be consulted at: http://europa.eu.int/comm/budget/inforeuro/.
5.	Check for inconsistencies with data previously submitted to the EMCDDA by your national focal point.
6.	Provide information in the methodological comments below; this is essential to carry out an analysis of prices of illicit substances at EU level.
7.	Where methodology varies from one year to another, mention these changes in the methodological comments below.
Substances	
8.	For cannabis products, heroin, cocaine, crack, amphetamine and methamphetamine, provide prices per gram of substance sold at retail/street level.
9.	For ecstasy-type substances and LSD, provide prices per tablet/dose/unit sold at retail/street level.
10.	Ecstasy-type substances include MDMA, MDEA and MDA.
11.	Distinguish as far as possible between different types of herbal cannabis; prices of herbal cannabis (type unspecified) should be reported only when no distinction is available between prices of sinsemilla and other herbal cannabis (European and non-European seeded herbal cannabis).
12.	Distinguish as far as possible between brown and white heroin; prices of heroin (type unspecified) should be reported only when no distinction is available between prices of brown and white heroin.

Statistical measures	
13.	The sample size refers to the number of samples for which prices are provided in the table.
14.	The minimum value refers to the lowest price among all prices reported (to nearest EUR 0.1).
15.	The maximum value refers to the highest price among all prices reported (to nearest EUR 0.1).
16.	The mean value refers to the arithmetic mean (or simple mean), calculated as the sum of the prices divided by the number of prices reported (to nearest EUR 0.1).
17.	The mode value (or typical value) refers to the most frequent price (to nearest EUR 0.1) among all prices reported.
18.	Provide as far as possible the statistical measures mentioned above; should you not be able to provide these values but are able to provide other measures (such as the weighted mean or the median), specify it clearly in the methodological comments below.
19.	The value of the middle point between minimum and maximum price values is not useful; do not use it under the headings 'Mean' or 'Mode'.

Standard Table 16: Price at *street level* of some illicit substances (EUR)

NAME OF THE DATA SOURCE (name of institution and name of monitoring system/study):

COUNTRY:

YEAR:	**2004**				
EXCHANGE RATE (4):		**ER =**			
	Sample size (13)	Minimum (14)	Maximum (15)	Mean (16)	Mode (17)
Cannabis resin (1 gram)					
Herbal cannabis (type unspecified) (1 gram) (11)					
– sinsemilla (1 gram)					
– other herbal cannabis (European/non-European seeded herbal cannabis) (1 gram)					
Heroin (type unspecified) (1 gram) (12)					
– Heroin brown (1 gram)					
– Heroin white (1 gram)					
Cocaine (1 gram)					
Crack (1 gram)					
Amphetamine (1 gram)					
Methamphetamine (1 gram)					
Ecstasy-type substances (1 tablet/unit) (10)					
LSD (1 dose/unit)					

	2005					2006				
	ER =					ER =				
	Sample size (13)	Minimum (14)	Maximum (15)	Mean (16)	Mode (17)	Sample size (13)	Minimum (14)	Maximum (15)	Mean (16)	Mode (17)

Standard Table 16 continued

METHODOLOGICAL COMMENTS

1. Are there inconsistencies with data previously submitted? If there are, please identify them and state the reason(s) (e.g. update, previous mistake, etc.).

2. What is the type of information system (source) from which the data are provided? (e.g. routine monitoring system, repeated survey/study, ad hoc survey/study).

3. What is the timeframe of data collection? (e.g. continuous/permanent, number of times per year and duration/dates, once a year and duration/date).

4. What is the geographical coverage of the data provided? (e.g. national, local, number and type of sites covered).

5. What is the method used to collect data on drug prices at retail/street level (e.g. surveys among users, police estimates, test purchases)? Please describe the methodology used to collect and/or estimate data on drug prices (sampling strategy, number of estimates collected, whether it refers to a particular setting, etc.).

6. How are prices per gram determined (e.g. based on real weight (weighed amounts), estimated from non-weighed smaller amounts for sale)? If it is the case, please mention any conversion rule used (e.g. to convert price of crack per rock into per gram, to convert price of heroin per street dose into per gram).

7. Please mention any deviation from what is requested in the data submitted (e.g. weighted mean instead of arithmetic mean, median instead of mode, prices per other amount than the one requested).

8. Please mention potential biases (and their direction) to be taken into account when interpreting the data (e.g. biases related to coverage, sampling strategy, level of the drug market, etc.).

9. In countries where the national currency is NOT the euro, please provide any comment/data that may be relevant for interpretation of trends (e.g. stable trend in national currency but not in euros due to variations in exchange rates). You may report here your data in national currency (only if you wish to do so).

10. Please provide relevant bibliographic references.

11. Other comments.

Annex 2

Metropolitan Police Service Covert Drug Purchases Database Form	
Restricted Covert Drug Purchase Operations: Drug Price and Purity Data Form to be completed by the Exhibits Officer	
Exhibits Officer (name)	
E-mail address	
Telephone number	
Forensic Science Service Reference	
CRIS Reference	
Custody Record Reference	

Metropolitan Police Service

Metropolitan Police Service Covert Drug Purchases Form (Form CDP 1)

Operation name			Pseudonym of officer making purchase			Sex		Age		Ethnic code	
Unit/borough running operation				Date of purchase			Time of purchase				
Location of purchase							Post code				
Offender's full name Surname					First name(s)						
Sex		Age		Date of birth		Ethnic code		Place of birth		Nationality	
CRO or PNC number				Officer in case (OIC)						E-mail address	

Drug type(s)	Amount(s)	Prices (GBP)	Police Exhibit reference and Exhibit bag number	Weight(s): after FSS analysis	Purity: after FSS analysis
Crack					
Cocaine (powder)					
Heroin					
Ecstasy					
LSD					
Methadone					
Opium					
Cannabis					
Cannabis resin					
Ampheta-mine					
Other (specify)					

Annex 3

Notice 10-06 Item 2 of the Metropolitan Police Service

The Metropolitan Police Service's (MPS) Covert Drug Purchases Database: Monitoring the price and purity of heroin, cocaine and other controlled drugs

(CR 216/04/17 and DP7/05/1)

Introduction

The purpose of this Notice is to set out the Specialist Crime Directorate's (SCD) criteria and procedure for monitoring the price and purity of heroin (crude diamorphine), cocaine (including crack) and other controlled drugs. Analyses of these data will:

- improve the understanding by MPS of the price and purity of specific drugs across London;
- support Operation Paramount – a national drug price index that is collated by the National Criminal Intelligence Service and will be incorporated into the functions of the new Serious and Organised Crime Agency;
- help MPS to have a greater understanding of drugs markets;
- help the SCD Central Drug Trafficking Database (CDTD) project team to monitor and evaluate the effectiveness of the tactic of covert drug purchases as a means for disrupting those organised crime networks involved in the trafficking of specific drugs;
- assist the courts in determining appropriate sentences.

The results of this research will be incorporated into the National Intelligence Model (NIM) strategic and tactical assessments produced by the CDTD Project team, and made available to MPS staff. The research findings will also be available to statutory and non-statutory agencies working with the MPS.

Background

Drug price and purity information provides important intelligence. For intelligence to have true value it must come from a reliable source and be as accurate as possible. As prices and purities vary considerably, the presentation of aggregate data must use the best statistical techniques

available. Research has shown that information from police test purchase operations is the most reliable and accurate data source available. A methodology to collate and present this data has been developed after a pilot project in 2004. The procedure to be followed is outlined below, which has been agreed with the Detective Chief Inspector of SCD11(10) Covert Operations.

Recording price and purity of specified controlled drugs: procedure

Details of **all (starting from Sunday 1 January 2006)** covert drug purchases will be recorded on the Covert Drug Purchase (CDP) form. Blank CDP forms can be found on the MPS Forms intranet site (form number 196). An example of a completed CPD form is at Annex 1 of this Notice. The responsibility for completing the CDP form will rest with the police officer deputed to act as the Exhibits Officer for the duration of the Test Purchase Operation (TPO) or Undercover Buy Operation (UBO). The form is designed to be completed on screen so that it can be sent by e-mail to the Drugs Directorate (SCD3-CDP) for analysis.

One CDP form will be completed for each transaction. So, for example, in the case where a police officer carries out two test purchases from the same offender, at the same location in the course of one day, then the CDP form will be completed twice. In cases where the police officer buys two drugs (say crack and heroin) at the same time and from the same offender, then only one CDP form will be used, but the Exhibits Officer must record the details of both drugs on the form. When completing the CDP form, the Exhibits Officer should make every effort to ensure that information is entered in the fields relating to drug type(s), amount(s), price(s), police exhibit reference(s) and exhibit bag number(s), weight(s) and purity, and that the details recorded match those on the laboratory form 1 and the witness statement provided by the forensic scientist. It is accepted that, in many cases, the police officers involved in the TPO or UBO will not know the identity of the person selling the drug. In these cases, the Exhibits Officer will not be able to complete the fields relating to the offender (for example name, age, date of birth, place of birth, nationality and CRO/Police National Computer number).

As soon as the result of the forensic analysis is known, the relevant fields on the CDP form will be completed. The Exhibits Officer will then send the completed CDP form to the group e-mail address SCD3-CDP using the MPS AWARE system.

The Senior Investigating Officer in charge of the TPO or UBO is responsible for ensuring that there is no undue delay in the completion of the CPD form.

On receipt, the CPD form will be reviewed. If any errors or discrepancies are found the Exhibits Officer will be contacted by return e-mail.

The information relating to prices, purity, drug type and so on will be scrutinised, validated and entered onto the SCD Covert Drug Purchase Database. It will be analysed and the results will be incorporated into the NIM strategic and tactical assessments produced by the CDTD Project team.

Definitions

Covert Drug Purchase

For the purpose of this Notice, the term 'covert drug purchase' means:

- the purchase of any controlled drug
- the purchase of any non-controlled drug (for example ephedrine, caffeine, aspirin)
- the purchase of any innocuous substance (for example chalk, soap, plaster)
- by a Test Purchase Officer or an Undercover Officer whilst acting as such.

Controlled Drug

The term 'controlled drug' means any drug mentioned in Schedule 2, Part I, II or III to the Misuse of Drugs Act 1971.

Application

This Notice is of particular relevance to:

- Undercover Officers;
- Test Purchase Officers;
- Officers designated as Exhibits Officer in operations involving the covert purchasing of controlled drugs;
- Senior Officers planning, supervising and managing operations involving the covert purchases of controlled drugs;
- Criminal Justice Unit Managers and their deputies;
- Staff in the Drugs Directorate;
- Staff in the SCD11 (Covert Policing Unit).

For more information regarding this Notice please contact [the Drugs Directorate Drug Prevention] Inspector on extension xxxx or by e-mail.

Annex 4

Statistics and indicators: examples of calculation

This annex presents simple equations for some of the statistics discussed in the text and are targeted at those readers with little or no previous statistical experience. These few notes are not a substitute for a good statistical reference, such as that by Kirkwood and Sterne (2003) referenced in the bibliography, which will prove invaluable when working with data.

Any statistical computing package will have routines to generate these descriptive statistics. Equally, all spreadsheet packages will have functions to generate these statistics. Note that it is important to understand how any computer package used calculates statistics as not all are the same.

Notation

Let:

n = sample size.

X = the variable price of cocaine per gram in euros.

x_i = a specific realisation of the variable X.

The subscript i is used to denote a specific observation of a variable, sample, or weight.

For example:

x_i = is the i^{th} specific observation on the price of cocaine per gram.

i = 1 .. n

$\sum_{i=1}^{n} x_i = x_1 + x_2 + \ldots + x_n$ = the summation operator. Sum the observations on X between 1 and n.

Arithmetic mean

The arithmetic mean is obtained by summing the values in the data set and dividing by the count.

Symbolically

$$\overline{X} = \frac{\sum_{i=1}^{n} x_i}{n}$$

Example 1

A sample of 10 prices per gram of cocaine were recorded 30, 35, 40, 40, 50, 50, 60, 60, 65, 70

$n = 10$

$$\sum_{i=1}^{n} x_i = 30 + 35 + 40 + 40 + 50 + 50 + 60 + 60 + 65 + 70 = 500$$

$$\overline{X} = \frac{500}{10} = 50$$

The sample mean price of cocaine per gram in euros = 50.

Example 2

The arithmetic mean is sensitive to extreme values, commonly referred to as outliers.

Consider the effect on the mean of changing a single value in the sample to an extreme value. x_{10} is changed from 70 to 250.

A sample of 10 prices per gram of cocaine were recorded 30, 35, 40, 40, 50, 50, 60, 60, 65, 250

$n = 10$

$$\sum_{i=1}^{n} x_i = 30 + 35 + 40 + 40 + 50 + 50 + 60 + 60 + 65 + 250 = 680$$

$$\overline{X} = \frac{680}{10} = 68$$

The sample mean price of cocaine per gram in euros = 68.

Here the arithmetic mean is not a particularly good representative value of the sample, being greater than 9 observations, and less than only 1.

Weighted mean

A weighted mean is appropriate where the values being summed do not have equal importance. The weighted mean is calculated by multiplying each value in the sample by its associated weight

and dividing by the sum of the weights. Equivalently, scale the weights so their sum equals 1, then multiply each value in the sample by the scaled weight and sum.

Symbolically:

$$\overline{X} = \frac{\sum_{i=1}^{n} w_i x_i}{\sum_{i=1}^{n} w_i}$$

where $w_i \geq 0$

Example 3

Consider the following two samples:

Sample 1.
30, 35, 40, 40, 50, 50, 60
$n_1 = 7$

$$\sum_{i=1}^{n} x_i = 30 + 35 + 40 + 40 + 50 + 50 + 60 = 305$$

$$\overline{X}_1 = \frac{305}{7} = 43.571$$

Sample 2.
60, 65, 70
$n_2 = 3$

$$\sum_{i=1}^{n_2} x_i = 60 + 65 + 70 = 195$$

$$\overline{X}_2 = \frac{195}{3} = 65$$

Combining sample 1 and sample 2 and calculating the mean.

$n = 10$

$$\sum_{i=1}^{n} x_i = 30 + 35 + 40 + 40 + 50 + 50 + 60 + 60 + 65 + 70 = 500$$

$$\overline{X} = \frac{500}{10} = 50$$

The combined sample mean price of cocaine per gram in euros = 50.

Consider a situation where the raw data are not available, and only the two sample means and their sample size are reported,

Sample 1: mean price of cocaine per gram is 43.571 calculated from 7 observations.

Sample 2: mean price of cocaine per gram is 65 calculated from 3 observations.

To combine the two means into an overall mean it is necessary to consider the relative importance of the two statistics. Sample 1 is greater in size than sample 2 and should receive more relative importance in the calculation of a combined value.

Calculating an arithmetic mean of the two average prices would ignore the difference in relative importance.

$$\frac{43.571 + 65}{2} = 54.286$$ **WRONG.**

A weighted mean is needed. The weights are equal to the size of the sample.

$w_1 = 7$

$w_2 = 3$

$w_1 + w_2 = 10$

$$\overline{X} = \frac{\sum_{i=1}^{n} w_i x_i}{\sum_{i=1}^{n} w_i} = \frac{7 * 43.571 + 3 * 65}{7 + 3} = 50$$

Equivalently, scaling the weights so their sum equals 1.

$w_1 = 7/10$

$w_2 = 3/10$

$w_1 + w_2 = 1$

$$\frac{7}{10} * 43.571 + \frac{3}{10} * 65 = 50$$

Median

The median refers to the value that divides the sample into two equal numbers of observations, e.g. for a list of drug prices, an equal number of observations will fall below and above the median.

The median is obtained by ordering the observations from the smallest to the largest and taking the middle value. For an odd number of observations the median is a specific value. Having ordered the observations from small to large the median is the $(n+1)/2$ observation.

For an even number of observations take the arithmetic mean of the two central values to obtain the median. Equivalently, having ordered the data from small to large, take the arithmetic mean of the $n/2$ value and the $(n/2 + 1)$ value.

Example 4 (odd number of observations)

A sample of 11 prices per gram of cocaine were recorded:

30, 35, 40, 40, 50, 50, 60, 60, 65, 70, 80

$n = 11$

(11 + 1) /2 = 6.

The 6th observation is 50.

30, 35, 40, 40, 50, 50, 60, 60, 65, 70, 80

The median value is EUR 50 per gram.

Example 5 (even number of observations)

A sample of 10 prices per gram of cocaine were recorded:

35, 40, 40, 50, 50, 60, 60, 65, 70, 80

$n = 10$

$n/2 = 5$

$n/2 + 1 = 6$

The 5th and 6th observations are 50 and 60 respectively in this case.

35, 40, 40, 50, 50, 60, 60, 65, 70, 80

$$\frac{50 + 60}{2} = 55$$

The median value is EUR 50 per gram.

Mode

The mode is the most frequently occurring value in the data set. Where there is a tie for the most frequently occurring value, the dataset will have more than one mode.

Example 6

A sample of 10 prices per gram of cocaine were recorded:

30, 35, 40, 40, 50, 55, 60, 65, 70, 75

The most frequently occurring value is 40, occurring twice while all other values occur only once.

30, 35, 40, 40, 50, 55, 60, 65, 70, 75

The modal value is 40.

Example 7

Some datasets will express more than one mode.

A sample of 10 prices per gram of cocaine were recorded:

30, 35, 40, 40, 50, 55, 60, 60, 65, 70

Here the values 40 and 60 both occur twice, resulting in more than one modal value.

30, 35, 40, 40, 50, 55, 60, 60, 65, 70

A distribution with two modes is said to be 'bi-modal'. With large datasets bi-modal and multi-modal distributions can sometimes be an indication that a factor should be sought that would break the data into more distributions, each modal value being the centre of a distribution.

Minimum

The minimum is the smallest value.

Example 8

A sample of 10 prices per gram of cocaine were recorded:

30, 30, 40, 40, 50, 55, 60, 60, 65, 70

The minimum value is 30.

Maximum

The maximum is the largest value.

Example 9

A sample of 10 prices per gram of cocaine were recorded:

30, 30, 40, 40, 50, 55, 60, 60, 65, 70

The maximum value is 70.

Range

A sample of 10 prices per gram of cocaine were recorded:

Example 10

A sample of 10 prices per gram of cocaine were recorded:

30, 35, 40, 40, 50, 50, 60, 60, 65, 70

The range is 70 – 30 = 40.

Quartiles

Having ordered the data from the smallest to largest value, the quartiles split the data into four equally sized groups, size being in terms of number of observations.
The first or lower quartile is the observation that leaves roughly 25 % of the data points below it and 75 % above it.
The second quartile is the median, the data point that splits the ranking into two equally sized groups, 50 % of the distribution appearing below the data point and 50 % above.
The third or upper quartile is the data point that leaves roughly 75 % of the data points below it and 25 % above it.

There are a number of different methods of calculating quartiles. A simple method is to calculate the median value, split the data set around the median, then calculate the medians for the upper and lower half of the data. For an even number of observations the data set splits easily into two equal halves. For an odd number of observations, include the median value in both the upper and lower halves.

Example 11 (odd number of observations)

A sample of 11 prices per gram of cocaine were recorded:

30, 35, 40, 45, 50, 50, 60, 60, 65, 70, 80

$n = 11$

$(11 + 1) / 2 = 6.$

The 6th observation is 50.

30, 35, 40, 45, 45, 50, 60, 60, 65, 70, 80

The median value is EUR 50 per gram
Breaking the sample into two parts.

The lower part:

30, 35, 40, 45, 45, 50

Finding the median of the lower part by taking the arithmetic mean of the two central values.

$$\frac{40 + 45}{2} = 42.5$$

The first or lower quartile equal 42.5.

The upper part:

50, 60, 60, 65, 70, 80

Finding the median of the upper part by taking the arithmetic mean of the two central values.

$$\frac{60 + 65}{2} = 62.5$$

For the sample, the lower quartile is 42.5, the median is 50 and the upper quartile is 62.5.

Example 12 (even number of observations)

A sample of 10 prices per gram of cocaine were recorded:

35, 45, 40, 50, 50, 60, 60, 65, 70, 80

$n = 10$

$n/2 = 10$

$n/2 + 1 = 10$

The 5th and 6th observations are 50 and 60 respectively in this case.

35, 40, 40, 50, 50, | 60, 60, 65, 70, 80

The median value is EUR 50 per gram

Breaking the sample into two parts.

$$\frac{50 + 60}{2} = 55$$

The median value is EUR 55 per gram.

Breaking the sample into two parts.

The lower part:

35, 40, 40, 50, 50

Finding the median value of the lower part.

$n = 5$

$(5 + 1)/2 = 3$

The third value is 40.

35, 40, 40, | 50, 50

The upper part:

60, 60, 65, 70, 80

Finding the median value of the lower part.

$n = 5$

$(5 + 1)/2 = 3$

The third value is 65.

60, 60, 65, | 70, 80

For the sample, the lower quartile is 40, the median is 55 and the upper quartile is 65.

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The European Monitoring Centre for Drugs and Drug Addiction (EMCDDA) is one of the European Union's decentralised agencies. Established in 1993 and based in Lisbon, it is the central source of comprehensive information on drugs and drug addiction in Europe.

The EMCDDA collects, analyses and disseminates factual, objective, reliable and comparable information on drugs and drug addiction. In doing so, it provides its audiences with an evidence-based picture of the drug phenomenon at European level.

The Centre's publications are the prime source of information for a wide range of audiences including policy-makers and their advisors; professionals and researchers working in the drugs field; and, more broadly, the media and general public.

The EMCDDA's Manuals are practical handbooks aimed at professionals and grassroot practitioners working in the drugs field.

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