

Evidence and Experience in Psychiatry



SUBSTANCE ABUSE DISORDERS

Evidence and Experience

Hamid Ghodse, Helen Herrman,
Mario Maj and Norman Sartorius



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Substance Abuse Disorders

WPA Series

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Preface

This book offers a comprehensive review of substance abuse disorders that, it is generally recognized, have proved to be very difficult problems for medical and psychiatric practice over the last century. It has three sections, one each for tobacco, alcohol and 'drugs'. Each section contains three reviews: epidemiology, treatment and management and prevention. Whole books have previously been dedicated to the subject of each section and indeed to each chapter within each section. This book does not seek to achieve that level of detail; instead, by standing back and taking a broader perspective, it highlights the differences and the similarities between the areas of study and emphasizes the importance of prevention, health-care delivery, policy formation and academic research. The authors of each chapter are internationally renowned in their respective fields and their chapters are complemented by commentaries from world-class authorities in research, teaching and clinical practice.

The misuse of tobacco, alcohol and of licit and illicit drugs is one of the greatest health challenges in the world today. It affects not just the health of those using these substances, but also all other aspects of their life as well as their families, their colleagues and the wider society. It lies behind a high proportion of all crime, costing nations billions of dollars each year in prevention and treatment programmes, in law enforcement and other economic costs. This imposes a heavy burden on the social infrastructure of developed and developing countries. Valuable human and financial resources have to be diverted away from productive activities contributing to development and prosperity, while drug trafficking foments corruption that is one of the most formidable obstacles to good governance.

The young people of today live in a world that is very complex. It provides them with tremendous opportunities as well as difficult challenges, with many benefits and many risks. The influence of their peers and their surroundings upon them and their behaviour, their life style and their health is greater than ever before. Peer influences no longer emanate solely from school or the local neighbourhood but can come from thousands of miles away. Indeed, adolescents' ideals and role models may be in another continent; their problems may start from under the same roof or from far away. The provision of a healthy environment has thus become more difficult and the sociocultural control of behaviour less predictable. These complex societal changes might have contributed to the increase of mental and behavioural problems of children and adolescents. Indeed, the scale of misuse of tobacco, alcohol and drugs is such that practitioners are likely to see its impact on patients on most days. In comparison, the control of traditional diseases now appears relatively simple.

Smoking remains the single biggest preventable cause of ill health – and the smoking epidemic has yet to peak in low- and middle-income countries where the majority of the world's smokers now live. Tobacco use is strongly correlated with and can be a substantial contributor to social disadvantage. If current trends continue, it will kill 1000 million people prematurely during this century. According to the World Health Organization, three out of every five young people who experiment with tobacco will become dependent smokers

into adulthood and half of them will die prematurely. However, studies demonstrate that no single youth-focused intervention will be effective if society as a whole does not address tobacco use as a social problem. Therefore, the main recommendation for public-health decision makers and activists is to concentrate efforts on changing the environment in parallel with any youth-orientated strategy in order to ensure adherence of this population to the concept that the best life option is to be or become a nonsmoker.

An instructive comparison can be made between the control regimes for illicit drugs and tobacco. Although it is both psychoactive and addictive, nicotine was never put under a drug-control regime like those of the International Conventions for the control of narcotic and psychotropic drugs. The recent World Health Organization Framework Convention on Tobacco Control adopts a very different approach. It emphasizes interlinked strategies for harm reduction, demand reduction, denormalization of tobacco use and regulation of the tobacco industry. Tobacco markets are relatively unregulated, relying on taxation, advertising and age-related controls on consumption. In this context, it is interesting that the annual prevalence of tobacco use is about one quarter of the world population (age 15+) – some 1.7 billion people – while the annual prevalence of use of any illicit drug is only 5% of the world population (age 15–64) – some 200 million people. The prevalence of tobacco consumption is thus eight times that for illicit drugs. Tobacco also claims 25 times as many lives as illicit drug abuse. In the early twentieth century and prior to any international drug control, the prevalence of drug dependence in many parts of the world was very high indeed. In China alone there were 10 million opium addicts out of a total estimated population of 450 million and in the United States according to a government report 90% of narcotics were used for nonmedical purposes.

Had there been no drug-control system, the size of the drug-using population, as well as the burden of disease associated with it, would have been much greater – perhaps even at levels close to tobacco. It can be argued therefore that the multilateral drug-control system has helped to contain the problem at 5% of the world population (age 15–64) or <1% if only problem drug use is considered. This is an achievement that should not be underrated and provides a useful perspective within which more recent developments can be analysed.

It is evident from the chapter on the epidemiology of drug abuse that in some parts of the world the abuse of prescription drugs has already surpassed the abuse of traditional illicit drugs such as heroin and cocaine. For example, in the United States, the abuse of prescription drugs, including pain killers, stimulants, sedatives and tranquillizers, exceeds that of practically all illicit drugs, with the exception of cannabis. The unregulated market for pharmaceuticals, particularly through the internet, exposes people to serious health risks through the delivery of often poorly documented, unsafe, ineffective or low-quality medicines. An additional concern is that the gains of the past years in international drug control may be seriously undermined by this ominous development, if it remains unchecked.

The epidemiological data that have been reviewed show that the most salient issue is the global nature of drug abuse, including the changing geographical location of crops and drug production, and the density and malleability of trafficking routes. Changes in drug use or policies within one country inevitably impact on others, emphasizing the need for international collaboration on a problem that knows no borders. A global view of the problem shows that knowledge of changes in the prevalence rates in one country or modification of the trafficking routes or oversupply of drugs in the illicit market allows some prediction of potential problems in other countries. This global view also facilitates international collaboration in relation to the interchange of information, evidence of best practice, coordination of activities and mutual support.

The importance of this type and level of collaboration is emphasized when it is realized that hundreds of preventive programmes were implemented around the world at various times without any attempt to evaluate their effectiveness or cost effectiveness. Under increasing pressure from governments and funding agencies to demonstrate the effectiveness of drug prevention interventions, several reviews have been undertaken during the past decade and the number of methodologically sound studies is now growing. Similarly, with regard to treatment, currently available evidence does not support any single treatment approach as yielding better outcomes for the chronic, relapsing nature of addiction, with all its correlates and consequences. Indeed, it seems likely that the most promising results come from a combination of pharmacotherapeutic and psychosocial treatment approaches that take account of the local sociocultural environment.

Worldwide, of course, alcohol consumption is one of the most important risk factors in the global burden of disease, ranking fifth, behind underweight (from malnutrition and underfeeding), unsafe sex, high blood pressure and tobacco use. In addition, it is important to remember that alcohol abuse contributes to some of the other risk factors for disease – for example to the prevalence of unsafe sex. The prevalence and severity of alcohol-use disorders depend on many factors, such as the amount and quality of alcohol consumed on a daily basis and the frequency of drinking. This is reflected in the distribution of alcohol-use disorders in different world regions. Although aggregate alcohol consumption is escalating fast in the developing world, limited research data are available on the regional prevalence and patterns of alcohol use in a vast number of countries. Such data would aid in the formulation of cost-effective treatment strategies within the medical and social infrastructures of those countries because most of the currently recommended practices for prevention and treatment, together with the supporting evidence, are derived from developed Western healthcare settings. Here, research evidence about effective interventions has not uniquely influenced policy and clinical decisions about responses to alcohol-related problems. Instead, in shaping policy, research evidence competes with: vested interests, such as those of the alcohol manufacturers and retailers; the divergent views of government departments such as treasury, employment, industry and health; and, community and clinician perceptions about the nature and extent of alcohol-related harm. Community views in turn are influenced by an individual's perceived proximity to the adverse outcomes of alcohol consumption and popular perceptions that alcohol problems are resolutely an issue of personal responsibility/individual weakness.

Preventing substance abuse and treating those who suffer from substance abuse disorders is an investment in the health of nations just as much as the prevention and treatment of HIV infection, diabetes or tuberculosis. However, because substance-abuse problems often have associated social problems, the issues have to be addressed by the whole of society. The review carried out within this book will therefore be useful not only to psychiatrists and other medical practitioners, but also to a wide range of professional groups, from health and social services, behavioural and social scientists and practitioners in the judiciary and law enforcement. We hope that it will also contribute to the ongoing debate on some of the controversial issues discussed here.

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SECTION 1

Drugs

Epidemiology of Drug Abuse: A Global Overview

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1.1 INTRODUCTION

Public Health is interested in the health condition of the population and in the relation between the health status of groups and the environment. Epidemiology, through the differentiation of healthy individuals from those in poor health, and by the study of biological and social, individual and collective factors related to health and disease, estimates the extension and magnitude of a problem, subgroups of the population affected, trends over time, its determinants and consequences, the proportion of persons exposed to preventive interventions and the treatment demand covered. Its challenge is to describe the problem in a way that provides the evidence required to orientate policy.

Providing a comprehensive view of the drug problem across different cultures poses some difficulties, mainly derived from the availability of accurate information. On the one hand, illicit activities are difficult to evaluate, willingness to report might be affected by social tolerance toward drug use; persons conducting surveys in countries where drug use is defined as a felony and the police are active, might find more difficulties in obtaining an adequate rate of persons accepting to answer a questionnaire and an accurate self-report of use. Also, studies conducted in different countries might reflect differences in methods pursued, populations covered and conceptual definitions of behaviours and consequences, more than variations in rates of use. In spite of these limitations, data available show interesting global trends that can serve as an arena for the discussion of drug policies.

This chapter provides a view of the extension of the problem per type of substance and in different regions of the world; it is introduced by a discussion related to the different approaches epidemiology can follow, it provides evidence on the need to study dimensions of use and problems as separate interacting indicators and of considering the circular nature of the drug problem with epidemic rises, periods when drug use is stable or is reduced,

followed by a new rise, that calls attention to the need to consider replicating studies with a periodicity that allows the description of trends.

Data included in the chapter are drawn from a literature review, from the reports of member countries to the United Nations, from the annual reports of the International Narcotics Control Board, the UNESCO and from statistics and other studies coordinated by the World Health Organization. Regional organizations such as the European Monitoring Centre for Drugs and Drug Addiction (EMCDDA), the Inter-American Drug Abuse Control Commission CICAD, were also visited. This information is completed with data coming from epidemiological studies, household and student surveys, and surveillance systems, when available.

1.1.1 The Scope of Epidemiology

Epidemiology seeks to answer questions such as is there a drug problem? If so, what type of problem? What is its impact at the national and local levels? And depending on the type of problem, what are the more appropriate policies?. To answer these questions it uses surveys and other methodological strategies to assess the prevalence of use and abuse, problems and trends based on conceptual models that provide specific definitions of the problem, the accepted indicators to measure it and the policy to follow. The following section describes the main sources of information available:

- A. *Estimates of production and drug seizure.* The availability of drugs in local markets can be derived from studies that assess the cultivation and production of drugs and from seizures that provides information about price and purity of individual drugs and about the type of substances that are available in certain locations, provided it is possible to differentiate quantities aimed for exportation and quantities aimed for local markets, especially in transit countries. In analysing this data caution must be taken as changes in price and purity of illegal substances on the streets do not necessarily indicate changes in prevalence; variations in effectiveness of enforcement and in reporting efforts can also shape this information [1].
- B. *Estimating prevalence.* Counting the number of individuals that have used drugs is not enough to determine the scope of the problem in a given society. The impact of the drug problem on public health and thus the type of problem to be faced is modulated by:
 - I. The patterns of drug use, that include the type of substances used, the routes of administration, the frequency and quantity of intake, the subgroup of the population using them (i.e. pregnant females, adolescents, etc.) or the circumstances of use (i.e. driving under the influence of drugs).
 - II. The likelihood of dependence and of other drug-related problems influenced by variations in the vulnerability of individuals genetic predispositions (i.e. heritability estimates a range between 40 and 60% [2], factors in the development that increase the likelihood of transiting from experimentation to heavy use and dependence (i.e. childhood adversities including exposure to violence), in variations in the proximal environment (i.e. drug availability, drug use amongst siblings and peers, etc.).
 - III. Sociocultural factors that include tolerance to use of drugs, *demographic* such as increase in the proportion of young persons with no equivalence in the availability of school and job opportunities, or *social transitions* such as migration. These

factors modulate the likelihood of experimenting with drugs and advancing towards dependence as well as its impact in different societies.

- IV. Availability of resources to face the problem (i.e. universal or limited access to treatment and other social services) and health and social policies that modulates the availability of resources to cope with the problem. Lower rates of use might result in a greater burden when they occur in contexts of poverty, social inequity or high degree of delinquency, or when there are no resources to identify cases and offer treatment. Formal responses to the problem will affect the availability of drugs on the streets and the number of persons imprisoned for drug use or possession. Special features of the *illegal production, diversion from legal sources and traffic* of drugs and organized crime will also affect the problem, influencing the rate of violence and drug availability.
- C. *Mortality and morbidity*. Mortality studies focus on the most serious forms of drug abuse, causes being numerous from direct causes such as overdose, to indirect accidents or murder; they can relate to the route of administering drugs or specific lifestyles such as HIV, hepatitis B or C. Mortality information can be driven from national causes of death statistics, examinations from the medical examiner, police or hospital records, amongst other sources [1]. The accuracy of information varies from country to country. According to Single *et al.* [3] illicit drugs have been implicated as a sufficient or contributory factor in at least 90 causes of death and disease. For each of these causes it is possible to estimate the excess mortality of persons with an addiction as compared to the general population controlled by age and sex [4], it is also possible to estimate aetiologic fractions or attributable proportions and estimate the numbers of deaths and admissions to hospital that can be causally attributed to illicit drugs.
- D. These indicators can be resumed in a concept known as *burden of disease*, that includes premature mortality attributable to the disease and days lived without health. Substance-attributable burden is usually estimated by combining relative risk data with exposure prevalence data and disease-related mortality and morbidity information, from national databases [5].

The extent of drug use and the *social perception* of the extent of the problem does not always show the same trend, for instance a stabilization in drug use and even a reduction of new cases after a period of rapid increase can be accompanied by an increase in problems and of the demand for treatment as a result of chronic use by a proportion of those that started experimenting some time back. This trend can be accompanied by more visibility if an increase in murders occurs as a result of modifications in the drug cartels organization and their fight for markets, or if public policies change, or if the mass media focuses more closely on an old problem, modifying the social perception. The challenge of epidemiology is to assess the problem from a scientific perspective and to deliver knowledge in a way that is understood by the population, especially those that are in charge of public policies.

In summary, knowledge about the number of persons that use, abuse or become dependent and the trends over time is an important base for policy, but might not be enough to understand the impact of the problem in a given society. Approaches that evaluate the problem on two axes, substance use on the one hand and problems on the other, and that analyse their interrelation in the sociocultural context can provide a more accurate view of the problem by integrating in the analysis of prevalence, drug supply, individual and contextual variations, social perceptions of the problem and policies [6].

1.1.2 Conceptual Framework

Paradigms underlying epidemiological studies are also central because they define the basic suppositions upon which the problem is constructed, the aetiological explanations that are provided, indicators that are accepted as valid for its study and as such it is closely related to the way policies are conceived and actions are taken to counteract the problem [7].

The paradigm of *infectious diseases* conceives disease as a result of the interaction of a host with different degrees of susceptibility, exposed to an agent, in defined modes of transmission and environments; this model has been extended to study behavioural disorders such as drug abuse. The paradigm is mechanical biological and determinist in nature and follows a logical lineal causal mode. Public health interventions derived from this explanation seeks to block the casual link by eliminating the agent and by protecting the host, reducing the level of exposure to the agent and modifying the environmental conditions that facilitate exposure. The epidemiological tools are surveys to determine the proportion of the population exposed and that using drugs, the notification systems and the follow up of individuals to determine the routes of contact.

In accordance with the disease model, the more salient policy during the last century was the *reduction of supply*. It was assumed that the expansion of the problem could be prevented by reducing the opportunities of exposure that in turn depended on drug availability.

This notion of the individual as a passive host affected by an agent if exposed gave way to a more complex formulation that conceived an individual actively seeking for the agent. The resulting *psychosocial paradigm* considers the multifactor nature of the phenomenon; replaces the concept of a unique casual agent for the exposure to a wide variety of risk or protecting factors that affect the likelihood of an individual to experiment with drugs or to develop dependence.

Actions derived from this paradigm place less emphasis on the control of the agent, instead it aims at the reduction of risk factors and the enhancement of factors that make the individual less vulnerable or more resistant to the risks present in his environment; promotes healthy lifestyles and health protection through education. Interventions were then aimed at increasing the resilience of individuals to drugs. This model shares the linear causal model of the infectious diseases model and fails to explain variations derived from more distant contextual factors such as the role of affluence or extreme poverty and unemployment.

The tradition in *psychiatric epidemiology*, by definition more interested in substance-abuse disorders than in their use, includes *symptoms* as indicators. The use of this approach has made important contributions in the determination of treatment needs and the proportion covered, but provides information on only one of the elements of the drug phenomenon, this is dependence.

A *phenomenological model* considers that behaviour is mediated by cognitive processes through which the individuals construct the meaning of the world in which they live. *Alternative models* consider that public policy in itself plays a causal role in the shaping of the problem and in the social response.

The increase in problems in different regions, globalization and perhaps also the claim of drug-producing developing nations that the demand of drugs in the developed world was eliciting supply, turned to the recognition of the need of a more balanced approach in the efforts and budgets aimed at reducing both supply and demand. This conception has gone even further, by considering that only an integrated approach that combines components of supply and demand could make a difference.

A model based on *drug markets* [8], has also gained recognition, it considers supply and demand mediated by factors such as the needs of users, their priorities and lifestyles. The market approach considers drug use as a complex behaviour determined by the individual himself, his environment and the drugs available. It considers that markets are affected by the interaction between the demand for drugs and their availability, which in turn are influenced by the sociocultural environment and by political forces.

It acknowledges that supply satisfies and creates demand that supports existing drug supply or creates a new one. This continuum is affected by factors such as the emergence of alternative substances and sources for obtaining them, new markets of users, relapse rates, social ideology and the situation of the economy.

Illicit drug markets might be considered as new (emerging) or well established (mature): they vary by type of substances involved and by the number and type of users. Emerging markets are formed by a large proportion of abusers who consume smaller volumes of illicit drugs, with stimulant-type amphetamines being a paradigmatic example. Mature markets, on the other hand, are formed by small proportions of heavy drug users who consume large volumes of drugs, a typical example being the heroin market. Both markets can coexist side by side [9].

Whatever the paradigm chosen, or the combination of several of them, they will determine the methods and indicators followed to study and the recommendations on strategies to face the problem.

Most epidemiological evaluations of the problems around the world use a combination of indicators coming from the paradigms we have described. Room [10] has characterized epidemiological studies in four traditions: i) *medical epidemiology*, interested in patterns of drug use as risk factor for health problems; the outcome variable can be chronic disease such as heart disease, or infectious diseases such as HIV or Hepatitis B and C. The role of epidemiology being the elucidation of the circumstances under which the association between use and consequences occur (i.e. injuries derived from driving under the influence of drugs) and the proportion of the disease is attributable to substance use; ii) an alternative *tradition interested in the substances* by themselves, with little interest in assessing consequences; it has two ramifications aimed on the one hand at assessing variations in exposure and on the other to study different patterns of substance use; iii) a third tradition, *psychiatric epidemiology*, defines its outcome as harmful use, abuse or dependence defined through diagnostic criteria; iv) a fourth tradition: *social epidemiology*, is interested in the study of problems derived from abuse; uses the term problematic use more than dependence and is interested in patterns of use as the predictor variable and social problems as outcome. A fifth tradition of *psychosocial research* not considered by Room in his paper, focuses on the individual and is interested in the study of the relative impact of risk and protective factors in drug initiation, continuous use, development of dependence, remission and relapse.

Following this traditions, some countries started assessing the problem by tracking drug-related deaths and hospital and treatment centre registers of cases; others followed a tradition by conducting surveys having as the main indicator *ever use of drugs* and *use in the last 12 months*. Some assessed different patterns of use as a predictor variable of health or social consequences; others pay more attention to the role of psychosocial variables on the individual and in its immediate environment. And still others are interested only in cases diagnosed as having a *substance abuse* problem in the American Psychiatric Association DSM IV tradition or *harmful use* in the World Health Organization ICD 10 tradition and dependence disorders, similarly conceptualized in both systems.

Today it is more often recognized that approaches are complimentary and help understand the impact of the problem in the health and social welfare of the population. The tradition of counting the number of persons exposed to drugs, later evolved to accept the multifactor nature of the problem and epidemiology included amongst its objectives and thus as indicators in questionnaires, the search for risk and protective factors for drug experimentation, continuous use, dependence and remission and included risk behaviours (i.e. syringe sharing) health (i.e. infections resulting from injecting procedures) and social consequences (i.e. delinquency), and the assessment of similarities and differences across cultures. A later recognition that dimensions of supply and demand are necessary in the assessment of the problem has led to more global approaches in data recollection and interpretation.

To end this first part of the chapter, we consider it important to analyse the *cyclical nature* of the problem. Trends in drug abuse frequently follow a cycle whereby individual, drugs or consumption patterns re-emerge at different times and or in different regions. These cycles are influenced by opportunities for illicit cultivation, diversion or trafficking, and of changing public attitudes and patterns of consumption.

According to Musto [11] the cocaine epidemic in the United States at the beginning of the last century predicted the outbreak observed in the 1970s with cycles of tolerance and intolerance responding to cultural and political strains. Aspects initially considered as beneficial such as euphoria and stimulation of the central nervous system, were later seen as seductive risks and the drug considered as a threat to society.

These trends have also been observed in the case of several substances including opium, morphine and cannabis [11]. Mäkelä *et al.* [12] have described the same phenomenon for alcohol consumption that crosses political systems and cultures of drinking.

Following this conceptualization, low levels of problems coincide with public attitudes of tolerance, this phase gives rise to an increase in rates of use and consequences and to the modification of public attitudes that become less tolerant and to more restrictive policies, which in turn diminish the problems and along with it, public attitudes become more tolerant and policy less restrictive, in an ongoing cycle, that according to Musto [11] lasts a generation.

These historical moments have implications in the effect of programs aimed at reducing use and consequences: in periods of increase the aim should be to maintain and accelerate the diminishment of problems, and to control or reduce this trend, the same prevention program could have very different results depending on the historical moment. These cycles vary from one place to another. Today, market economies are experiencing a reduction of the problem, and the more disadvantaged countries an increase [13].

Epidemiology aimed at informing public policies should take into consideration this phenomenon when interpreting results. This evidence calls attention to the convenience to conduct studies in a continuous form, and to include as variables for study public attitudes toward drug use and policy.

1.1.3 The Scope of the Problem

The twentieth century ended with the conviction that drug abuse was a global problem and thus global solutions were required. The apparently neat boundary between producer, transit and consumer countries has clearly broken down. Drugs are illegally produced in

developed and developing regions, and precursors required for the manufacture of drugs from the raw products are usually distributed from more industrialized countries to usually less-developed regions where drugs are produced.

Globalization has diminished geographical barriers making drugs more available throughout the globe, yet the level of development, geography and drug markets play an important role in drug problems.

As to *production*, marijuana grows in most countries of the world and is today the most widely consumed substance; amphetamine-type stimulants can be produced inside countries provided precursors are available: since 1990, 60 countries have reported to the United Nations illegal production of this substance [13]; in contrast, 99% of the cocaine is grown in the Andean region in South America and the large majority of opium is cultivated in Afghanistan (93% of the world production) with Myanmar, Pakistan and Lao People's Democratic Republic contributing in a lesser proportion; in the Americas, Colombia, Mexico and more recently Guatemala cultivate small quantities of this drug [13], mainly for the United States market estimated in 1.3 million users [14].

Drugs produced in these limited number of countries are trafficked and made available to drug users around the world, it is possible to track changes in traffic routes and in local rates of drug use and problems. As an example, we describe the changes in the routes of cocaine in the Americas to the US market and to Europe, and the modifications of drug-use rates in the same periods.

In the 1970s, the Colombian cartels preferred the Caribbean corridor, *interdiction* success produced a change in routes. These modifications have affected significantly the rates of drug use in the region. By 1998, UNODC estimated that 59% of the cocaine went via Central America/Mexico and 30% via the Caribbean; by 1999, flows of drugs passing through the Central American/Mexico corridor dropped to 54%, while flows through the Caribbean increased to 43%; in 2000, the proportions shifted to 66% and 33%, respectively; the rates for 2003 were 77%, 22% and in 2006, 90% was said to have transited through the Central America/Mexico corridor [14].

In Mexico, the cumulative incidence or number of cases that have used the drug and survived to the moment of the survey of cocaine use were as low as 0.33% amongst the urban population 12–65 years of age [15]; by 2002, it had increased to 1.23% [16] and in 2008 it reached 2.37% of the adolescent and adult urban population [17].

A more recent example is the increase in the amount of cocaine shipped to West Africa from South America. It has been estimated that in 2007, 35% of the cocaine shipped from the coasts of Colombia, Venezuela, Brazil and the Guyanas is trafficked through this corridor [14]; in parallel, a resulting increase in the amount of drug use in these regions has been observed [13], for example, in Brazil the annual prevalence rate of cocaine changed from 0.4% in 2001 to 0.7 in 2005 [18].

The increase in drug availability is a contributing factor to the enlargement of the population that uses drugs if other variables in the social context that facilitate drug use, co-occur.

The *number of countries that report use of different substances* provides useful information on the extension of use of different type of substances. From this indicator we know that cannabis (marijuana and hashish) is the most extended drug in the world, by 2000 it was used in 96% of countries that report to the United Nations, followed by opiates (heroin, morphine and opium: 87% and derivatives from the coca leaf (81%). The use of these natural products is followed by amphetamine-type stimulants (73%), benzodiazepines (controlled

psychotropic that has a depressant effect on the central nervous system) (69%), various types of solvent inhalants (69%) and hallucinogens (60%) [19].

There are important variations within the countries in the *proportion of the population that has been exposed to the substances*. The United Nations estimated that in 2006/2007; around 5% of the population 15–64 years of age had used drugs at least once in the last 12 months and that problem use reached 0.6% of the population. The most widely consumed drug was cannabis with 3.9% of users, followed at a considerably lower extent by amphetamines with 0.6% of the world's population (with use of ecstasy reaching 0.2%), opiates were reported by 0.39% of which 0.28% was heroin, and 0.38% had used cocaine [20].

Globally, the United Nations has estimated that in 2007 between 172 and 250 million people took drugs at least once in the last 12 months and that there are between 18 and 38 million problem drug users aged 15–64 years. Of the total persons that used drugs in the previous year, between 134 and 190 million correspond to marijuana and other forms of cannabis, between 16 and 51 million to amphetamine group and between 12 and 24 million are ecstasy and ATS users in East and South East Asia, of methamphetamines in North America, of amphetamines in Europe and in the Near and Middle East. As for opiates, between 15 and 21 million reported their intake with higher rates found along the trafficking routes close to Afghanistan, in 2006 it was estimated that some 11 million were taking heroin, with an increase in Asia, and no differences in other parts of the world. In 2007 between 16 and 21 million reported the intake of cocaine [13].

As not all the population exposed become heavy consumers and develop dependence, it is important to consider rates of *drug abuse and dependence*. From the tradition of psychiatric epidemiology, the World Mental Health Initiative, reports rates of substance abuse without dependence and dependence with abuse (dependence was estimated only for those that reported having experienced problems) for seven developing countries, Nigeria [21], two sites in China (Beijin and Shangai) [22], Colombia [23], South Africa [24], Ukraine [25] Lebanon [26] and Mexico [27] and two countries from the developed world, United States [28] and New Zealand [29].

Results from this initiative show interesting differences in lifetime prevalence. The highest rates were observed in the United States (7.9% abuse and 3% dependence) and in New Zealand (5.3% abuse and 2.2% dependence), and the lowest in Lebanon (0.5% abuse and 0.1% dependence), China (0.5% abuse), Nigeria (1.0% abuse) and in Ukraine (0.9% abuse and 0.5% dependence); from the developing world, South Africa (3.9% abuse and 0.6% dependence), Mexico (2.7% abuse and 0.8% dependence) and Colombia (abuse 1.6%, dependence 0.6%) ranked relatively high.

Treatment demand has been used to describe geographical differences in the type of drug problem that countries are phasing. This indicator [13] shows that in South-America the highest demand is derived from cocaine (52% of all treatment demand) it is also the main drug of abuse amongst people in treatment in North America (33.5%); in contrast, in Europe and Asia, opiates occupy the first place (60% and 65%, respectively), and cocaine represents a small proportion, 8.4% in Europe and only 0.3% in Asia. In Africa, cocaine is gaining importance representing 7.2% of treatment demand, but cannabis remains as the main reason for seeking treatment (63%); this is also true in Oceania (47% in Australia and in New Zealand); cannabis is playing a more important role in Europe (19.5% of treatment demand is due to the use of this drug). In North America (Canada, US and Mexico) after cocaine (33.5%) cannabis (23.3%) occupies second place of importance in treatment

demand; opiates on average in the North American region occupy the third place (20.7%), but in México only 7% of patients in treatment have reported heroin use [30], opiates are rarely seen amongst patients in treatment in South America (1.7%) but represent 16.5% of treatment demand in Africa. Amphetamine-type stimulants were more prominent in Asia (18%), Oceania (20%) and in North America (18%) and are responsible for an increasing proportion of treatment demand, in South America (10.9%) [13].

It is well known that not all persons with drug dependence reach treatment, the WHO World Mental Health Survey [31], documents a *treatment gap* amongst persons with substance-abuse disorders in the year previous to the surveys in developed and developing countries, in the United States, for example, 51.5% of the population 18 years of age and older received any treatment [28], the rate for Mexico was only 17% [32].

Overall, only a small proportion of cases had contact with treatment during the first year of onset of the substance-abuse disorder, including alcohol, ranging from 0.9% in Mexico to 2.8% in Nigeria and China. In the developed world, the proportion was larger but still low, 6% in New Zealand and 11.3% in the United States. By age 50, a larger proportion had been treated in these countries, an average of 22% of cases in the developing countries and 62% in the countries from the developed world [33].

Drug use is related to an important number of health outcomes (morbidity), that include infectious diseases such as HIV Hepatitis B and C, suicide, neuropsychiatric conditions, complications for the offspring of addicted mothers, overdoses, accidents and poisoning and suicide [5]. Injecting drug use, reported in 148 countries and territories [34] has been a behaviour of special concern due to the frequency in which contaminated injection equipment is used and because the lifestyles of this group are often related to high-risk sexual behaviour. Furthermore, poor living conditions and stigmatization are important barriers for accessing services.

HIV infection amongst people who inject drugs has been reported in 120 countries and it has been estimated that there are approximately 16 million injecting drug users worldwide, 3 million of which are infected with HIV. The largest numbers of HIV positive people who inject drugs are in Eastern Europe, East and Southeast Asia and Latin America; it has been estimated that up to 40% of some groups in these regions are HIV positive. China, the United States, the Russian Federation and Brazil have the largest populations of injectors and account for 45% of the total estimated worldwide population of people who inject drugs [35]. Hepatitis C is a related disorder, estimated to affect over 80% of injecting drug users [36]. Other forms of drug use, particularly amphetamine and methamphetamine have also been associated to risk of developing the immunodeficiency syndrome [35].

Overall, it has been estimated that in 2000, 0.4% (0.6% for males and 0.2% for females) of the *mortality* in the world was attributable to illicit drugs, when days without health are included, using a measure known as *Burden of Disease*, the estimated proportion increases to 0.8% (1.1% for males and 0.4% for females) [5].

Rehm *et al.* [5] estimated that the global burden, measured in disability adjusted life years attributable to illicit drugs, was higher in the developed world 1.8% (2.3% for males and 1.2% for females) followed by low mortality in developing regions or emerging economies, 0.8% (1.2% for males and 0.3% for females) and only 0.5% (0.8% for males and 0.2% for females) in high-mortality developing regions. This measure includes death by murder but does not include other indicators of the social impact of *drug-related violence* that affect societies [37]. For instance, the people of the Latin America region identify economic issues and crime as their two greatest problems [37].

Illegal production and trafficking routes are factors related to availability of substances, and thereby have an impact on the variations in rates of use described above, as well as on different sociocultural factors that validate certain forms of use in well-defined social groups. There are certain individual characteristics that make a person more vulnerable to experimenting and going on to abuse and depend on drugs (for example emotional problems, low self-esteem or low perception of risk associated to the use of different drugs). There are also characteristics of the proximal environment where individuals develop (for example whether or not their close friends use drugs) and those of the more distal context such as social inequality, lack of employment opportunities for youth and access to treatment, that impact on this vulnerability. But availability of substances is a necessary precondition for drug use [33,38,39].

The rate of problems is modulated by Illicit production increasingly focuses either on the territory of unsuccessful or geographically marginalized states, not necessarily wedded to the production of illegal drugs, but more likely, where drug production has become a symptom of wider structural problems [40]. According to the United Nations, particularly vulnerable to drug-trafficking organizations are states with a weak social and institutional fabric, or in which political events, domestic instability and conflict have contributed to the collapse or weakening of state structures and controls [41]. And those more attractive for the establishment of new markets are those where drugs are produced or trafficked. The rate of problems is also determined by the access to treatment and by availability of treatment options for the dependence to different substances.

In the following sections particularities of the different substances are discussed.

1.1.4 Cannabis

Marijuana is a greenish-grey mixture of the dried, shredded leaves, stems, seeds and flowers of the hemp plant *Cannabis sativa*. Its main active chemical is THC (delta-9-tetrahydrocannabinol), which causes the mind-altering effects of intoxication. The amount of THC (which is also the psychoactive ingredient in hashish) determines the potency and, therefore, the effects of marijuana. As THC enters the brain, it causes a user to feel euphoric – or ‘high’ – by acting on the brain’s reward system, areas of the brain that respond to stimuli such as food and drink as well as most drugs of abuse. THC activates the reward system in the same way that nearly all drugs of abuse do, by stimulating brain cells to release the chemical dopamine [42].

Cannabis is produced in all regions and in almost all latitudes of the world. In the last decade, 120 countries reported illegal cultivation in their territories. The main region of production is located in the north of Africa and there is evidence that the cultivation in Latin America has diminished, while an increase is observed in Europe, Asia and Africa. Indoor production has enlarged in some areas of Europe and North America and in the east of Europe, increasing the concentration of THC from 3 to 7% registered in the 1990s to 10 to 30% [19].

According to the UNODC [20] the estimated global number of cannabis users ranges from some 142.6 to 190.3 million persons, equivalent to a range from 3.3 to 4.4% of the population aged 15–64 who used cannabis at least once in 2007.

The World Mental Health Initiative [31] included not only substance-use disorders, aetiological factors and the analysis of the treatment gap in different countries, but also the