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GLOBAL OVERVIEW: DRUG DEMAND DRUG SUPPLY

2

WORLD DRUG REPORT 2021

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PREFACE

Drugs cost lives.

In an age when the speed of information can often outstrip the speed of verification, the COVID-19 pandemic has taught us that it is crucial to cut through the noise and focus on facts, a lesson that we must heed in order to protect societies from the impact of drugs.

Drug use killed almost half a million people in 2019, while drug use disorders resulted in 18 million years of healthy life lost, mostly due to opioids. Serious and often lethal illnesses are more common among drug users, particularly those who inject drugs, many of whom are living with HIV and Hepatitis C.

The illicit drug trade also continues to hold back economic and social development, while disproportionately impacting the most vulnerable and marginalized, and it constitutes a fundamental threat to security and stability in some parts of the world.

Despite the proven dangers, drug use persists and, in some contexts, proliferates. Over the past year, around 275 million people have used drugs, up by 22 per cent from 2010. By 2030, demographic factors project the number of people using drugs to rise by 11 per cent around the world, and as much as 40 per cent in Africa alone.

There is often a substantial disconnect between real risks and public perception. In some parts of the world for example, cannabis products have almost quadrupled in potency, and yet the percentage of adolescents who perceive cannabis as harmful has dropped by as much as 40 per cent, despite the evidence linking regular use to health problems, particularly in young people, and despite the correlation between potency and harm.

New psychoactive substances also continue to be a challenge, as markets witness the introduction of new drugs that are unpredictable and poorly understood. Regulatory and legislative steps have been successful in stemming the tide globally, but in low-income countries the problem is on the rise; between 2015 and 2019, South and Central America recorded a fivefold rise in the amount of new synthetic psychoactive substances seized, while seizures in Africa increased from minor to substantial amounts. Strong increases were also reported in South and Southwest Asia as well as the Near and Middle East.

Meanwhile, the COVID-19 crisis has pushed more than 100 million people into extreme poverty, and has greatly exacerbated unemployment and inequalities, as the world lost 114 million jobs in 2020. In doing, so it has created conditions that leave more people susceptible to drug use and to engaging in illicit crop cultivation.

Furthermore, disparities in access to essential controlled medicines around the world continue to deny relief to patients in severe pain. In 2019, four standard doses of controlled pain medication were available every day for every one million inhabitants in West and Central Africa, in comparison to 32,000 doses in North America.

In parallel, drug traffickers have quickly recovered from the initial setback caused by lockdown restrictions and are operating at pre-pandemic levels once again. Access to drugs has also become simpler than ever with online sales, and major drug markets on the dark web are now worth some $315 million annually. Contactless drug transactions, such as through the mail, are also on the rise, a trend possibly accelerated by the pandemic.

Communicating facts about drugs and promoting science-based interventions is an absolute necessity if we are to reduce demand and supply of drugs, while also facilitating access to controlled medicines for those in need. It is also the surest path to eliminating stigmatization and discrimination and providing adequate treatment, as seven in eight people who suffer from drug use disorders remain without appropriate care.

At the UN Office on Drugs and Crime we are dedicated to pursuing and promoting fact-driven, human rights-based approaches to drug control and treatment.

I am proud to present to you this World Drug Report, which embodies our commitment to raising awareness and combating misinformation.

It is my hope that this report will inform policymakers, practitioners, and the general public on the facts of the world drug problem, and provide them with a powerful tool to share evidence and information, and in doing so help save and preserve lives.

Ghada Waly, Executive Director
United Nations Office on Drugs and Crime

WORLD DRUG REPORT 2021

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EXPLANATORY NOTES

The designations employed and the presentation of the material in the *World Drug Report* do not imply the expression of any opinion whatsoever on the part of the Secretariat of the United Nations concerning the legal status of any country, territory, city or area, or of its authorities, or concerning the delimitation of its frontiers or boundaries.

Countries and areas are referred to by the names that were in official use at the time the relevant data were collected.

Since there is some scientific and legal ambiguity about the distinctions between "drug use", "drug misuse" and "drug abuse", the neutral term "drug use" is used in the *World Drug Report*. The term "misuse" is used only to denote the non-medical use of prescription drugs.

All uses of the word "drug" and the term "drug use" in the *World Drug Report* refer to substances controlled under the international drug control conventions, and their non-medical use.

All analysis contained in the *World Drug Report* is based on the official data submitted by Member States to the UNODC through the annual report questionnaire unless indicated otherwise.

The data on population used in the *World Drug Report* are taken from: *World Population Prospects: The 2019 Revision* (United Nations, Department of Economic and Social Affairs, Population Division).

References to dollars ($) are to United States dollars, unless otherwise stated.

References to tons are to metric tons, unless otherwise stated.

The following abbreviations have been used in the present booklet:

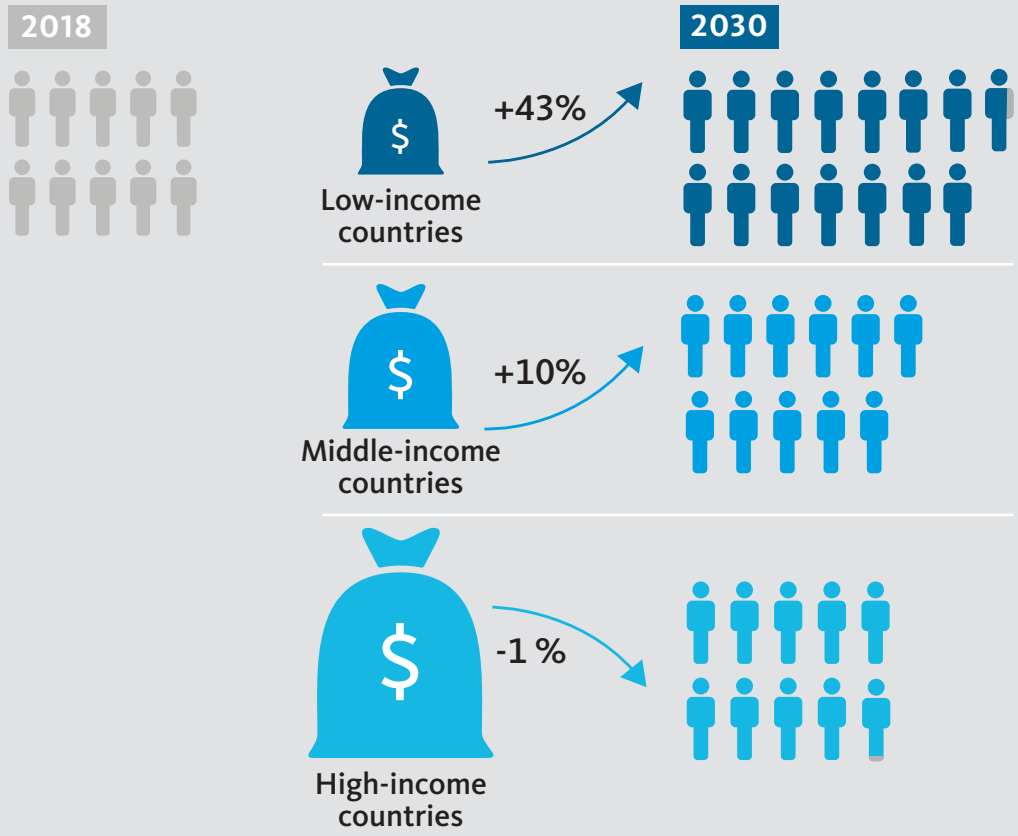
ASEAN	Association of Southeast Asian Nations
ATS	amphetamine-type stimulants
CBD	cannabidiol
COVID-19	coronavirus disease
DALYs	disability-adjusted life years
DMT	dimethyltryptamine
Δ-9-THC	*delta*-9-tetrahydrocannabinol
EMCDDA	European Monitoring Centre for Drugs and Drug Addiction
Europol	European Union Agency for Law Enforcement Cooperation
GBL	*gamma*-butyrolactone
GHB	*gamma*-hydroxybutyric acid
INCB	International Narcotics Control Board
LSD	lysergic acid diethylamide
MDMA	3,4-methylenedioxymetamphetamine
MPDV	3,4-methylenedioxypyrovalerone
NPS	new psychoactive substances
PWID	people who inject drugs
S-DDD	defined daily doses for statistical purposes
UNAIDS	Joint United Nations Programme on HIV/AIDS
UNDP	United Nations Development Programme
UNODC	United Nations Office on Drugs and Crime
WHO	World Health Organization

SCOPE OF THE BOOKLET

Constituting the second part of the *World Drug Report 2021*, the present booklet contains an overview of the global demand for and supply of drugs. It provides the latest estimates of and trends in drug use and looks at several cross-cutting issues related to the world drug problem. Among the issues examined are the extent of drug use and its health impact, including trends seen among people with drug use disorders, drug treatment demand, the harms resulting from NPS use, and HIV and hepatitis among people who inject drugs. The booklet also features a projection of the impact of population growth on drug use by 2030.

On drug supply, the booklet provides an overview of the extent of illicit crop cultivation and trends in drug production and trafficking, including of NPS, at the global level. In addition, it reviews the latest evidence regarding the supply of drugs and other substances through drug markets on the Internet. It includes a chapter dedicated to the sale on the clear web of a number of synthetic substances destined for drug markets, and another on trafficking in drugs and NPS on the dark web.

INCREASE IN POPULATION AT MOST RISK OF DRUG USE IS HIGHEST IN COUNTRIES WITH LOW LEVEL OF INCOME



Looking towards 2030: how will demographic changes impact drug use?

Research has shown that underlying factors influence drug use and its extent in the population. Trends in drug use are determined by a multitude of factors related to individual, family, community and environmental characteristics, as well as by the impact of national and local policy and service delivery.[1]

The interlinkage and complexity of these factors make drug use difficult to forecast and project. However, the size and composition of the global population are perhaps the only elements that can be easily considered to anticipate the global extent of drug use in the future. Notwithstanding the unpredictable trajectory of the prevalence of drug use, the total number of people who use drugs is a direct function of the population size. Therefore, using a population projection can provide a scenario of the size of the population using drugs in 2030, the target year for achieving the Sustainable Development Goals. Such a scenario can assist drug service providers in different regions to consider the order of magnitude of potential efforts needed to meet target 3.5 of the Sustainable Development Goals on strengthening the prevention and treatment of substance use.

The focus of the present chapter is an analysis that projects, solely as a result of demographic changes, the size of the global and regional populations of people who use drugs in 2030, assuming that the percentage of people who use drugs remains the same; it is not aimed at forecasting drug use, which would involve taking many more factors into account.

While population growth definitely matters, it may not be the main driver of change in the number of people expected to use drugs by 2030. In addition to population growth, changes in levels of drug use are likely to occur over the next decade as a result of changes in drug policy and other factors, such as changes in legislation and in its implementation, changes in service provision, and changes in youth culture, risk perceptions and social norms, to name but a few. The impact of the COVID-19 pandemic may also lead to changes in drug use. Changes of that nature and their impact on drug use are, however, very difficult to predict and quantify at present.

The analysis presented here should therefore be used to anticipate, within reason, the size of the population that uses drugs and its distribution across regions, rather than serve as an accurate forecast of future drug use. This projection can help provide the contextual knowledge needed for the development of evidence-based policies aimed at addressing drug supply and drug demand, because an increase in the number of people who use drugs by 2030 is likely to be matched by an increase in drug cultivation, manufacturing and trafficking, as well as an increase in the number of people with drug use disorders who need drug service provision.

As the analysis shows, the population growth projection for 2030 translates into a potential increase of 11 per cent in the global population who use drugs, with a much greater impact in low-income than in high-income countries. The consideration of a broader context, including other projected demographic changes, related to age and sex distribution and urbanization, may result in an even greater increase in the total number of people who use drugs in low-income countries, particularly in Africa. With drug use being higher among young people than among those in older age groups, the fact that there is a larger proportion of young people in middle- and low-income countries than in high-income countries is likely to exacerbate the increase in the total number of people using drugs, as is the trend towards urbanization. Finally, depending on the extent to which the prevalence of drug use among women converges upwards towards that among men, additional impetus may be given to the number of drug users. However, even taken altogether, these changes and factors may not be the most important drivers of changes in drug use over the next decade.

1 See previous World Drug Reports, in particular UNODC, *World Drug Report 2020*, booklet 4, *Cross-Cutting Issues: Evolving Trends and New Challenges* (United Nations publication, 2020).

Projected impact of population growth on drug use by 2030

In 2018, an estimated 269 million (range: 166–373 million) people had used a drug at least once in the previous year, equivalent to 5.4 per cent (range: 3.3–7.5 per cent) of the global population aged 15–64.[2] Assuming no change in the global prevalence of drug use, considering solely the projected increase in the global population would result in the global number of people who use drugs rising by an estimated 11 per cent, to 299 million people by 2030. This projection is purely a reflection of population growth.[3]

Such an increase at the global level would mask, however, important variations in growth rates across regions. The strongest growth in population, and thus in the projected number of people who use drugs, will take place in lower-income countries (such growth is forecast to exceed 40 per cent over the period 2018–2030), while countries in more developed regions, in particular Europe, will likely see a decline in the number of people who use drugs by 2030.[4]

As a result of its projected population growth and relatively young population, Africa is likely to be particularly vulnerable to an increase in the number of people who use drugs by 2030

Of the 269 million people estimated, in 2018, to have used a drug in the previous year, about 60 million (range: 35–81 million) were located in Africa, representing 8.4 per cent (range: 5.0–11.4 per cent) of the population aged 15–64 in that region; the estimated prevalence of drug use in Africa was therefore higher than the estimated global prevalence in 2018.[5] Africa is also forecast to have the largest population growth of any region over the period 2018–2030 and thus appears to be particularly vulnerable to an increase in the number of people who use drugs in the next decade, merely as a result of population growth.

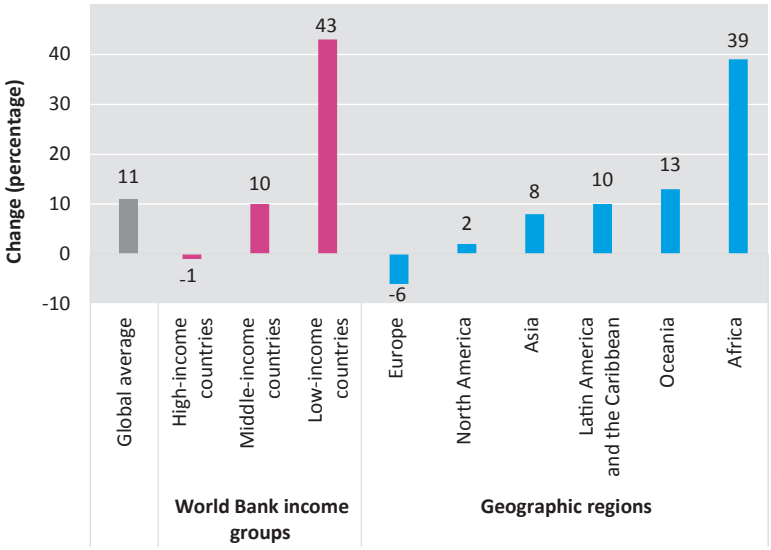
2 UNODC, *World Drug Report 2020*, booklet 2, *Drug Use and Health Consequences* (United Nations publication, 2020).

3 This projection does not account for changes in age structure on drug use, owing to the limited availability of data on drug use prevalence at the national level, which impedes the development of global and regional estimates of drug use by age.

4 UNODC estimates, based on responses to the annual report questionnaire; and United Nations, Department of Economic and Social Affairs, Population Division, *World Population Prospects: Revision 2019*.

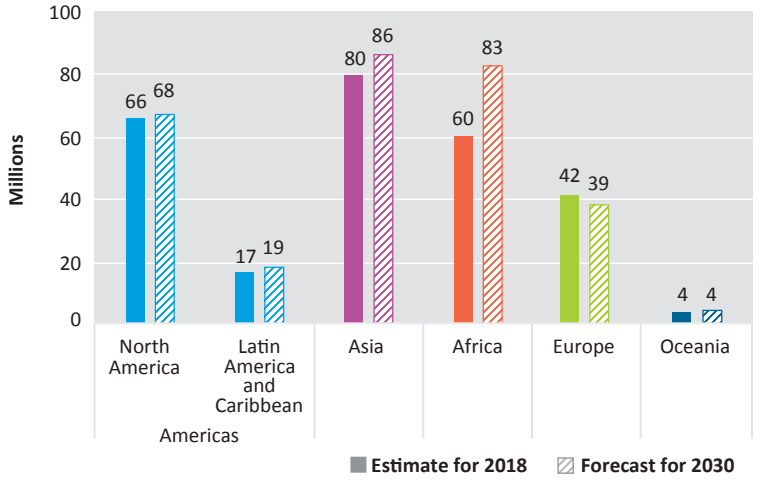
5 UNODC, *World Drug Report 2020*, booklet 2, *Drug Use and Health Consequences*.

FIG. 1 Projected change in the size of the population aged 15–64, by region and by income group, 2030 compared with 2018



Source: United Nations, Department of Economic and Social Affairs, Population Division, *World Population Prospects: Revision 2019* (United Nations publication, 2019).

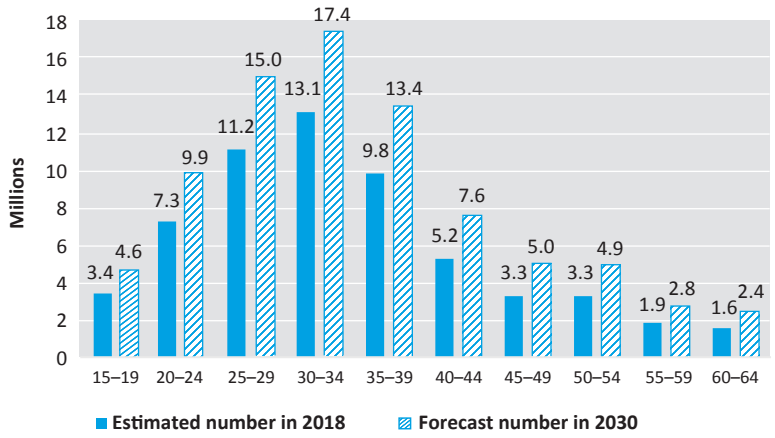
FIG. 2 Estimated number of people who had used drugs in the past year in 2018 and projected number in 2030, solely as a result of population growth, by region



Source: UNODC estimates, based on responses to the annual report questionnaire; and United Nations, Department of Economic and Social Affairs, Population Division, *World Population Prospects: Revision 2019.*

Note: The 2030 estimates reflect solely the changes in population size by region based on regional projections for the total population aged 15–64 for 2030. They assume no change in drug use; i.e., they assume that the prevalence of drug use in 2018 will remain unchanged by 2030.

FIG. 3 Estimated number of people who had used drugs in the past year in 2018 and projected number in 2030 (solely as a result of projected population growth), by age group, Africa



Sources: UNODC estimates, based on responses to the annual report questionnaire; UNODC and Nigeria, *Drug Use in Nigeria 2018* (Vienna, 2019); and United Nations, Department of Economic and Social Affairs, Population Division, *World Population Prospects: Revision 2019.*

Note: The 2030 estimates reflect solely the changes in population size by age, based on the forecast by age of the population aged 15–64 for 2030 in Africa and on the distribution of cannabis use by age in Nigeria in 2018 (used as a proxy in the absence of the distribution of drug use by age for Africa as a whole). They assume no change in drug use; i.e., they assume that the prevalence of drug use in Africa in 2018 will remain unchanged by 2030. They also assume that the relative breakdown by age of drug use (on the basis of the data on cannabis in Nigeria) will remain unchanged over time.

On the basis of the assumption of an unchanged overall prevalence of drug use in Africa, population growth alone would result in an increase of 38 per cent in the number of people who use drugs over the period 2018–2030 in the region, to reach a projected 83 million (range: 49 million–112 million) in 2030.

Considering the age structure of the current population of Africa and its projection by 2030, the projected number of people who use drugs in the region could be concentrated mainly in the age groups 25–29 and 30–34. The age group 30–34 is likely to remain that with the highest level of drug use in Africa, in terms of both prevalence and the number of people who use drugs, by 2030. However, the largest relative increase (by 50 per cent) between 2018 and 2030 in the projected number of people who use drugs in Africa is likely to be among the population aged 45–54. Their number (9.9 million in 2030), however, is projected to remain nearly half of those aged 30–34 (17.4 million in 2030).[6]

Differences between men and women in the extent of drug use may play a critical role in changes in the projected number of people who use drugs in developing countries, including in Africa

One factor that could contribute to even stronger growth in drug use in some regions could be the closing of the gap between men and women in terms of the prevalence of drug use. At the global level, the prevalence of drug use continues to be higher among men than among women, with an estimated two in three people who use drugs being men.[7] Having said that, there are a few classes of drug, such as tranquillizers (used non-medically), for which the prevalence of use is higher among women than among men.[8] If drug use among women in the future becomes more similar to that among men, there may be more women using drugs and the expected total number of users may be higher than that projected simply on the basis of population growth.

In Western countries, the gap between men and women in the prevalence of drug use has already started to close. In the United States of America, for example, the prevalence of drug use among women was equivalent to 69 per cent of the prevalence among men in 2010, but it had reached 77 per cent by 2019, when the prevalence rate was 17 per cent among women and 22 per cent among men, and it was actually higher among girls aged 12–17 than among boys of the same age.[9]

Among high-school students aged 15–16 in 30 European countries, the prevalence of drug use among girls was, on average, equivalent to 68 per cent of the corresponding prevalence rate among boys in 1995; this rose to 74 per cent by 2019, or – if only data from countries reporting in both 1995 and 2019 are compared – from 68 to 78 per cent.[10]

6 These projections assume that the regional prevalence among the population aged 15–64 of 2018 in Africa will remain constant over time and that the distribution of drug use by age in Africa is the same as that in Nigeria in 2018 for cannabis (used as a proxy in the absence of a regional distribution of drug use by age for Africa) and that it will also remain constant over time. See online methodological annex of the present report for further details.

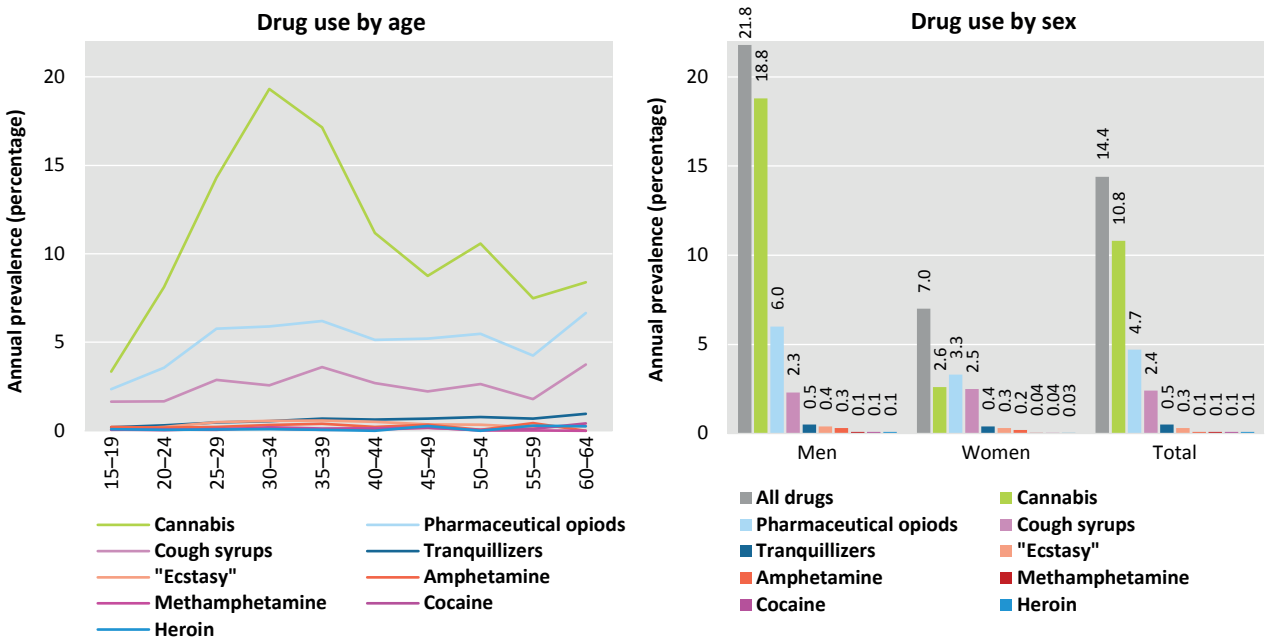
7 UNODC, *World Drug Report 2015* (United Nations publication, 2015).

8 UNODC, *World Drug Report 2016* (United Nations publication, 2016).

9 United States, Substance Abuse and Mental Health Services Administration, Center for Behavioral Health Statistics and Quality, "SAMHSA, 2019 National Survey on Drug Use and Health: Detailed Tables" (11 September 2020), and previous years.

10 EMCDDA, *ESPAD Report 2019: Results from the European School Survey Project on Alcohol and Other Drugs*, Joint Publications Series (Luxembourg, Publications Office of the European Union, 2020).

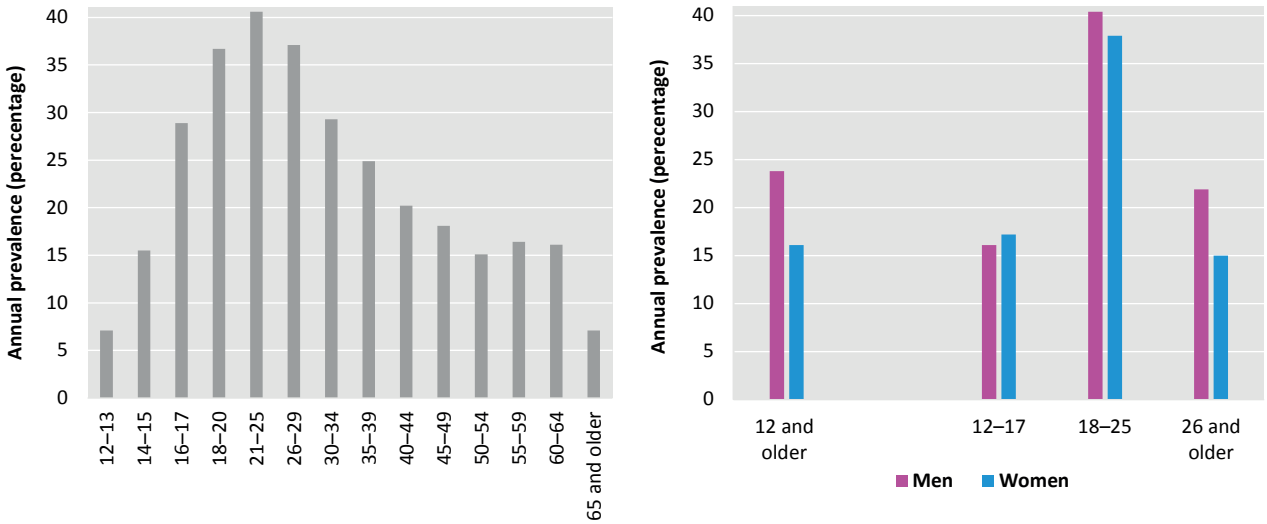
FIG. 4 Drug use, by age and sex, Nigeria, 2018



Source: UNODC and Nigeria, *Drug Use in Nigeria 2018* (Vienna, 2019).

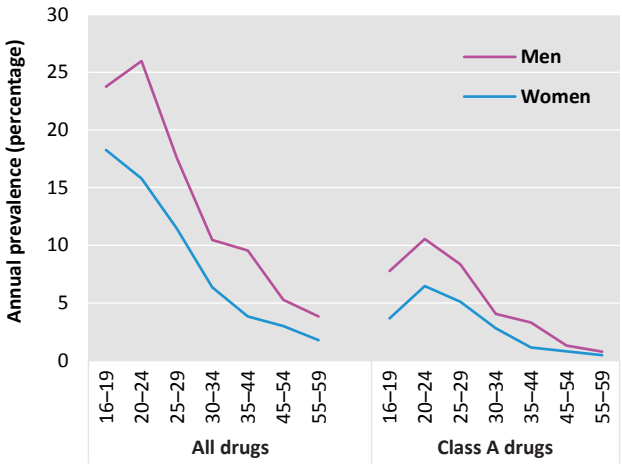
Note: Non-medical use of pharmaceutical opioids, cough syrups, tranquillizers and amphetamine.

FIG. 5 Drug use, by age and sex, United States, 2019



Source: United States, Substance Abuse and Mental Health Services Administration, Center for Behavioral Health Statistics and Quality, "SAMHSA, 2019 National Survey on Drug Use and Health: Detailed Tables" (11 September 2020).

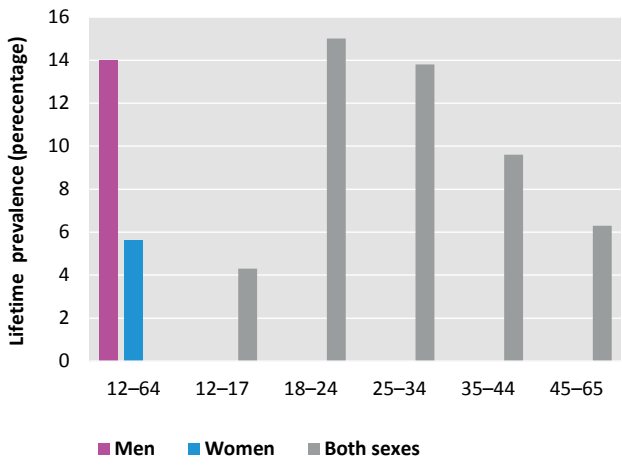
FIG. 6 Drug use, by age and sex, England and Wales, United Kingdom, fiscal year 2019/20



Source: United Kingdom, Office for National Statistics, "Drug Misuse in England and Wales: year ending March 2020", item 10, appendix tables.

Note: Class A drugs include, in England and Wales, substances such as opiates (notably heroin), methadone, cocaine, methamphetamine and hallucinogenic mushrooms.

FIG. 7 Drug use, by age and sex, Colombia, 2019



Source: Colombia, National Department of Statistics, "Boletín Técnico: Encuesta Nacional del Consumo de Sustancias Psicoactivas (ENCSPA) – Período de referencia 2019" (Bogotá, July 2020).

By comparison, the prevalence of drug use among women in Nigeria (estimated at 4.0 per cent in 2018) accounts for less than one third of the corresponding prevalence among men (12.9 per cent);[11] however, such a ratio does not apply to all drug categories. For example, in the case of non-medical use of certain pharmaceutical products, use among women exceeds use among men.[12]

Although there is no evidence to suggest that an increase in the prevalence of drug use among women to a level comparable to that among men is likely to occur in middle- and low-income countries in the foreseeable future, a narrowing of the gender gap is possible. In Africa, for example, if the prevalence of drug use among women were to increase to the overall average prevalence rate in Africa (estimated at 8.4 per cent in 2018), thereby reaching 65 per cent of the prevalence of drug use among men,[13] the overall number of people who use drugs in Africa would rise by about 75 per cent by 2030.

Population most at risk of using drugs, young people aged 15–34, is projected to grow in the next decade, in particular in low-income countries

Most research suggests that adolescence and young adulthood is a critical risk period for initiating drug use.[14] Compared with high-income countries, low-income countries have a younger population. Data show that people aged 15–34 account for about one quarter of the total population in high-income countries and more than one third in low-income countries.[15]

The number of young people in middle- and low-income countries is expected to increase over the next decade. By contrast, population growth in high-income countries is projected to be primarily among those aged 65 and older; the population aged 15–34, the cohort most at risk of using drugs, is projected to decline. This suggests that low-income countries could see a stronger increase in the population using drugs than the increase calculated

11 UNODC estimates, based on responses to the annual report questionnaire and on UNODC, *Drug Use in Nigeria 2018* (Vienna, 2019).

12 UNODC and Nigeria, *Drug Use in Nigeria 2018* (Vienna, 2019).

13 Based on data on drug use disaggregated by sex in Nigeria (ibid.).

14 See, for example, UNODC, *World Drug Report 2018*, booklet 4, *Drugs and Age: Drugs and Associated Issues Among Young People and Older People* (United Nations publication, 2018).

15 United Nations, Department of Economic and Social Affairs, *World Population Prospects: Revision 2019* (New York, 2019).

purely on the basis of total population growth. That said, such country groupings may also mask large differences in both population age structure and how that structure is projected to change over the next decade between countries with the same level of income.

Projected impact of urbanization on drug use by 2030

Research has shown that urbanization is likely to be one of the many factors that can have an impact on drug use.[16, 17] There is no estimate that can easily determine the extent to which urbanization influences drug use, and it is therefore not possible to quantify the impact of projected urbanization on total drug use. However, the positive correlation observed in some studies between urbanization and drug use suggests that the projected global increase in urbanization may lead to a stronger increase by 2030 in the global number of people who use drugs than the increase projected purely on the basis of population growth.

The positive correlation between drug use and urbanization may be explained by underlying factors: an increase in drug use may not necessarily result from urbanization in itself, but rather from widespread poverty, unemployment or criminality, which may be associated with some urban areas.[18]

Irrespective of the restricted social mobility of some population groups and urban deprivation, many cities are also known for their nightlife (often associated with higher levels of drug use). The age structure can be different in cities, too, as younger people may be more likely to move to urban agglomerations than older people. In short, cities contain multiple risk environments where various patterns of drug use, from occasional to problematic, may be seen.[19]

Moreover, while norms and value systems of individuals and communities may vary largely between countries, they may also differ between rural areas and urban

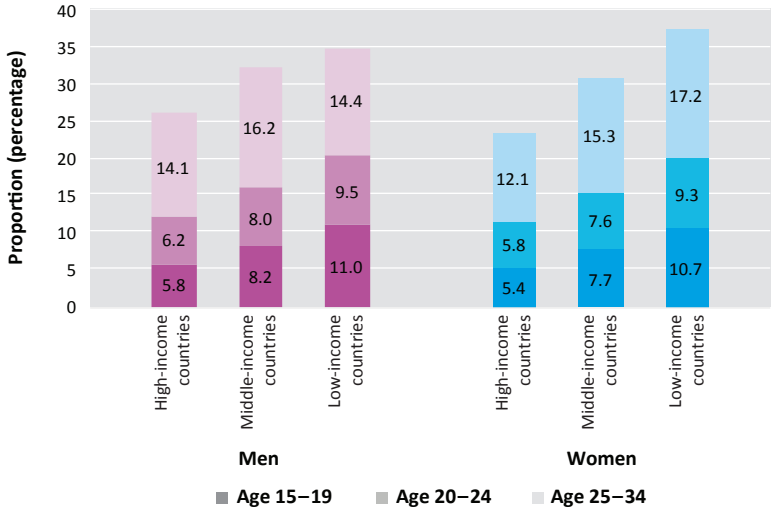
16 See Isidore S. Obot and Shekhar Saxena, eds., *Substance Use Among Young People in Urban Environments* (Geneva; Kobe, Japan, 2005, WHO).

17 Sheila Cyril, John C Oldroyd and Andre Renzaho, "Urbanisation, urbanicity, and health: a systematic review of the reliability and validity of urbanicity scales", *BMC Public Health*, vol. 13, art. No. 513 (May 2013).

18 Richard Godfrey and Marlene Julien, "Urbanisation and health", *Clinical Medicine*, vol. 5, No. 2 (March 2005), pp. 137–141.

19 EMCDDA, *Drugs Policy and the City in Europe*.

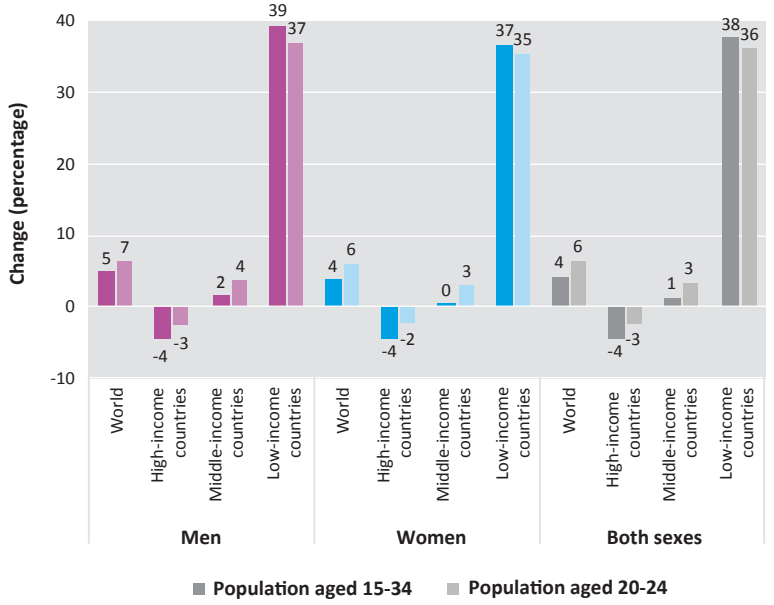
FIG. 8 Proportion of population most at risk of using drugs (i.e. youth and young adults), by income group and by sex, 2020



Source: United Nations, Department of Economic and Social Affairs, *World Population Prospects: Revision 2019*.

Note: Based on World Bank income groups.

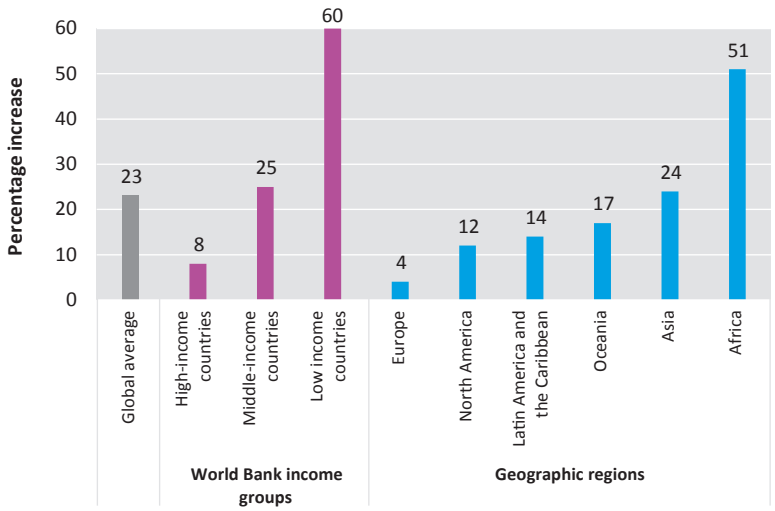
FIG. 9 Projected changes in the size of the population most at risk of using drugs (i.e. youth and young adults) between 2018 and 2030, by income group and by sex



Source: United Nations, Department of Economic and Social Affairs, *World Population Prospects: Revision 2019*.

Note: Based on World Bank income groups.

FIG. 10 Projected changes in the size of the urban population, by income group and by region, 1998–2030



Source: United Nations, Department of Economic and Social Affairs, *World Urbanization Prospects: The 2018 Revision* (United Nations publication, 2019).

Note: Based on World Bank income groups.

centres,[20, 21, 22, 23, 24] leading to differences in social controls[25, 26, 27, 28, 29] and the internalization of social norms,[30] which may have an impact on drug use.

20 Kalinga Seneviratne and Sivananthi Thanenthiran, *Cities, Chaos and Creativity: A Sourcebook for Communicators*, (Kuala Lumpur, Urban Governance Institute, UNDP, 2004).

21 Walter W. Custer and Pater A. Wyss, *Urbanisation in Entwicklungsländern: Arbeitspapiere der Interdisziplinären Nachdiplomstudiums für Entwicklungsländer* (Zürich, Verlag der Fachvereine an der ETH, 1974).

22 Robert Magliola and John Farrelly, eds., *Freedom and Choice in a Democracy*, vol. 1, Meanings of Freedom (Washington D.C., Council for Research in Values and Philosophy, 2004).

23 Zentrum für Historische Sozialforschung, Historical Social Research (Cologne, Germany, Gesellschaft Sozialwissenschaftlicher Infrastruktureinrichtungen–Leibniz-Institut für Sozialwissenschaften, 1979).

24 Hsian-Chuen Sharon Wei, *The Impact of Urbanization on the Chinese Family: A Comparative Study of Urban and Rural Families in Contemporary Taiwan* (Los Angeles, California, University of Southern California, 1980).

25 Brian J.L. Berry, *The Human Consequences of Urbanization, Divergent Paths in the Urban Experience of the Twentieth Century* (London, Macmillan Press, 1973).

26 M. Lakshmi Narasaiah, *Urbanisation and Cities* (New Delhi, Discovery Publishing House, 2003).

27 M.S. Gore, *Urbanization and Family Change* (Bombay, India, Popular Prakashan, 1990).

28 "Urbanization and family breakdown: most agree on a correlation between city life, crime", *Ebony*, vol. 34, No. 10 (August 1979).

29 John E. Fogarty International Center for Advanced Study in the Health Sciences, *The Family in Transition*, Fogarty International Center proceedings, No. 3 (Bethesda, Maryland, United States, Fogarty International Center, 1971).

30 Christoph Möller, *The Possibility of Norms: Social Practice Beyond Morals and Causes* (Oxford, Oxford University Press, 2020).

Access to drugs in urban areas is often easier than in rural areas (except in some drug-producing areas) as possibilities to use and traffic drugs are facilitated in areas where a drug scene already exists, a phenomenon that is found more often in urban than in rural settings.

Some research has shown far higher drug use levels in urban areas than in rural areas.[31] Data from school surveys in Colombia[32] and Mexico,[33] for example, have shown that the use of some drugs is up to 60 per cent higher in urban areas than in rural areas. Moreover, past-month prevalence of drug use in large metropolitan areas in the United States[34] is almost 80 per cent higher than in rural areas; in "cosmopolitan areas" of the United Kingdom of Great Britain and Northern Ireland, it is almost three times higher than in rural areas.[35]

The overall number of people living in an urban environment worldwide is projected to rise by 23 per cent between 2018 and 2030.[36] There was a strong positive correlation between growth in the estimated number of people who use drugs and growth in the number of people living in urban settings at the global level (R = 0.96) over the period 2009–2018. Shifts in the population from rural to urban areas are thus likely to go hand in hand with an increase in overall drug use, making the projection based solely on population growth of the number of people who use drugs in 2030 likely a very conservative estimate. In addition, expected growth in the urban population is projected to be significantly higher in low-income countries than in high-income countries.[37] Therefore, considering the impact of urban population growth on drug use, Africa is again likely to

31 UNODC, *World Drug Report 2020*, booklet 4, *Cross-Cutting Issues: Evolving Trends and New Challenges* (United Nations publication, 2020).

32 Observatorio de Drogas de Colombia, *Estudio Nacional de Consumo de Sustancias Psicoactivas en Población Escolar Colombia – 2016* (Bogotá, 2016).

33 Jorge Ameth Villatoro Velázquez and others, "El consumo de drogas en estudiantes de México: tendencias y magnitud del problema", *Salud Mental*, vol. 39, No. 4 (July–August 2016).

34 United States, Substance Abuse and Mental Health Services Administration, *Key Substance Use and Mental Health Indicators in the United States: Results from the 2018 National Survey on Drug Use and Health: Detailed Tables* (Rockville, Maryland, Center for Behavioral Health Statistics and Quality, 2019).

35 United Kingdom, Home Office, *Drug Misuse: Findings from the 2018/19 Crime Survey for England and Wales*, Statistical Bulletin, No. 21/19 (London, 2019), appendix tables.

36 United Nations Department of Economic and Social Affairs, *World Urbanization Prospects: The 2018 Revision* (United Nations publication, 2019).

37 Ibid.

be the region most at risk of further increasing levels of drug use over the next decade, although in absolute numbers the increase could also be significant in Asia, where a large share of the global population resides.

Potential impact of increased drug use in low-income countries on drug market dynamic

The projections discussed in this chapter suggest that increases in the number of people who use drugs are more likely to be found in low-income countries than in high-income countries over the next decade, in particular in Africa and, to a lesser extent, in Asia, rather than in Europe or North America. This suggests that there will be an increasing number of people who use drugs in countries where there are fewer resources available for drug prevention or comprehensive drug treatment responses. This may also mean that criminal profits generated by drug trafficking, which are usually highest at the end of the supply chain, in consumer countries, may shift from high-income to low-income countries, where resources for combating drug trafficking and money-laundering may be more limited.

European and North American markets may still be attractive to traffickers if retail prices and drug expenditure per user remain much higher than in low-income countries. However, with the affluent population expanding, the dynamics of drug markets may change in low-income countries and traffickers may find fertile ground for expansion. In particular, such trends may prompt criminal groups to move manufacture closer to consumer markets, including in countries that are particularly vulnerable to criminal infiltration and corruption. That said, the dynamics may also change in high-income countries where, to compensate for a decreasing base of young people, traffickers could more aggressively target the market through the development of new products that are differentially targeted at high- and low-income countries.

DRUG DEMAND

Impact of drug use on the health of the user and on public health

People who use drugs regularly are likely to experience negative health consequences such as drug use disorders. They are also more at risk of contracting infectious diseases such as HIV and hepatitis C, and to experience overdose and suffer from premature death. Furthermore, an association exists between drug use disorders and co-occurring or comorbid mental health disorders (for example, depression, anxiety or psychosis).[38, 39, 40] There is also an association between drug use disorders and socioeconomic disadvantage, low educational attainment, increased difficulty in finding and remaining in employment, and financial instability and poverty.[41]

The extent to which harmful drug use can affect both the people who use drugs and the people around them is also mediated by the availability of, and access to, services that can help address the adverse health and social consequences of drug use. Moreover, a societal culture that protects and promotes the human rights of people who use drugs and encourages people to access health-care services voluntarily without stigma or fear of recrimination reduces barriers and facilitates access to a range of services and interventions that address drug use disorders and social integration, especially for individuals from population groups with specific needs who are suffering from drug use disorders.[42]

38 Karen Santucci, "Psychiatric disease and drug abuse", *Current Opinion in Pediatrics*, vol. 24, No. 2 (April 2012), pp. 233–237.

39 Natalie C. Momen and others, "Association between mental disorders and subsequent medical conditions", *New England Journal of Medicine*, vol. 382 (2020), pp. 1721–1731.

40 Oleguer Plana-Ripoll and others, "Exploring comorbidity within mental disorders among a Danish national population", *JAMA Psychiatry*, vol. 7, No. 3 (January 2019), pp. 259–270.

41 See, for example, UNODC, *World Drug Report 2020*, booklet 5, *Socioeconomic Characteristics and Drug Use Disorders* (United Nations publication, 2020).

42 WHO and UNODC, *International Standards for the Treatment of Drug Use Disorders: Revised Edition Incorporating Results of Field-Testing* (Geneva and Vienna, 2020).

Extent of drug use

More than a quarter of a billion people use drugs

In 2019, an estimated 275 million people worldwide aged 15–64, or 1 in every 18 people in that age group, had used drugs at least once in the previous year (range: 175 million to 374 million). This corresponds to 5.5 per cent of the global population aged 15–64 (range: 3.5 to 7.4 per cent).

Between 2010 and 2019, the estimated number of past-year users of any drug globally increased from 226 million to 274 million, or by 22 per cent, in part as a result of global population growth, which increased by 10 per cent among those aged 15–64. However, considering the wide uncertainty intervals of these estimates and the fact that the global estimates represent the best available data in any given year, any comparison of the estimates should be undertaken with great caution.

Over the last decade, there has been a diversification in the substances available on the drug markets. In addition to traditional plant-based substances (cannabis, cocaine and heroin), the last decade has witnessed the expansion of a dynamic market for synthetic drugs and of the non-medical use of pharmaceutical drugs. Drugs are more potent nowadays and their increasing availability and consecutive or sequential use among occasional or regular users pose an even greater challenge than in the past to the prevention of drug use, treatment of drug use disorders and addressing the adverse health consequences thereof.[43]

In recent years, hundreds of NPS have been synthesized. The majority are stimulants, followed by cannabinoids and an increasing number of opioids, with unpredictable and sometimes severe negative health consequences, including death. The harm from use of NPS is more noticeable at the individual level than at the population level, with the exception of NPS opioids such as fentanyl analogues.[44]

43 See, for instance, UNODC, *World Drug Report 2019*, booklets 3, 4 and 5 (United Nations publication, 2019).

44 See the section entitled "Different dimensions of harms resulting from NPS", below.

General population surveys: measuring the extent of drug use

The estimate of the extent of drug use among the general population measured by the prevalence of drug use (lifetime, past 12 months or past month) is one of the key epidemiological indicators of drug use and provides important information to help policymakers and programme planners design evidence-based interventions and services for the population at risk.[a] In this regard, population-based surveys (household surveys) have been used as the main instrument to calculate the prevalence of drug use in the general population.

However, population-based surveys, like other epidemiological indicators of drug use, have their limitations. Population-based surveys typically do not include institutionalized populations in their sampling design, for example, people who are in prison or in residential treatment, nor other marginalized population groups, which are sometimes difficult to reach. As a result, population-based surveys may underestimate drug use as such population groups usually have a higher prevalence of drug use, including high-risk or problematic drug use, than the general population. Also, population-based surveys often rely on the self-reported use of drugs – a behaviour that may carry stigma or social and legal sanctions, and thus respondents may be reluctant or unwilling to reveal the true extent of their drug use behaviour.[b] This in turn may lead to the extent of drug use in the population being underestimated, as has been noted in different population-based surveys.

Other indirect methods of estimation have been successfully used to overcome the underreporting of drug use behaviours in the general population. These methods, among others, include network scale-up methods used in population-based surveys,[c, d] as well as surveys or studies among high-risk population groups (e.g., regular opioid users or PWID) that use sampling methods, such as respondent-driven sampling[e, f] and multiplier/benchmark or capture/recapture methods to estimate the extent of high-risk drug use.[g] Estimates that are derived from indirect methods are then triangulated with those obtained from self-reported behaviour in population-based surveys in order to provide a more complete picture of the extent of drug use in the population.[h]

a UNODC, *Developing an Integrated Drug Information System* (United Nations publication, 2003).

b Timothy P. Johnson, "Sources of error in substance use prevalence surveys", *International Scholarly Research Notices* (2014).

c Tyler H. McCormik, Matthew J. Salganik and Tian Zheng, "How many people do you know?: Efficiently estimating personal network size", *Journal of the American Statistical Association*, vol. 105, No. 489 (March 2010).

d Matthew J. Salganik and others, "The game of contacts: Estimating the social visibility of groups", *Social Networks*, vol. 33 (2011), pp. 70–78.

e Douglas D. Heckathorn, "Respondent-driven sampling: a new approach to the study of hidden populations", *Social problems*, vol. 44, No. 2 (May 1997).

f Lena Hipp and Ulrich Kohler, "How to implement respondent-driven sampling in practice: Insights from surveying 24-hour migrant home care workers", *Survey Methods: Insights from the Field* (2019).

g UNODC, *Estimating Prevalence: Indirect Methods for Estimating the Size of the Drug Problem* (United Nations publication, 2003).

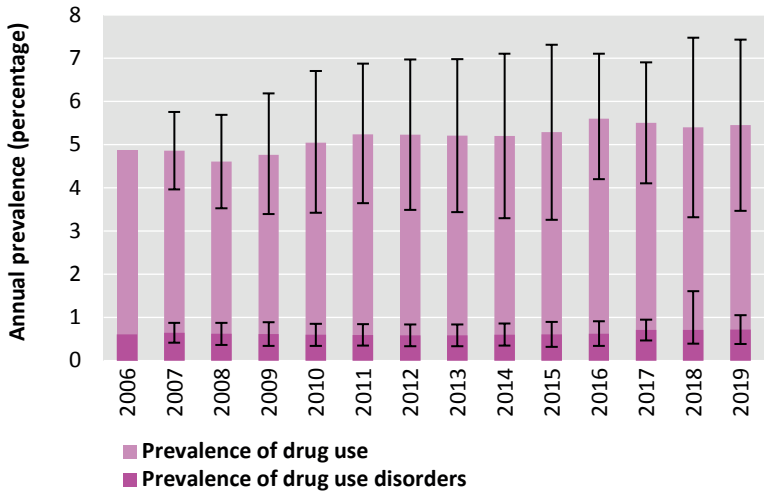
h See, for example, UNODC and Government of Nigeria, Drug use in Nigeria (Vienna, 2018).

Some 36 million people suffer from drug use disorders

Among the estimated 275 million past-year users of any drug, approximately 36.3 million (range: 19.6 million to 53.0 million), or almost 13 per cent, are estimated to suffer from drug use disorders, meaning that their drug use is harmful to the point where they may experience drug dependence and/or require treatment. This corresponds to a prevalence of drug use disorders of 0.7 per cent (range: 0.4 to 1.1 per cent) globally among the population aged 15–64.

Between 2010 and 2016, the prevalence of drug use disorders remained rather stable globally, with the number of people suffering from drug use disorders changing over that period mainly as a result of population growth. However, the prevalence estimates increased from 2017 onwards and the prevalence of drug use disorders (0.7 per cent) in 2019 was higher than previously estimated (0.6 per cent in 2016), corresponding to a change in the estimated number of people suffering from drug use disorders from 30.5 million in 2016 to 36.0 million in 2019. This higher prevalence is the result of the findings of drug use surveys conducted during the period 2018–2019 in

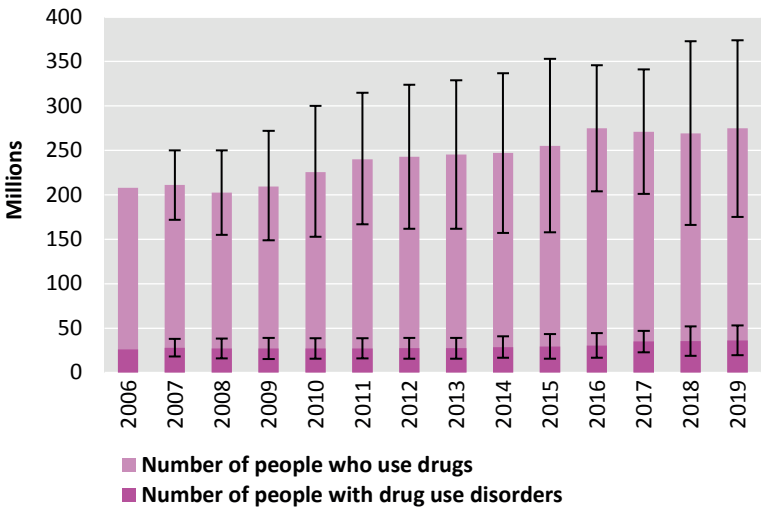
FIG. 11 Global prevalence of drug use and drug use disorders, 2006–2019



Source: UNODC, responses to the annual report questionnaire.

Note: Annual prevalence estimates are based on the percentage of adults (aged 15–64) who used drugs in the past year. The global estimates of the extent of drug use and drug use disorders reflect the best available information for 2019. Changes compared with previous years largely reflect the information updated by countries for which new data on the extent of drug use were made available in 2020. Therefore, the global and regional estimates presented in a given year are based on both the new estimates that were available for a particular country in the reference year and the most recent estimates available for the other countries. For 2019, the estimated global prevalence of drug use is based on estimates from 141 countries, covering 88 per cent of the world's population. Of those, new data points were reported for 13 countries in 2019.

FIG. 12 Global number of people who use drugs and people with drug use disorders, 2006–2019



Source: UNODC, responses to the annual report questionnaire.

Note: Estimated number of people (aged 15–64) who used drugs in the past year.

two countries with large populations, India and Nigeria. Nevertheless, given the wide uncertainty intervals of the estimates, comparisons over time should be undertaken with caution.

Cannabis remains by far the most commonly used drug

Worldwide, there were an estimated 200 million past-year users of cannabis in 2019, corresponding to 4.0 per cent of the global population aged 15–64. The annual prevalence of the use of cannabis remains highest in North America (14.5 per cent), the subregion of Australia and New Zealand (12.1 per cent), and West and Central Africa (9.4 per cent).

Just over a decade ago, in 2010, cannabis use, particularly among young people, was reported as stabilizing or declining in countries with established cannabis markets, such as in Western and Central Europe, North America and parts of Oceania (Australia and New Zealand). However, that trend was offset by increasing consumption in many countries in Africa and Asia. The global number of past-year cannabis users increased by 18 per cent between 2010 and 2019.[45]

Over the past decade, an increasing number of cannabis products with high levels of potency have been introduced onto the cannabis market.[46] These products tend to be high in Δ9-THC and low in CBD.

Opioids present the greatest harm to the health of users

Opioids are a major concern in many countries because of the severe health consequences associated with their use, including non-fatal and fatal overdose. For example, in 2019, the use of opioids accounted for over 70 per cent of the 18 million "healthy" years of life lost due to disability and premature death (DALYs) attributed to drug use disorders, as well as for all deaths that were attributed to drug use disorders.[47]

In 2019, 62 million people were estimated to have used opioids (i.e., opiates and pharmaceutical and/or synthetic

45 See also booklet 3 of the present report, *Drug Market Trends: Cannabis and Opioids*.

46 See UNODC, *World Drug Report 2019*, booklet 5, *Cannabis and Hallucinogens* (United Nations publication, 2019).

47 Institute for Health Metrics and Evaluation, "Global Burden of Disease Study 2019 Data Resources: GBD Results Tools".

opioids) for non-medical reasons at the global level. This corresponds to 1.2 per cent (range 0.7 to 1.6 per cent) of the global population aged 15–64.[48] The subregions with the highest past-year prevalence of use of opioids were North America (3.6 per cent), the Near and Middle East/South-West Asia (3.2 per cent) and Oceania (2.5 per cent, essentially Australia and New Zealand). In Asia, although the prevalence of past-year opioid use is at a comparable level to the global average, more than half (58 per cent) of the estimated global number of opioid users reside in that region.

Although global estimates are not available, the non-medical use of pharmaceutical opioids is reported as a major concern in many countries, for example, in West and North Africa and in the Near and Middle East (tramadol) and in North America (hydrocodone, oxycodone, codeine, tramadol and fentanyl). There are also signs of increasing non-medical use of pharmaceutical opioids in Western and Central Europe, as reflected in the increasing proportion of admissions to treatment for such use.

Among users of opioids, nearly 31 million were past-year users of opiates (heroin and opium) in 2019, corresponding to 0.6 per cent of the global population aged 15–64. The subregions with the highest prevalence of use of opiates were the Near and Middle East/South-West Asia (1.8 per cent), South Asia (1.1 per cent), North Africa (1.1 per cent) and Central Asia and Transcaucasia (1 per cent). Nearly 70 per cent of the estimated global number of opiate users reside in Asia.

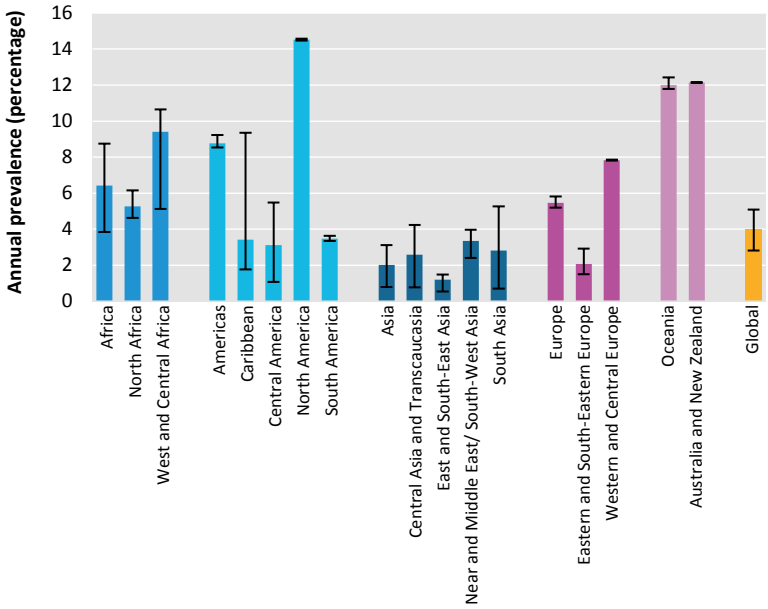
Use of amphetamines, in particular of methamphetamine, is increasing in North America and in parts of Asia

In 2019, there were an estimated 27 million past-year users of amphetamines, corresponding to 0.5 per cent of the global population aged 15–64. The highest past-year prevalence among the population aged 15–64 was in North America (2.3 per cent) and the subregion of Australia and New Zealand (1.3 per cent).

The type and form of amphetamines used varies considerably from region to region: in North America, the

48 The increase in 2019 in the number and prevalence of people who used opioids in the past year compared with the previous year reflects an increase in South-West Asia following an update of estimates from Afghanistan, new data from Colombia and Uruguay in South America and a revision of estimates from previous years for Africa.

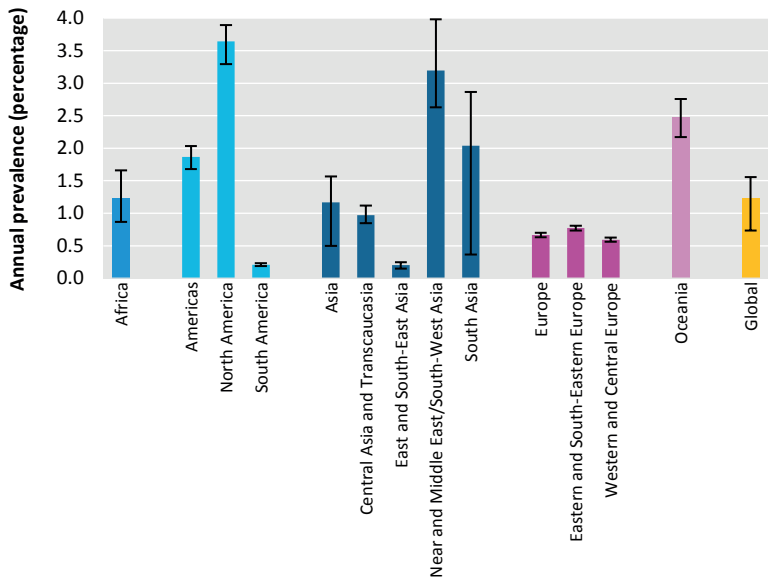
FIG. 13 Use of cannabis, by region and subregion, 2019



Source: UNODC, responses to the annual report questionnaire.

Note: Data are not shown for subregions where recent estimates (not older than 10 years) were not available from countries and thus subregional estimates could not be computed. For 2019, the estimated global prevalence of cannabis use in the past year is based on estimates from 113 countries, covering 60 per cent of the world's population. Of those, new data points were reported for 12 countries in 2019.

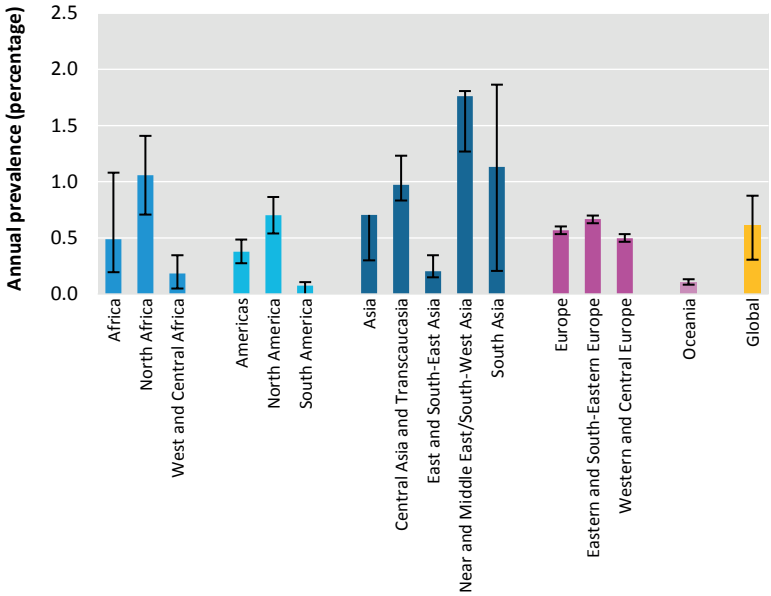
FIG. 14 Use of opioids, by region and subregion, 2019



Source: UNODC, responses to the annual report questionnaire.

Note: Opioids include opiates and synthetic opioids, including pharmaceutical opioids (non-medical use). Data are not shown for subregions where recent estimates (not older than 10 years) were not available from countries and thus subregional estimates could not be computed. For 2019, the estimated global prevalence of opioid use in the past year is based on estimates from 102 countries, covering 81 per cent of the world's population. Of those, new data points were reported for five countries in 2019.

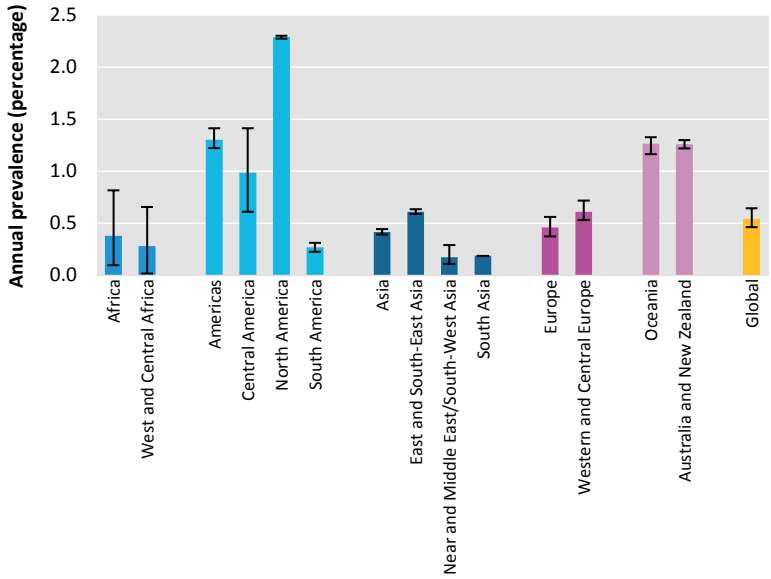
FIG. 15 Use of opiates, by region and subregion, 2019



Source: UNODC, responses to the annual report questionnaire.

Note: Opiates include opium and heroin. Data are not shown for subregions where recent estimates (not older than 10 years) were not available from countries and thus subregional estimates could not be computed. For 2019, the estimated global prevalence of opiate use in the past year is based on estimates from 85 countries, covering 80 per cent of the world's population. Of those, new data points were reported for seven countries in 2019.

FIG. 16 Use of amphetamines, by region and subregion, 2019



Source: UNODC, responses to the annual report questionnaire.

Note: Data are not shown for subregions where recent estimates (not older than 10 years) were not available from countries and thus subregional estimates could not be computed. Amphetamines include amphetamine, methamphetamine and pharmaceutical stimulants. For 2019, the estimated global prevalence of amphetamine use in the past year is based on estimates from 84 countries, covering 76 per cent of the world's population. Of those, new data points were reported for nine countries in 2019.

non-medical use of pharmaceutical stimulants and methamphetamine is most common; in East and South-East Asia and Oceania (Australia), it is crystalline methamphetamine; and in Western and Central Europe and the Near and Middle East, it is amphetamine, which in the Middle East is mainly referred to as "captagon". In many countries in South and Central America, especially those that have reported recent survey data, the non-medical use of pharmaceutical stimulants is more common than the use of other amphetamines.

Since 2010, there has been a relatively stable situation in the use of amphetamines reported in most countries in Western and Central Europe, based on population surveys; however, data based on the analysis of wastewater showed an increase in 2018 and 2019 in the consumption of amphetamines in nearly half of the cities (21 out of 41 cities) for which data were available in that subregion.[49] In North America, there are indications of an increase in methamphetamine use, while the use of methamphetamine, in particular crystalline methamphetamine, is considered to be increasing in East and South-East Asia, based on qualitative information on trends and limited data from other indicators from the countries in the subregion. More than one third of the estimated global number of users of amphetamines reside in East and South-East Asia.

Nearly 20 million people globally are estimated to have used "ecstasy" in the past year, corresponding to 0.4 per cent of the global population aged 15–64. Past-year use of "ecstasy" is relatively high in the subregion of Australia and New Zealand (2.8 per cent), Western and Central Europe (0.9 per cent) and North America (0.9 per cent).[50] The use of "ecstasy" is mainly associated with recreational nightlife settings, with higher levels of use among younger people.[51] The trend in the use of "ecstasy" may, however, have reversed in those established markets during the COVID-19 pandemic.[52] Between 2007 and 2012, most countries in Western and Central Europe reported stable

49 EMCDDA, *European Drug Report 2020: Trends and Developments* (Luxembourg, Publications Office of the European Union, 2020).

50 In 2019, the estimated number of "ecstasy" users in the past year was higher than the previous year's estimate in Australia and New Zealand, Central America and Eastern and South-Eastern Europe and lower in East and South-East Asia.

51 EMCDDA, *Technical Report: Monitoring Drug Use in Recreational Settings across Europe – Conceptual Challenges and Methodological Innovations* (Luxembourg, Publications Office of the European Union, 2018).

52 See booklet 5 of the present report, *COVID-19 and Drugs: Impact and Outlook*.

or declining trends in the use of "ecstasy", following indications of a resurgence in such use in the mid-2000s, owing to increasing availability of high-purity "ecstasy" in Western and Central Europe, as well as in other subregions. However, recent survey reports from countries in Western and Central Europe show an overall stable trend in the use of the drug.[53] The forms of "ecstasy" used have also diversified, as high-purity powder and crystalline forms of the drug have become more readily available and are now commonly used in established "ecstasy" markets.

Indications of increasing cocaine use in the Americas and Western and Central Europe

Globally, an estimated 20 million people were past-year users of cocaine in 2019, corresponding to 0.4 per cent of the global population aged 15–64. The prevalence of past-year use of cocaine is comparatively high in Oceania (2.7 per cent, mainly reflecting the situation in the subregion of Australia and New Zealand), North America (2.1 per cent), Western and Central Europe (1.4 per cent) and South America (1.0 per cent).

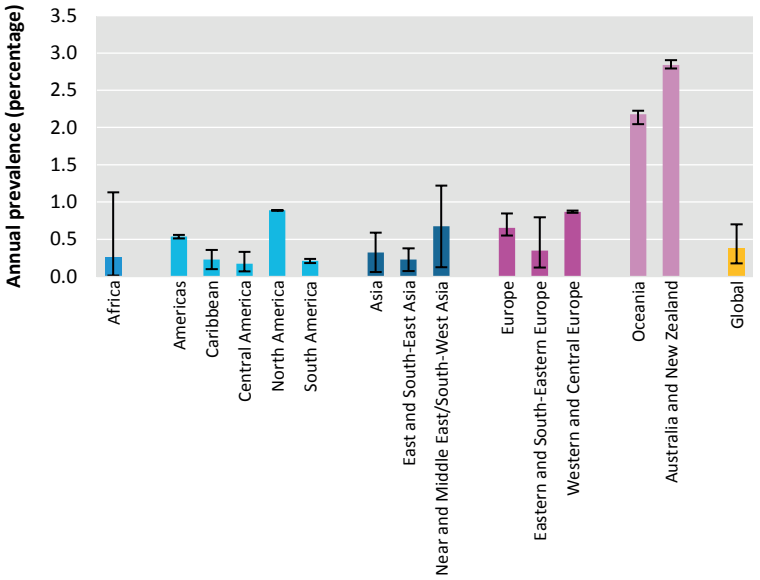
Prior to 2010, stable trends were reported in the use of cocaine in Central America, South America and Europe, while decreasing cocaine use was reported in North America. More recently, in Western and Central Europe, wastewater analysis and survey results in some countries suggest an increase in cocaine consumption and prevalence of use in the subregion. In North America, cocaine use in the United States has been fluctuating, with a stable trend over the last few years. Although survey data reported from South America are limited, some countries in the subregion have reported mixed trends in cocaine use in recent years. Meanwhile, in parts of Asia and West Africa, increasing amounts of cocaine have reportedly been seized, which indicates that cocaine use could potentially increase, especially among the affluent, urban segments of the population, in subregions where such use had previously been low.

Drug use among adolescents and young adults

Adolescence and early adulthood are an important period of transition. It is a time of physical and psychological development, with changes occurring in the brain, and

53 EMCDDA, *European Drug Report 2020: Trends and Developments*.

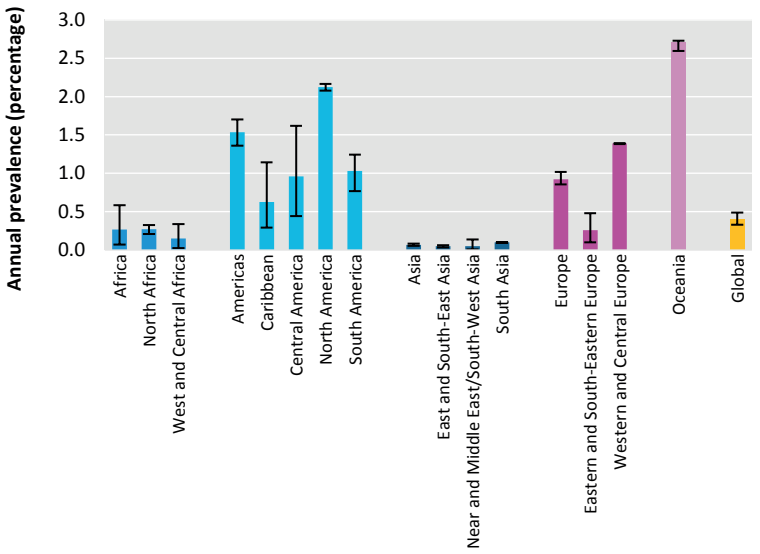
FIG. 17 Use of "ecstasy", by region and subregion, 2019



Source: UNODC, responses to the annual report questionnaire.

Note: Data are not shown for subregions where recent estimates (not older than 10 years) were not available from countries and thus subregional estimates could not be computed. For 2019, estimated global prevalence of "ecstasy" use in the past year is based on estimates from 84 countries, covering 32 per cent of the world's population. Of those, new data points were reported for 10 countries in 2019.

FIG. 18 Use of cocaine, by region and subregion, 2019



Source: UNODC, responses to the annual report questionnaire.

Note: Data are not shown for subregions where recent estimates (not older than 10 years) were not available from countries and thus subregional estimates could not be computed. For 2019, the estimated global prevalence of cocaine use in the past year is based on estimates from 93 countries, covering 58 per cent of the world's population. Of those, new data points were reported for 10 countries in 2019.

Vaping

Vaping devices, also known as e-cigarettes, e-vaporizers or electronic nicotine delivery systems, are battery-operated devices used by people to inhale an aerosol that typically contains nicotine, flavourings, other chemicals, CBD and possibly even Δ9-THC. More than 460 different e-cigarette brands are currently on the market in the United States, where the products are commonly known as e-cigs, e-hookahs, hookah pens and vapes.[a]

Vaping has become one of the more popular ways to consume both tobacco and cannabis (Δ9-THC). Generally, vaping devices or e-cigarettes are considered less harmful than regular cigarettes and have been promoted as devices for those who want to quit smoking tobacco[b, c] but they have considerably increased tobacco use among young people in the United States.[d, e]

In 2020, 3.6 million adolescents (3.02 million, or 19.6 per cent, of high-school students and 550,000, or 4.7 per cent, of middle-school students) in the United States were estimated to be current users of e-cigarettes, with 22.5 per cent of high-school e-cigarette users and 9.4 per cent of middle-school users reporting daily use.[f] Over the period 2019–2020, current use of e-cigarettes declined among both middle- and high-school students (from 4.11 million, or 27.5 per cent, of high-school students and 1.23 million, or 10.5 per cent, of middle-school students in 2019). This was a reversal of the previous trend in increasing e-cigarette use among adolescents:[d] during the period 2017–2018, frequent e-cigarette use had increased by 38.5 per cent among current e-cigarette users.[g] By contrast, in the United Kingdom, based on different survey results over the period 2015–2017, 7 to 18 per cent of youths aged 11–16 reported having used e-cigarettes and 1 to 3 per cent reported regular (at least weekly) use.[h]

In the United States, an outbreak of lung diseases was attributed to vaping in 2019. By the end of that year there had been more than 2,500 cases of users being hospitalized for vaping-related lung injury. By February 2020, 68 deaths in 29 states and the District of Columbia had been confirmed as attributed to vaping.[i] The Centers for Disease Control initially suggested that nicotine vaping had been the cause of the outbreak, because the outbreak followed a large increase in nicotine vaping among adolescents in the United States. Further investigations based on case-control studies revealed that, in the majority of cases, users had vaped cannabis oils that were contaminated by vitamin E acetate,[j] an additive found most notably in THC-containing e-cigarettes or vaping products. It does not usually cause harm when ingested as a vitamin supplement or applied to the skin, but research suggests that it may interfere with normal lung functioning when inhaled.

In the United States, e-cigarettes and vapes were initially designated as tobacco products; the Food and Drug Administration regulation from 2016 that imposed minimal product safety regulations therefore did not require manufacturers to meet pharmaceutical safety standards or to disclose the ingredients of all e-liquid contents. In 2018, the requirement to disclose ingredients in e-cigarettes and vapes was announced and products that were already on the market were granted until 2022 to comply with the new Food and Drug Administration regulations.[k]

a United States, National Institute on Drug Abuse, "Drug facts: vaping devices (electronic cigarettes)" (January 2020).

b United States, Centers for Disease Control and Prevention, "About electronic cigarettes (e-cigarettes)".

c Jamie Hartmann-Boyce and others, "Electronic cigarettes for smoking cessation", *Cochrane Database of Systematic Reviews*, No. 10, art. No. CD010216 (October 2020).

d Andrea S. Gentzke and others, "Tobacco product use among middle and high school students", *Morbidity and Mortality Weekly Report*, vol. 69, No. 50 (December 2020).

e United States Department of Health and Human Services, *E-Cigarette Use Among Youth and Young Adults: A Report of the Surgeon General* (Atlanta, Georgia, Centers for Disease Control and Prevention, National Center for Chronic Disease Prevention and Health Promotion, Office on Smoking and Health, 2016).

f Theresa W. Wang and others, "E-cigarette use among middle and high school students", *Morbidity and Mortality Weekly Report 2020*, vol. 69, No. 37 (September 2020), pp. 1310–1312.

g Andrea S. Gentzke and others, "Vital signs: tobacco product use among middle and high school students", *Morbidity and Mortality Weekly Report*, vol. 68, No. 6 (February 2019), pp. 157–164.

h Linda Bauld and others, "Young people's use of e-cigarettes across the United Kingdom: findings from five surveys 2015–2017", *International Journal of Environmental Research and Public Health*, vol. 14, No. 9 (August 2017).

i United States, Centers for Disease Control and Prevention, "Outbreak of lung injury associated with the use of e-cigarette, or vaping, products", February 2020.

j Wayne Hall, Coral Gartner and Billie Bonevski, "Lessons from the public health responses to the US outbreak of vaping-related lung injury, *Addiction* (May 2020).

k Rosalie Liccardo Pacula, "The need to more effectively regulate END markets: a primary public health lesson of the U.S. vaping associated lung injury outbreak", *Addiction* (August 2020).

Vulnerability of women to drug use

Compared with men, overall drug use remains low among women. At the global level, women are three times less likely than men to use cannabis, cocaine or amphetamines and one in five people who inject drugs are women. By contrast, women are more likely than men to misuse pharmaceutical drugs, particularly pharmaceutical opioids and tranquillizers. This mainly reflects differences in opportunities to use drugs owing to the influence of social or cultural environments, rather than intrinsic gender vulnerability.[a]

The scientific literature shows that processes of drug use initiation, social factors and characteristics affecting people who use drugs, biological factors and progression to the development of drug use disorders vary considerably between men and women.[b, c] Women typically begin using substances later in life than men. However, in the case of alcohol, cannabis, opioids and cocaine, once women have initiated substance use, they tend to increase their rate of consumption more rapidly than men and may progress more quickly than men to the development of drug use disorders. This has been consistently reported among women who use those substances and is known as "telescoping".[d] Women who use drugs also face particular health risks. For instance, women who inject drugs have a greater vulnerability than men to HIV, hepatitis C and other blood-borne infections.[e]

Women are more likely than men to identify trauma and/or stressors such as relationship problems, environmental stress and family problems as causes for their initiation or continuation of substance use. Moreover, internalizing problems such as depression and anxiety are much more common among women than among men. On the other hand, men are more likely than women to suffer from externalizing behaviour problems such as conduct disorder, attention-deficit hyperactivity disorder and anti-social personality disorder. Drug use disorders among men can be considered as part of the externalizing behaviour spectrum.[f]

Women with substance use disorders are reported to have high rates of post-traumatic stress disorder and may also have experienced childhood adversity such as physical neglect, abuse or sexual abuse.[g] Childhood adversity seems to have a different impact on males and females. Research has shown that boys who have experienced childhood adversity use drugs as a means of social defiance. By contrast, girls who have experienced adversity are more likely to internalize it as anxiety, depression and social withdrawal and are more likely to use substances to self-medicate.[h] While life expectancy and health outcomes are often poorer for men who have experienced childhood adversity, domestic abuse, sexual violence and other forms of gender-based discrimination are more likely to be experienced by women and girls.[i] Gender-based violence comprises multiple forms of violence against women, including childhood sexual abuse, intimate-partner violence and non-partner assault, as well as trafficking in women and sexual exploitation. Some studies show that women who use drugs have a prevalence of gender-based violence two to five times higher than women who do not use drugs.[j] Literature reviews of studies in developed and developing countries have consistently found that in the context of gender-based violence, intimate-partner violence significantly increased the risk of acquiring HIV among different populations of women, including women who use drugs, although due to the complex nature of the issues (substance use, intimate-partner violence and sexually transmitted infections) it is difficult to ascertain the exact causal relationships between these factors.[k, l, m, n, o]

Post-traumatic stress disorder among women is most commonly considered to have derived from a history of repeated childhood physical and sexual abuse. Research shows that rates of dual diagnosis of post-traumatic stress disorder and substance use disorders for men are two to three times lower than for women, and typically result from combat or crime trauma.[p, q] Among women, mood and anxiety disorders, including post-traumatic stress disorder, are often reported prior to substance use initiation, while among men, they are more often secondary to the diagnosis of substance use disorders.[r] Childhood abuse, neglect and instability are transgenerational and impart a high risk of initiating drug use and developing substance use disorders to the children of individuals who have experienced childhood adversity and families that have experienced abuse and neglect.[s]

a UNODC, *World Drug Report 2018*, booklet 5, *Women and Drugs: Drug Use, Drug Supply and Their Consequences* (United Nations publication, 2018).

b Christine E. Grella, "From generic to gender-responsive treatment: changes in social policies, treatment services, and outcomes of women in substance abuse treatment", *Journal of Psychoactive Drugs*, vol. 40, SARC Suppl. No. 5 (November 2008), pp. 327–343.

c Ellen Tuchman, "Women and addiction: the importance of gender issues in substance abuse research", *Journal of Addictive Diseases*, vol. 29, No. 2 (April 2010).

d Lindsay Oberleitner and others, "Childhood stressors differentially affect age of first use and telescoping across women and men", *Drug and Alcohol Dependence*, vol. 140 (July 2014), pp. e164–e165.

e UNAIDS, "Women who inject drugs more likely to be living with HIV", based on data from Global AIDS Monitoring 2103–2017, 11 June 2019.

f Dorte Hecksher and Morten Hesse, "Women and substance use disorders", *Mens Sana Monographs*, vol. 7, No. 1 (January–December 2009).

g Lisa M. Najavits, Roger D. Weiss and Sarah R. Shaw, "The link between substance abuse and posttraumatic stress disorder in women", *American Journal on Addictions*, vol. 6, No. 4 (Fall 1997), pp. 273–283.

h Elizabeth A. Evans, Christine E. Grella and Dawn M. Upchurch, "Gender differences in the effects of childhood adversity on alcohol, drug, and polysubstance-related disorders", *Social Psychiatry and Psychiatric Epidemiology*, vol. 52, No. 7 (July 2017), pp. 901–912.

i Mark A. Bellis and others, "Adverse childhood experiences and their impact on health-harming behaviours in the Welsh adult population", Public Health Wales NHS Trust (2015).

j Louisa Gilbert and others, "Targeting the SAVA (substance abuse, violence and AIDS) syndemic among women and girls: a global review of epidemiology and integrated interventions", *Journal of Acquired Immune Deficiency Syndrome*, vol. 69, Suppl. 2 (June 2015), pp. s118–s127.

k Jacquelyn C. Campbell, Jacquelyn C. Campbell and Jason E. Farley, "The intersection of intimate partner violence against women and HIV/AIDS: a review", *International Journal of Injury Control and Safety Promotion*, vol. 15, No. 4 (2008), pp. 221–231.

l Louisa Gilbert and others, "Partner violence and sexual HIV risk behaviors among women in methadone treatment", *AIDS and Behaviour*, vol. 4, No. 3 (September 2000), pp. 261–269.

m Deborah Y. Phillips and others, "The intersection of intimate partner violence and HIV in U.S. women: a review", *The Journal of the Association of Nurses in AIDS Care*, vol. 25, No. 1 Suppl. (2014): S36–49.

n Michael O. Osinde, Dan K. Kaye and Othman Kakaire, "Intimate partner violence among women with HIV infection in rural Uganda: critical implications for policy and practice", *BMC Women's Health*, vol. 11, No. 50 (November 2011).

o Nabila El-Bassel and others, "Posttraumatic stress disorder and HIV risk among poor, inner-City women receiving care in an Emergency Department", *American Journal of Public Health*, vol. 101, No. 1 (January 2011), pp. 120–127.

p Masoumeh Amin-Esmaeili and others, "Epidemiology of illicit drug use disorders in Iran: prevalence, correlates, comorbidity and service utilization results from the Iranian Mental Health Survey", *Addiction*, vol. 111, No. 10 (October 2016), pp. 1836–1847.

q Lisa M. Najavits, Roger D. Weiss and Sarah R. Shaw, "The link between substance abuse and posttraumatic stress disorder in women", *American Journal on Addictions*, vol. 6, No. 4 (Fall 1997), pp. 273–283.

r Monica L. Zilberman and others, "Substance use disorders: sex differences and psychiatric comorbidities", *Canadian Journal of Psychiatry*, vol. 48, No. 1 (February 2003).

s Iris Torchalla and others, "'Like a lots happened with my whole childhood': violence, trauma, and addictionin pregnant and postpartum women from Vancouver's Downtown Eastside", *Harm Reduction Journal*, vol. 12, No. 1 (2015).

of cognitive and emotional development. For some, it is also a time of vulnerability to the use of drugs. Adolescence (12–17 years of age) is the critical risk period for substance use initiation. Within the population aged 15–64, the highest levels of drug use are seen among those aged 18–25.[54]

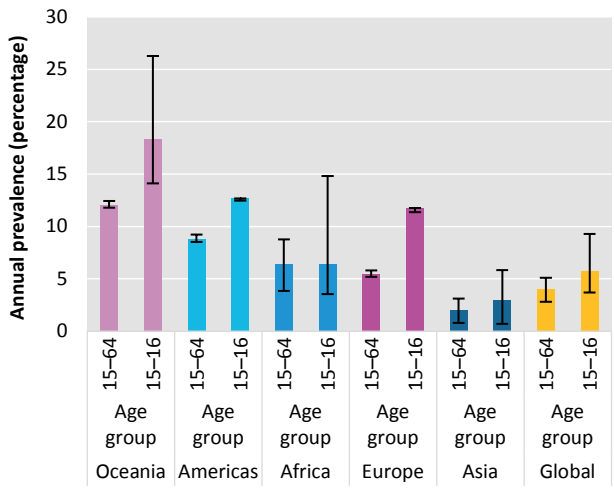
Cannabis is the most widely used drug among young people. Globally, it is estimated that there were about 14 million past-year users of cannabis among students aged 15–16 in 2019. This corresponds to an annual prevalence of cannabis use of 5.7 per cent among this age group, a rate that is higher than the rate among the general population aged 15–64 (4 per cent) and reflects regional variations.

People in treatment for drug use disorders

For people with drug use disorders, the availability of and access to drug treatment services remain limited at the global level: only one in eight people with drug use disorders receive drug treatment each year. Information on

54 UNODC, *World Drug Report 2018*, booklet 4, *Drugs and Age: Drugs and Associated Issues Among Young People and Older People* (United Nations publication, 2018).

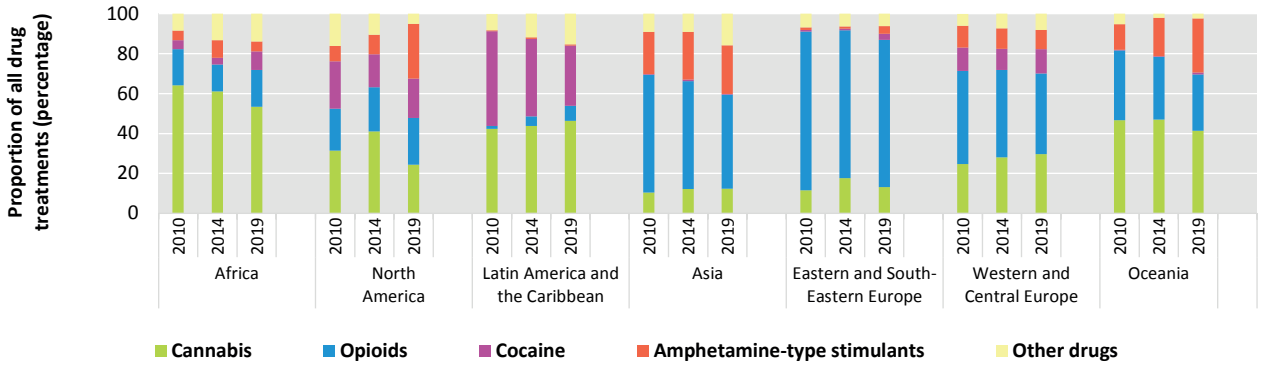
FIG. 19 Global and regional use of cannabis among people aged 15–16, and among the general population aged 15–64, 2019



Source: UNODC, responses to the annual report questionnaire; and other government reports.

Note: The estimates of the annual prevalence of cannabis use among those aged 15–16 is based on school surveys in most countries and may not be representative of all those aged 15–16.

FIG. 20 Trends in the primary drug of concern in people in treatment for drug use disorders, by region, 2010, 2014 and 2019



Source: UNODC, responses to the annual report questionnaire.

those in drug treatment can provide useful insight into trends and geographical variations with respect to drug use disorders. However, that information reflects the level of demand for treatment of drug use disorders (the number of people seeking help or referred by the criminal justice system or by their families, for example) and the extent of the availability of drug treatment services, rather than the number of people with drug use disorders.

Between 2010 and 2014, the proportion of people provided with treatment for the use of cannabis as the primary drug of concern, among all treatment admissions, increased in all regions other than Africa. After that, from 2014 to 2019, the trend varied across subregions, but nearly half of the people treated in Africa, Oceania (Australia and New Zealand) and Latin America in 2019 were being treated for the use of cannabis as the primary drug of concern.

Some of the factors that may have influenced the increase in the number of people in treatment for cannabis use disorders include changes in the number of those who actually need treatment, changes in the treatment referral system, changes in awareness of potential problems associated with cannabis use disorders and changes in the availability of and access to treatment for cannabis use disorders.[55]

While it may be argued that the development of cannabis use disorders could be linked to recent developments in cannabis markets (the increasing availability of different cannabis products (cannabis concentrates and edibles) of a high-THC content and the fact that the average THC content of cannabis herb and resin has doubled in the past decade), such a relationship has not been fully established.[56]

To date, there is no established pharmacological treatment for cannabis use disorders. Psychosocial interventions that are aimed at changing behaviour and providing support, such as cognitive behavioural therapy or motivational interviewing, continue to be the mainstay of treatment for cannabis use disorder.[57] These interventions may vary from one-time online contact or screening and brief interventions in an outpatient setting to a more comprehensive treatment plan, including treatment of other comorbidities in an outpatient or inpatient setting, depending on the severity of the disorder and the needs of the individual.

Opioids remain the main drug for which people receive treatment in Europe (particularly in Eastern and South-Eastern Europe), in North America and in Asia. In Europe, the use of opioids (mostly heroin) was the main reason for entering specialized drug use treatment in 2019: opioids accounted for 40 per cent of treatment admissions in Western and Central Europe and 74 per cent of such admissions in Eastern and South-Eastern Europe. In most regions, people provided with treatment for opioid use disorders tend to be older (mid-30s) than those treated for most other drugs and between one

55 For a detailed discussion on this, see UNODC, *World Drug Report 2016* (United Nations publication, 2016).

56 See UNODC, *World Drug Report 2019*, booklet 5, *Cannabis and Hallucinogens* (United Nations publication, 2019).

57 Jonathan Schettino and others, *Treatment of Cannabis-related Disorders in Europe*, EMCDDA Insights Series, No. 17 (Luxembourg, Publications Office of the European Union, 2015).

Pathway to substance use disorders

The path from initiation to harmful use of substances or drugs[a] among young people is influenced by factors that are often out of their control. Factors at the personal level (including behavioural and mental health, neurological developments and gene variations resulting from social influences), at the micro level (parental and family functioning, schools and peer influences) and at the macro level (socioeconomic and physical environment) can render adolescents vulnerable to substance use. These factors vary between individuals; not all young people are equally vulnerable to substance use and, in many instances, these influences change over time.

Overall, it is the critical combination of the risk factors that are present and the protective factors that are absent at a particular stage in a young person's life that makes the difference in their susceptibility to initiate and continue to use drugs. Factors such as early mental and behavioural health problems, poverty, lack of opportunities, isolation, lack of parental involvement and social support, negative peer influences and poorly equipped schools are more common among those who develop substance use problems than those who do not.[b, c, d] Harmful substance use has multiple direct effects on adolescents. The likelihood of unemployment, physical health problems, dysfunctional social relationships, suicidal tendencies, mental illness and lower life expectancy is increased by substance use in adolescence. In the most serious cases, harmful drug use can lead to a negative cycle in which damaged socioeconomic standing and ability to develop relationships reinforce substance use.[e]

People who initiate substance or drug use and later develop substance use disorders typically transition through a number of stages, including initiation of use, escalation, maintenance and, eventually, addiction.[f] Pathways can vary substantially depending on the use of substance and desistance or cessation of substance use. Some groups of users may maintain moderate use for decades and never escalate. Others may exhibit intermittent periods of cessation, abstain permanently, or escalate rapidly and develop substance use disorders. Overall, the evolution and impact of drug use in childhood and youth can be characterized by three elements: (a) risk factors that determine the fragility or resilience of the individual to drug use disorders; (b) the health and social impact of drug use on individual development; and (c) the impact of caregivers' drug use on the individual.

a The International Statistical Classification of Diseases and Related Health Problems (eleventh revision) defines harmful (patterns of) use of substances as a pattern of substance use that has caused damage to a person's physical or mental health or has resulted in behaviour leading to harm to the health of others.

b Hirokazu Yoshikawa, Lawrence J. Aber and William R. Beardslee, "The effects of poverty on the mental, emotional, and behavioral health of children and youth: implications for prevention", *American Psychologist*, vol. 67, No. 4 (May–June 2012), pp. 272–284.

c Danya Glaser, "Child abuse and neglect and the brain: a review", *Journal of Child Psychology and Psychiatry*, vol. 41, No. 1 (January 2000), pp. 97–116.

d Lyndal Bond and others, "Social and school connectedness in early secondary school as predictors of late teenage substance use, mental health, and academic outcomes", *Journal of Adolescent Health*, vol. 40, No. 4 (February 2007).

e Gary W. Evans, John Eckenrode and Lyscha A. Marcynyszyn, "Chaos and the macrosetting: the role of poverty and socioeconomic status", in *Chaos and its Influence on Children's Development: An Ecological Perspective*, Gary W. Evans and Theodore D. Wachs, eds. (Washington, D.C., American Psychological Association, 2010), pp. 225–238.

f Denise B. Kandel, ed., *Stages and Pathways of Drug Involvement: Examining the Gateway Hypothesis* (Cambridge, Cambridge University Press, 2002).

quarter and one third of them are first-time entrants.[58] Pharmacological therapy with opioid agonists, such as methadone and buprenorphine, is recommended by WHO.[59, 60]

There are currently no pharmacological interventions available for treating the use of stimulants, and behavioural interventions are the only available and effective treatment. However, some promising medications such as methylphenidate, several pharmaceutical amphetamines (such as dextroamphetamine or its prodrug, lisdexamphetamine) and modafinil, among others, are currently under consideration for the pharmacological treatment of stimulant use disorders.[61] Treatment for the

58 UNODC, responses to the annual report questionnaire. Based on analysis of data related to drug treatment provision reported by countries for the period 2015–2019.

59 UNODC and WHO, *International Standards for the Treatment of Drug Use Disorders: Revised Edition Incorporating Results of Field-Testing.*

60 WHO, *Guidelines for the Psychosocially Assisted Pharmacological Treatment of Opioid Dependence* (Geneva, 2009).

61 UNODC, *Treatment of Stimulant Use Disorders: Current Practices and Promising Perspectives – Discussion Paper* (March 2019).

Treatment for drug use is not always tailored to the specific needs of women

Women who use drugs tend to progress to drug use disorders in a shorter time period than men,[a] but while women account for nearly one in three people worldwide who use drugs such as cannabis, cocaine, amphetamines or opioids, only one in six people in treatment are women.[b] Women face numerous barriers in accessing drug treatment services, which may include the fear of possible legal sanctions and social stigma relating to their drug use, lack of childcare or the fear of losing custody of children while in treatment, or because of other family responsibilities related to the proscribed role of women as mothers and caregivers in general.[c]

Moreover, treatment services are not always made easily accessible to all those who need them, and particular attention is not always paid to special population groups or marginalized, disadvantaged and vulnerable members of society, in particular, women and pregnant women.[d, e] For instance, the rates of transmission of HIV from mother to child among women who inject drugs and who are living with HIV are significantly higher than for other women living with HIV. However, in many settings, maternity clinics may not screen women for drug user disorders or, in the case of pregnant women suffering from opioid use disorders, provide opioid agonist therapy, compelling women in such situations to leave appropriate care.[f, g, h, i, j] On top of this, many treatment interventions do not take into account the special needs and considerations of women in treatment, particularly in terms of trauma and safety; therefore, some treatment interventions may not be as effective for women as they are for men.[k, l, m, n]

a Lindsay Oberleitner and others, "Childhood stressors differentially affect age of first use and telescoping across women and men", *Drug and Alcohol Dependence*, vol. 140 (July 2014), pp. e164–e165.

b Based on analysis of data related to drug treatment provision reported by countries in the annual report questionnaire for the years 2015–2019.

c INCB, *Report of the International Narcotics Control Board for 2016* (E/INCB/2016/1).

d INCB, *Report of the International Narcotics Control Board for 2017* (E/INCB/2017/1).

e WHO and UNODC, *International Standards for the Treatment of Drug Use Disorders: Revised Edition Incorporating Results of Field-Testing*.

f Claire Thorne and others, "Progress in prevention of mother-to-child transmission of HIV infection in Ukraine: results from a birth cohort study", *BMC Infectious Diseases*, vol. 9, No. 40 (April 2009).

g Celestina Barbosa-Leiker and others, "Opioid use disorder in women and the implications for treatment", *Psychiatric Research and Clinical Practice*, vol. 3, No. 1 (Spring 2021), pp. 3–11.

h Gary Reid, Mukta Sharma and Peter Higgs, "The long winding road of opioid substitution therapy implementation in South-East Asia: challenges to scale up", *Journal of Public Health Research*, vol. 3, No. 1 (2014).

i Stephen W Patrick and others, "Barriers to accessing treatment for pregnant women with opioid use disorder in Appalachian states", *Substance Abuse*, vol. 40, No. 3 (2019), pp. 356–362.

j Bronwyn S. Bedick and others, "Barriers to accessing opioid agonist therapy in pregnancy", *American Journal of Obstetrics & Gynecology*, vol. 2, No. 4 (November 2020).

k EMCDDA, "Women's voices: experiences and perceptions of women facing drug-related problems in Europe", Thematic Paper Series (Luxembourg, Office for Official Publications of the European Communities, 2009).

l United States of America, National Institute on Drug Abuse, "Substance use in women: research report" (April 2020).

m Sharon Arpa, "Women who use drugs: issues, needs, responses, challenges and implications for policy and practice", EMCDDA commissioned paper (Lisbon, EMCDDA, 2017).

n UNODC, *Guidelines on Drug Prevention and Treatment for Girls and Women* (Vienna, 2016).

use of amphetamines is more common in Asia (predominantly for the use of methamphetamine), Oceania (based on data from Australia and New Zealand, for methamphetamine) and North America than elsewhere, with more than one quarter of people in treatment in those regions and subregion being treated for amphetamine use disorders. In many countries in East and South-East Asia, people receiving treatment for the use of methamphetamine account for more than three quarters of those in treatment for drug use.

As in the case of cannabis use disorders, people with amphetamine use disorders who are in treatment tend to be younger (in their mid-20s) than those in treatment for the use of opioids or cocaine, and the majority of them also tend to be first-time entrants. The provision of treatment in which cocaine is the primary drug of concern is seen mainly in the Americas, in particular in Latin America and the Caribbean. In Latin America, as in other subregions, people entering treatment for cocaine use disorders tend to be in their mid-30s, and 30 to 40 per cent are first-time entrants.[62]

62 UNODC, responses to the annual report questionnaire. Based on analysis of data related to drug treatment provision reported by countries for the years 2015–2019.

Achieving target 3.5 of the Sustainable Development Goals (Strengthen the prevention and treatment of substance abuse, including narcotic drug abuse and harmful use of alcohol): a review of the global indicator on the coverage of treatment interventions for drug use disorders

As part of the monitoring of progress towards achieving the 2030 Agenda for Sustainable Development, under Sustainable Development Goal 3 (Ensure healthy lives and promote well-being for all at all ages) and target 3.5 (Strengthen the prevention and treatment of substance use, including narcotic drug abuse and harmful use of alcohol), indicator 3.5.1 is dedicated to measuring the coverage of treatment interventions (including pharmacological, psychosocial interventions and rehabilitation and aftercare services) for substance use disorders. The indicator has been operationalized for drug use disorders as the proportion of people who received treatment for their drug use disorders in a given year over the total estimated number of people with drug use disorders.

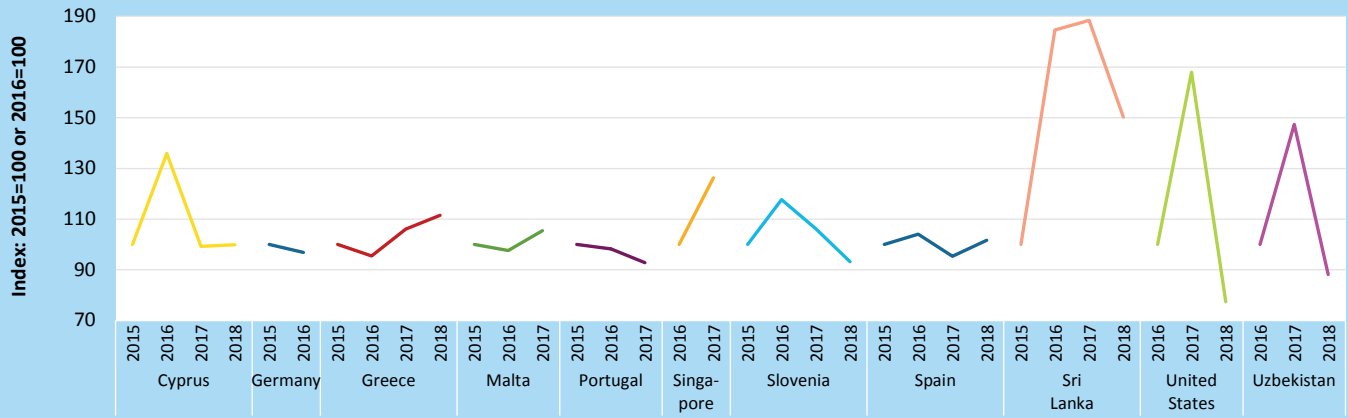
Focusing on the coverage of treatment for opioid use disorders, data show great variation between countries. Some countries reach coverage of over 60 per cent, while it is below 10 per cent in others. Progress in meeting the target for opioid use disorders is, however, visible in a few countries, although caution is required in interpreting differences in the coverage of drug treatment between countries. This is because they may, at least partly, result from differences in methodologies for estimating the number of people with drug use disorders and in the recording and reporting of people receiving treatment. Overall, identifying whether progress has been made towards achieving the target remains challenging.

There is overwhelming evidence that the cost of providing evidence-based treatment of drug use disorders is much lower than the cost of untreated drug dependence. Scientific evidence-based treatment of drug use disorders not only helps reduce drug-related harm but also improves the health, well-being and recovery of people with drug use disorders, while reducing drug-related crime and increasing public safety and positive community outcomes, for example, by reducing homelessness, requirements for social welfare and unemployment.[a]

Nevertheless, in many countries, there remains a large gap in national capacities and the provision of evidence-based services for the treatment of drug use disorders as part of a public health-care system. The coverage of drug treatment is influenced by a number of factors and the nature of treatment interventions differs by drug type.

a Nicole Kravitz-Wirtz and others, "Association of Medicaid expansion with opioid overdose mortality in the United States", *JAMA Network Open*, vol. 3, No. 1 (January 2020).

Trends in the drug treatment coverage of people with opioid use disorders, selected countries, 2015–2018



Source: UNODC, responses to the annual report questionnaire.

Note: Trends are independent of the level of treatment coverage of people with opioid use disorders. Caution is thus required when interpreting such trends, as marked increases or decreases in the index may result from changes in very low treatment coverage estimates.

Health consequences of drug use

The health consequences of drug use can include a range of negative outcomes such as drug use disorders, mental health disorders, HIV infection, hepatitis-related liver cancer and cirrhosis, overdose and premature death. The greatest harms to health are those associated with the use of opioids and with injecting drug use, owing to the risk of acquiring HIV or hepatitis C through unsafe injecting practices.

Harm associated with drug use continues to increase

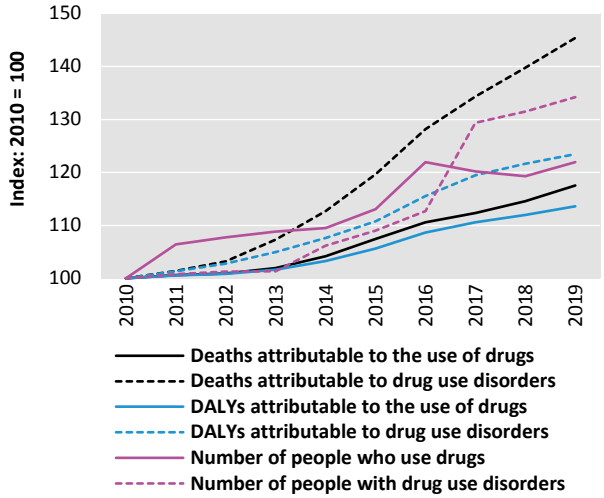
Deaths attributed to drug use disorders (mostly opioid use disorders) have increased sharply over the past decade, at a rate greater than the increase in the number of people who use drugs, or of those with drug use disorders. This might be a reflection of the use and, in particular, injection of opioids such as fentanyls in some regions, which makes people who use opioids more vulnerable to overdose and death. More positively, the past decade has seen a decline in deaths attributed to HIV and AIDS among people who use drugs. Most of the negative health consequences arising from the use of drugs today are attributable to opioid use disorders and to diseases such as liver cancer, cirrhosis and other chronic liver diseases that result from hepatitis C.

The Global Burden of Disease Study 2019 provides an indication as to which substances and causes of injury and disease are responsible for the greatest negative health consequences attributed to the use of drugs.[63, 64] The burden of disease attributable to the use of drugs is measured by deaths and years of "healthy" life lost, also called "disability-adjusted life years" or DALYs. DALYs measure the burden of disease from the combination of both the number of years of life lost as a result of premature death and the number of years of life lived with disability (any form of impairment).

According to the study, in 2019, an estimated 494,000 deaths and 30.9 million years of "healthy" life lost as a result of premature death and disability were attributable to the use of drugs. Most of the burden of disease was among males, who contributed to 71 per cent of deaths and 66 per cent of DALYs in 2019.

More than half (271,000, or 55 per cent) of the deaths attributable to the use of drugs in 2019 were attributed to liver cancer, cirrhosis and other chronic liver diseases resulting from hepatitis C. Deaths attributed to drug use disorders (128,000) accounted for 26 per cent, of which opioid use disorders contributed to 69 per cent, or 88,000 deaths. Over the past three decades (1990–2019) and the past decade (2010–2019), deaths attributable to the use of drugs have increased by 110 per cent and 18 per cent, respectively, with deaths over the past decade increasing by 45 per cent for drug use disorders (by 41 per cent for opioid use disorders) and by 20 per cent for diseases resulting from hepatitis C. Compared with deaths caused by most of the total of 369 diseases and injuries that showed stable or slowly changing trends, deaths resulting from drug use disorders have risen sharply over the past decade.[65] By contrast, deaths attributed to HIV and AIDS

FIG. 21 **Global trends in number of people who use drugs, those with drug use disorders, deaths and years of "healthy" life lost (DALYs) attributable to the use of drugs, 2010–2019**



Sources: UNODC, responses to the annual report questionnaire; and Institute for Health Metrics and Evaluation, "Global Burden of Disease Study 2019 Data Resources: GBD Results Tools".

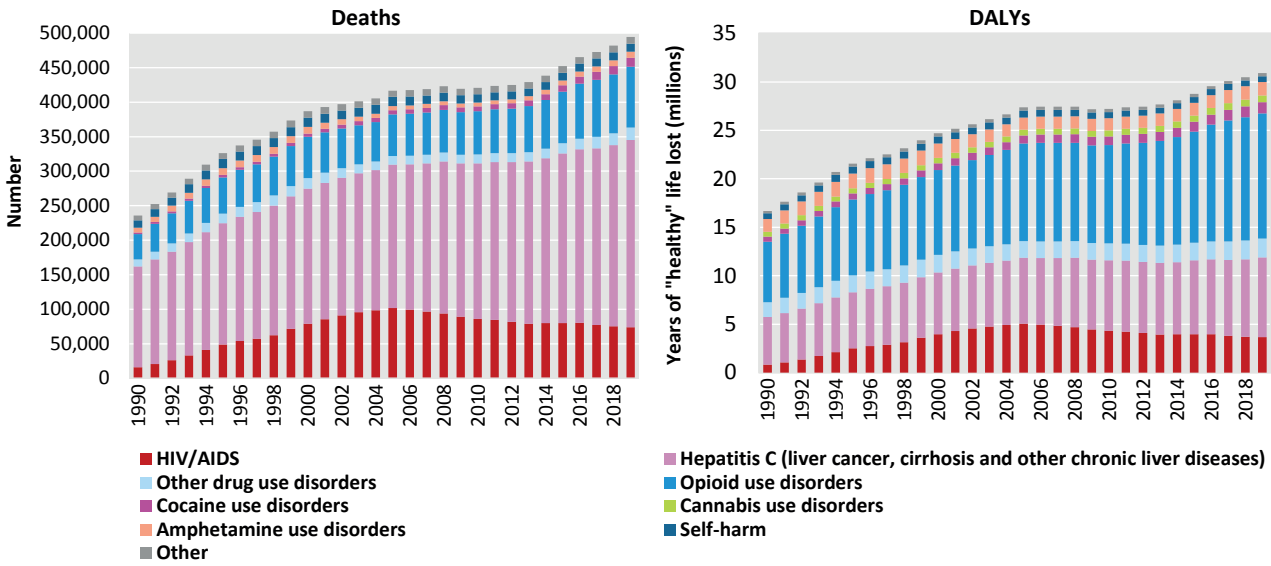
Note: Estimates of people who use drugs are for adults (aged 15–64) who used drugs in the past year.

63 In the study, the use of drugs is defined as dependency on opioids, cannabis, cocaine or amphetamines, or a history of injecting drug use. Estimates for the whole time series have been updated. Results from the current study supersede those from the previous round.

64 Institute for Health Metrics and Evaluation, "Global Burden of Disease Study 2019 Data Resources: GBD Results Tools".

65 Theo Vos and others, "Global burden of 369 diseases and injuries in 204 countries and territories, 1990–2019: a systematic analysis for the Global Burden of Disease Study 2019", *The Lancet*, vol. 396, No. 10258 (2020), pp. 1204–1222.

FIG. 22 Deaths and years of "healthy" life lost (DALYs) attributable to the use of drugs, 1990–2019



Source: Institute for Health Metrics and Evaluation, "Global Burden of Disease Study 2019 Data Resources: GBD Results Tools".

have declined by 14 per cent over the past decade. According to UNAIDS, since 2004, when the number of deaths resulting from AIDS-related illness reached its peak, reductions in the number of such deaths among all people living with HIV (not only those who use drugs) have largely been driven by the scale-up of treatment.[66]

Drug use disorders accounted for the largest proportion (59 per cent) of DALYs attributed to the use of drugs in 2019, with 18.1 million years of "healthy" life lost due to premature death and disability. Most of the DALYs (71 per cent) attributed to drug use disorders were caused by opioid use disorders, with 12.9 million years of "healthy" life lost. Diseases resulting from hepatitis C accounted for 27 per cent of DALYs, with 8.2 million years of "healthy" life lost. During the past three decades and over the past decade, DALYs have increased by 85 per cent and 14 per cent, respectively. Over the past decade, DALYs have increased by 23 per cent for drug use disorders (by 27 per cent for opioid use disorders) and by 13 per cent for diseases resulting from hepatitis C. By contrast, DALYs attributed to HIV/AIDS have declined by 15 per cent over the past decade.

Different dimensions of harms resulting from NPS

The fast-changing nature of the NPS market continues to challenge programmes and policies that address their emergence and proliferation, with health consequences affecting users of NPS at the individual and general population levels. The harms of the use of different NPS vary in their intensity and outcomes as health consequences and depend on different factors related to the class and group of substances, chemical structure and group of users. However, at the population level, with the notable exception of some NPS opioids, the extent of the acute effects or harm caused by most NPS appears to be much less than that of controlled drugs. Moreover, the different NPS do not seem to have established sizeable markets that may pose a threat to public health globally.

As defined by UNODC, NPS are substances that are not under international control, but which may pose a public health threat similar to substances that are under international control.[67] Although classed as one group, NPS actually comprise diverse groups of substances that have emerged in the drug markets over the past few decades

66 UNAIDS, *Miles to Go: Closing Gaps, Breaking Barriers, Righting Injustices* (Geneva, 2018).

67 UNODC, *The Challenge of New Psychoactive Substances: A Report from the Global SMART Programme* (March 2013).

Drug-related deaths are still increasing

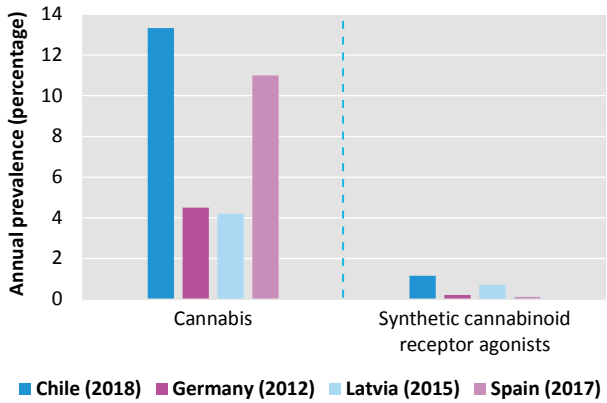
The most comprehensive and timely data on global deaths attributed to drug use are produced by the Global Burden of Disease Study,[a] which estimated that there was a total of 494,000 drug-related deaths in 2019. The estimate is not comparable with that presented in the *World Drug Report 2020* since the Global Burden of Disease Study recently revised the estimates of DALYs and deaths retrospectively. The new estimate for 2017 is 473,000, indicating an increase of nearly 5 per cent between 2017 and 2019. The latest time series released by the Global Burden of Disease Study indicates an overall increase in total deaths attributed to drugs of 17.5 per cent in the past decade.

Within the total number of deaths attributed to drug use, there is an important distinction: deaths directly related to drug use disorders (mainly overdoses); and deaths indirectly related to drug use, which are attributed to, for example, liver cancer or cirrhosis as a result of hepatitis, HIV and AIDS, and to self-harm associated with drug use.

a Institute for Health Metrics and Evaluation, "Global Burden of Disease Study 2019 Data Resources: GBD Results Tools".

Deaths related to drug use disorders	Deaths indirectly related to drug use	Total deaths attributed to drug use
(mainly overdoses)	(e.g., liver disease due to hepatitis, HIV and AIDS, self-harm associated with drug use)	
2019		
128,000	+ 366,000 =	494,000
2010–2019		
by 45%	by 10%	by 17.5%
45% 45%	8% 11%	16% 18%

FIG. 23 Use of cannabis and synthetic cannabinoid receptor agonists, selected countries



Source: UNODC, responses to the annual report questionnaire.

and have been referred to as "designer drugs", "legal highs", "herbal highs", "bath salts", etc.[68]

NPS include diverse chemical substances within broad groups of substances that are synthetic or plant-based. They include substances such as synthetic cannabinoid receptor agonists, synthetic cathinones, phenethylamines, piperazines, tryptamines, aminoindanes and NPS opioids. Plant-based NPS include substances such as kratom (*Mitragyna speciosa*), *Salvia divinorum* and khat (*Catha edulis*). Although termed as "new", many of these substances have been around for decades, some being synthesized or patented in the 1970s or even earlier.[69]

NPS users are a diverse group. They include mature, experienced and informed users, known as "psychonauts", who buy substances, often on both the clear web and the dark web (darknets), consciously experiment with psychoactive compounds and their combinations and can also provide information on the effects of those substances to other users.[70] NPS users also include users, especially young users, in recreational settings, including the straight and gay dance scenes, and in student populations and marginalized population groups, for example, homeless or socially marginalized people who inject drugs.[71] Motivations for using NPS are similar to those leading to the use of controlled drugs and include curiosity, drug-induced sexual pleasure-seeking, sensation-seeking and self-exploration. Street, peer and online availability, perceptions of value for money and legality, poor quality of available controlled drugs, preferred desired and duration of effects, and habit or dependent use are also factors associated with NPS use.[72]

The use of different NPS varies across countries and among different population groups. In a survey undertaken in six European countries, use of the following broad categories of NPS was reported (by order of their popularity): (a) synthetic cannabinoids (pure or as herbal blends), the use of which was most commonly reported in Germany, Poland and Hungary; (b) stimulants, the use of which was more commonly reported in the Netherlands and Ireland; (c) psychedelics, the use of which was most commonly reported in Portugal and Germany; and (d) dissociatives.[73] The same survey revealed that the daily use of synthetic cannabinoids was higher among marginalized groups of users (17.9 per cent) as compared with those in nightlife settings (1.2 per cent) or those who were responding online to the questionnaire (2.8 per cent).

The prevalence of the use of different NPS in the general adult population or adolescents also remains much lower than the prevalence of the use of conventional controlled substances. For instance, in England and Wales in 2018, 0.5 per cent of the adult population reported use of NPS, mainly synthetic cannabinoids, in the past year.[74] By comparison, 7.6 per cent of adults in England and Wales reported use of cannabis and 2.9 per cent use of cocaine in the past year.

In a cross-sectional study using convenience sampling of university students in Egypt, 6.8 per cent reported use of synthetic cannabinoids ("Strox") and 8 per cent reported smoking cannabis.[75] In 2019, among adolescents (aged 15–16 years) in 32 countries in Europe, an average of 2.5

68 Leslie A. King and Andrew T. Kicman, "A brief history of 'new psychoactive substances'", *Drug Testing and Analysis*, vol. 3, Nos. 7 and 8 (July–August 2011), pp. 401–403.

69 UNODC, *The Challenge of New Psychoactive Substances: A Report from the Global SMART Programme*.

70 Laura Orsolini and others, "Mind navigators of chemicals' experimenters? A web-based description of e-psychonauts", *Cyberpsychology, Behavior, and Social Networking*, vol. 18, No. 5 (May 2015), pp. 296–300.

71 Marie Claire Van Hout and others, "Health and social problems associated with recent novel psychoactive substance (NPS) use amongst marginalised, nightlife and online users in six European countries", *International Journal of Mental Health and Addiction*, vol. 16, No. 2 (2018), pp. 480–495.

72 Ibid.

73 Ibid.

74 United Kingdom, "United Kingdom drug situation 2019: focal point annual report", updated 2 December 2020.

75 Ahmed M. M. Hashim and others, "Prevalence of Strox smoking among university students in Cairo, Egypt", *The Open Public Health Journal*, vol. 13 (2020).

per cent reported that they had used NPS (mostly synthetic cannabinoids) at least once in the past 12 months, with the highest prevalence reported, in descending order, in Czechia, Latvia, Estonia, Poland and Monaco (ranging from 4.9 to 4.0 per cent) and the lowest prevalence reported, in ascending order, in North Macedonia, Finland and Portugal (from 0.4 to 0.8 per cent). By comparison, the overall prevalence of current cannabis use among the adolescents surveyed was 7.4 per cent. In general, differences in the use of NPS between boys and girls were small; however, significantly more boys than girls reported the use of NPS in Cyprus, Georgia, Greece, Ireland, Montenegro, Norway and Serbia, and significantly more girls than boys reported the use of NPS in Latvia and Slovenia.[76]

In general, the use of NPS is associated with a range of acute and chronic health consequences that depend on the characteristics and vulnerability of users, environmental characteristics, level of dosage, toxicity of the substance, route of administration and combination with other substances. Similarly to those resulting from the use of controlled drugs, harms resulting from the use of NPS may comprise adverse cardiovascular, respiratory and gastro-intestinal consequences, transmission of blood-borne viruses (HIV and hepatitis C), neurological and psychiatric harms such as psychosis, suicidal ideation and dependence, and death as a result of organ damage or cardiac and respiratory failure.[77]

Precisely quantifying the harm that NPS pose to the health of their users is challenging. The harm can be analysed in terms of macro-level consequences observable in aggregated statistics on use and health consequences or in terms of the risk that NPS pose to single individuals when they use them. NPS seem to pose a higher risk to single individuals than that reflected in aggregated, population-level statistics, in which NPS use does not account for a significant share of total harm caused by drug use. The novel or varying composition of each substance, which is often unknown to users, and relatively low prevalence of use may explain this difference.

NPS harm at the aggregated population level

In general, fewer people seek emergency care as a consequence of NPS use than as a consequence of the use of controlled drugs. Among respondents to the Global Drug Survey in 2020 – about 110,000 mainly young people from 25 countries, with access to the Internet – 3 per cent reported seeking emergency medical treatment resulting from use, in the previous 12 months, of synthetic cannabinoid receptor agonists; whereas 13 per cent of the respondents reported seeking medical treatment for heroin use.[78]

In Europe, over the period 2014–2017, almost 24,000 drug-related emergency presentations were recorded at 32 sentinel hospitals. Of those emergency room visits, 67 per cent were related to intoxication with established controlled drugs, 23 per cent were related to the misuse of pharmaceuticals and 6 per cent were related to the use of NPS. Among the 20 substances that were reported in relation to drug-related emergency room visits, heroin, cocaine, cannabis, GHB and GBL, amphetamine and MDMA were the ones most frequently reported, along with NPS synthetic cannabinoid receptor agonists and mephedrone.[79]

Within the different groups of NPS, sedatives and hypnotics have gained particular prominence. Over the period January 2019–April 2020, among the 670 toxicology cases involving NPS reported to UNODC, sedatives and hypnotics were by far the most frequently observed, accounting for more than two thirds of the reported cases, while substances from other NPS groups accounted for less than 10 per cent of the cases each.[80]

NPS harm at the individual level

In contrast to the effects of NPS at the population level, different NPS can be quite harmful at the individual level, with toxicology cases of single substances showing harmful effects, including death, as a result of their use. The following subsection contains examples of reported harmful effects of different NPS at the individual level.

76 EMCDDA, *ESPAD Report 2019: Results from the European School Survey Project on Alcohol and Other Drugs* (Luxembourg, Publications Office of the European Union, 2020).

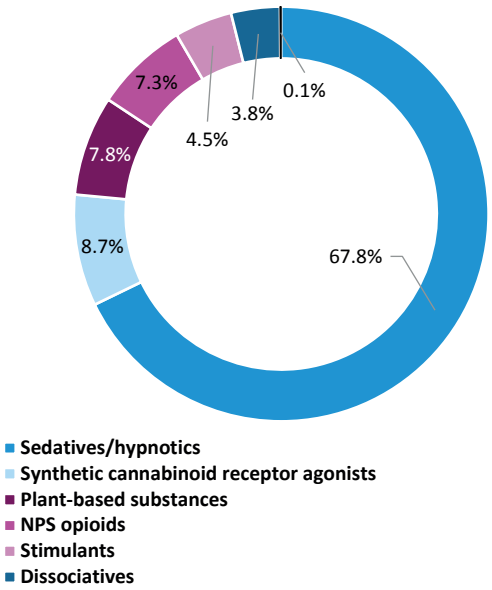
77 Marie Claire Van Hout and others, "Health and social problems associated with recent novel psychoactive substance (NPS) use amongst marginalised, nightlife and online users in six European countries".

78 Adam R Winstock and others, *Global Drug Survey (GDS) 2020: Key Findings Report/Executive Summary* (January 2021).

79 EMCDDA, *Drug-Related Hospital Emergency Presentations in Europe: Update from the Euro-DEN Plus Expert Network*, Technical Reports Series (Luxembourg, Publications Office of the European Union, 2020).

80 UNODC, "Current NPS threats", vol. III (October 2020).

FIG. 24 NPS groups emerging in toxicology cases that involved NPS reported to UNODC, January 2019–April 2020



Source: UNODC, "Current NPS threats", vol. III (October 2020).

Note: Based on a total of 670 cases involving 46 NPS reported to UNODC.

Benzodiazepine-type NPS

Benzodiazepines are widely used in medicine as anticonvulsants, sedatives and tranquillizers. A total of 38 substances in this class are under international control. Benzodiazepines, in the form of both controlled pharmaceutical drugs and NPS, are often detected in drug overdose cases and can contribute to serious adverse health effects and death, particularly when used in combination with opioids. Of the toxicology cases involving NPS reported to UNODC, 83 per cent of cases related to people driving under the influence of drugs involved benzodiazepines; flualprazolam and flubromazolam were the two most commonly found benzodiazepines in these cases of driving under the influence of drugs. However, in nearly half of post-mortem cases, etizolam, flualprazolam, flubromazolam and phenazepam were assessed to have either contributed to, or been the cause of, death.[81]

Synthetic cannabinoid receptor agonists

The class of NPS that are synthetic cannabinoid receptor agonists – the most common NPS reported globally – also comprises a range of chemically dissimilar substances that have the common feature of acting on the cannabinoid receptors (C1, C2) in the body. Among them, HU-210 was first synthesized in Israel in 1988 and is considered to have a potency of at least 100 times that of THC; others include JWH-018, JWH-073, JWH250 and JWH-081.[82] In general, users of synthetic cannabinoid receptor agonists have reported a number of toxic effects, including seizures, loss of consciousness, psychosis, vomiting, drowsiness, chest pain, agitation, hot flushes, dilation of pupils and a dry mouth.[83] In Europe, over the period 2014–2017, common clinical features among people attending 32 sentinel hospitals with acute intoxication related to the use of synthetic cannabinoid receptor agonists included agitation or aggression, anxiety, hallucinations, vomiting and psychosis.[84]

JWH-018 was among the first synthetic cannabinoids of the new generation of NPS that entered drug markets around 2004.[85] A 2011 study on JWH-018 reported severe toxicity following its ingestion that could lead to seizures and tachyarrhythmia.[86]

A number of fatal and non-fatal cases related to the use of different synthetic cannabinoid receptor agonists have been reported in recent years. In Poland, a large outbreak of several hundred intoxications was registered in 2015, including at least three fatal cases that were caused by the use of a type of NPS known as "Mocarz" (Strongman) that contained a mixture of synthetic cannabinoids – the presence of MDMB-CHMICA was recorded – suggesting that even low doses of the substance could have fatal consequences.[87] A year later, in New York, 33 cases of intoxication as a result of the use of AMB-FUBINACA, which is classified as a strong depressant and accounted for "zombie-like" behaviour, were reported.[88] In 2018,

81 Ibid.

82 See also UNODC, *World Drug Report 2017*, booklet 4, *Market Analysis of Synthetic Drugs* (United Nations publication, 2017).

83 Ibid.

84 EMCDDA, *Drug-related Hospital Emergency Presentations in Europe: Update from the Euro-DEN Plus Expert Network*.

85 Yigit Sezer and others, "In vitro assessment of the cytotoxic, genotoxic and oxidative stress effects of the synthetic cannabinoid JWH-018 in human SH-SY5Y neuronal cells", *Toxicology Research*, vol. 9, No. 6 (December 2020).

86 J. Lapoint and others, "Severe toxicity following synthetic cannabinoid ingestion", *Clinical Toxicology*, vol. 49, No. 8 (October 2011), pp. 760–764.

87 Piotr Adamowicz, "Fatal intoxication with synthetic cannabinoid MDMB-CHMICA", *Forensic Science International*, vol. 261 (2016), pp. e5–e10.

88 Axel J. Adams and others, "'Zombie' outbreak caused by the synthetic cannabinoid AMB-FUBINACA in New York", *New England Journal of Medicine*, vol. 376 (2017) pp. 235–242.

Turkey reported about 300 deaths attributed to the use of synthetic cannabinoid receptor agonists.[89] Most of those fatal intoxication cases were attributed to the use of the synthetic cannabinoid products marketed as "Bonsai" (JWH-018).[90, 91]

NPS opioids

NPS opioids, or research opioids, appear to be in the fast-growing category of new substances reported over the past five years. They comprise a range of fentanyl analogues.[92] NPS opioids also include a range of research opioids that were developed by the pharmaceutical industry, starting in the 1960s, in the search for suitable alternatives to using morphine for pain management. Some of those substances were not developed further and were subsequently considered "not suitable for human consumption" ("failed pharmaceuticals"). NPS opioids also include those that were either falsified, unregistered or unlicensed pharmaceuticals and were sold in countries where they were not approved for medical use. In recent years, some of those opioids have been rediscovered and others have been developed through successive modifications to their chemical structure so as to circumvent existing legislation and introduced to drug markets. Some of them have also been put under international control in the past few years. Excluding fentanyl analogues, NPS opioids include substances such as U-47700, AH-7921, MT-45, 2-methyl-AP-237, W-18,[93] the new class of benzimidazole (isotonitazene)[94] and the more recent brorphine, which was only identified in 2019.[95, 96]

89 UNODC, responses submitted by Turkey to the annual report questionnaire for 2018.

90 Gokhan Aksel and others, "Rising threat; Bonsai", *Turkish Journal of Emergency Medicine*, vol. 15, No. 2 (June 2015), pp. 75–78.

91 Dursun Firat Ergül and others, "Synthetic cannabinoid 'Bonzai' intoxication: six case series", *Turkish Journal of Anaesthesiology and Reanimation*, vol 43, No. 5 (October 2015), pp. 347–351.

92 UNODC, "The growing complexity of the opioid crisis", *Global SMART Update*, vol. 24 (October 2020).

93 Nan Qin and others, "Determination of 37 fentanyl analogues and novel synthetic opioids in hair by UHPLC-MS/MS and its application to authentic cases", *Scientific Reports*, vol. 10, art. No. 11569 (July 2020).

94 Peter Blanckaert and others, "Report on a novel emerging class of highly potent benzimidazole NPS opioids: chemical and in vitro functional characterization of isotonitazene", *Drug Testing and Analysis*, vol. 12, No. 4 (April 2020), pp. 422–430.

95 UNODC, *World Drug Report 2020*, booklet 4, "The growing complexity of the opioid crisis" (United Nations publication, 2020).

96 Nick Verougstraete and others, "First report on brorphine: the next opioid on the deadly new psychoactive substances' horizon?", *Journal of Analytical Toxicology*, vol. 44, No. 9 (November 2020).

Although they are dissimilar in their chemical structure, the common feature of NPS opioids is their action on the mu (μ) receptor. In addition, the harms associated with NPS opioids other than fentanyls vary considerably in their severity. AH-7921 was first identified in Europe in July 2012 and, by 2014, the clinical symptoms of its adverse effects, as reported in six cases in Sweden, were noted as tachycardia, hypertension and seizures. In December 2012, the first death attributed to AH-7921 was reported in Norway and, the following year, 16 cases of fatal intoxication were reported in Norway, Sweden, the United Kingdom and the United States.[97]

U-47700, a potent μ-opioid receptor agonist, was first identified in Sweden in October 2014 and later seized in various countries in Europe and in the United States.[98] In 2016, a significant number of acute intoxication cases attributed to U-47700 were reported in the United States. The symptoms included respiratory depression, cyanosis (a bluish discoloration, especially of the skin), miosis (excessive constriction of the pupil of the eye), reduced levels of consciousness, drowsiness, tachycardia, nausea, anxiety and abdominal pains. In most cases, the symptoms were reversed by the administration of naloxone.[99] Between July and December 2016, about 40 overdose deaths were reported in the States of Ohio, West Virginia and Wisconsin.[100] The popularity of U-47700 on the illicit market was presumably due to its reportedly short-lived euphoric and mood-lifting effects, which are experienced in waves and create an intense urge among users to continue re-dosing or using.[101]

In 2019, brorphine was the latest addition to the list of non-fentanyl NPS opioids reported on the market. Despite having structural similarities to fentanyl, brorphine differs in key aspects from fentanyl and falls outside the scope of generic legislation aimed at covering fentanyl analogues.[102] Between June and November 2020, 120 overdose deaths attributed to brorphine were reported in different states in the United States.[103]

97 Jolanta B. Zawaliska, "An expanding world of novel psychoactive substances: opioids", *Frontiers in Psychiatry*, vol. 8, No. 110 (June 2017).

98 Michael H Baumann and others, "U-47700 and its analogs: non-fentanyl synthetic opioids impacting the recreational drug market", *Brain Sciences*, vol. 10, No. 11 (November 2020).

99 Zawaliska, "An expanding world of novel psychoactive substances".

100 Baumann and others, "U-47700 and its analogs: non-fentanyl synthetic opioids impacting the recreational drug market".

101 UNODC, *World Drug Report 2020*, "The growing complexity of the opioid crisis".

102 Nick Verougstraete and others, "First report on brorphine: the next opioid on the deadly new psychoactive substances' horizon?".

103 Center for Forensic Science Research and Education, "New deadly opioid results in over 120 deaths", 18 November 2020.

More than 11 million people worldwide inject drugs

PWID are a particularly vulnerable population who potentially experience multiple negative health consequences as a result of injecting drug use. They are at increased risk of acquiring serious, life-threatening infectious diseases such as HIV and hepatitis C through the sharing of contaminated needles and syringes and are also at high risk of non-fatal and fatal overdose.[104, 105]

The prevalence of HIV and hepatitis C are disproportionally high among PWID and injecting drug use is a major contributor to the global hepatitis C epidemic. WHO estimates that, in 2015, almost one quarter (23 per cent) of the 1.7 million new hepatitis C infections globally were attributable to injecting drug use.[106] Moreover, UNAIDS estimates that, in 2019, PWID accounted for approximately 1 in every 10 new adult HIV infections globally.[107]

The joint UNODC, WHO, UNAIDS and World Bank estimate of the number of PWID worldwide in 2019 is 11.2 million (range: 8.9 million to 14.2 million), corresponding to 0.22 per cent (range: 0.18 to 0.28 per cent) of the population aged 15–64. Based on estimates of injecting drug use from 122 countries, the available data for 2019 cover 90 per cent of the global population aged 15–64. The estimated number of PWID for the preceding year, 2018, was 11.3 million (range: 8.9 million to 15.3 million), or 0.23 per cent (range: 0.18 to 0.31 per cent) of the population aged 15–64. Although there has been no change between the 2018 and 2019 estimates of PWID, any trend data must be viewed with caution, as methodologies may have changed.

Injecting drug use remains highly prevalent in Eastern Europe, Central Asia and Transcaucasia and North America, with rates that are 5.7, 2.8 and 2.5 times the global average, respectively. In terms of the number of PWID worldwide, most of them reside in East and South-East Asia (27 per cent), North America (16 per cent) and Eastern Europe (15 per cent). The prevalence of injecting drug use in East and South-East Asia is below the global average, but that subregion is the most populous, being home to 32 per cent of the global population aged 15–64. Combined, three countries – China, the Russian Federation and the United States – account for 26 per cent of the global population aged 15–64, but for 43 per cent of the estimated number of PWID worldwide.

Available data on PWID size estimations are more limited in their coverage of the populations aged 15–64 in the Caribbean (representing 31 per cent of the population), the Near and Middle East (42 per cent), Central America (58 per cent), Africa (68 per cent) and Oceania (72 per cent). Information was available for only 2 of the 26 countries and territories in the Caribbean (Dominican Republic and Puerto Rico) and for 2 of the 23 in Oceania (Australia and New Zealand).

Data on the prevalence of HIV among PWID are more limited in their coverage of the PWID populations in the Caribbean (representing 32 per cent of the population), Central America (33 per cent), the Near and Middle East (55 per cent) and Oceania (73 per cent). Information was only available for 4 of the 26 countries and territories in the Caribbean (Bahamas, Saint Lucia, Aruba and Puerto Rico) and from 2 of the 23 in Oceania (Australia and New Zealand).

Data on the prevalence of hepatitis C among PWID are more limited in their coverage of the PWID populations in Central America (representing 0 per cent of the population), the Caribbean (31 per cent), the Near and Middle East (53 per cent), Africa (63 per cent) and Oceania (72 per cent). Information was available for none of the countries in Central America, for only 2 of the 26 countries and territories in the Caribbean (Bahamas and Puerto Rico) and for 2 of the 23 in Oceania (Australia and New Zealand).

Approximately one in eight people who inject drugs worldwide is living with HIV

PWID are at a high risk of being infected with HIV; in 2019, the risk of acquiring HIV was estimated to be 29 times greater among PWID than among those who do not inject drugs. In addition, PWID accounted for almost half of new adult HIV infections in Eastern Europe and Central Asia (48 per cent) and in the Middle East and North Africa (43

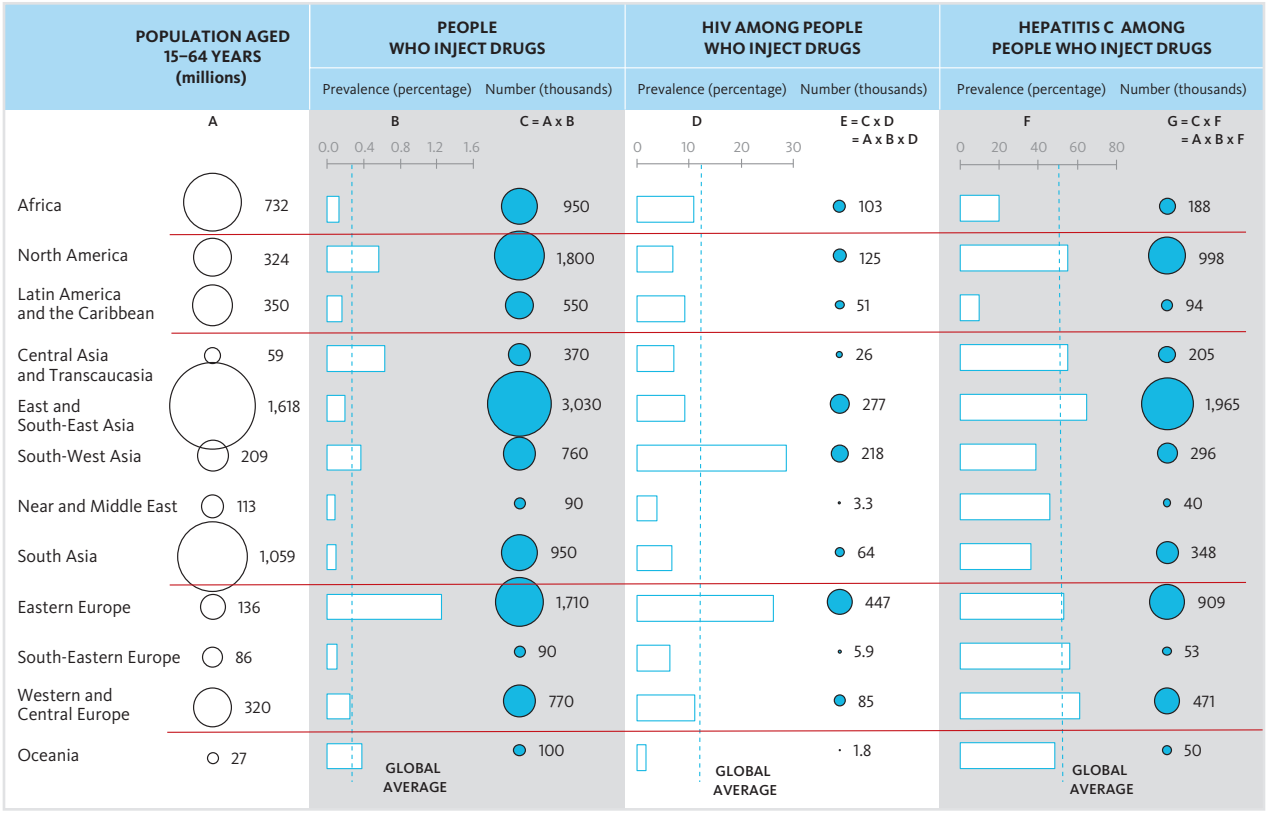
104 Bradley M. Mathers and others, "Mortality among people who inject drugs: a systematic review and meta-analysis", *Bulletin of the World Health Organization*, vol. 91, No. 2 (February 2013), pp. 102–123.

105 Samantha Colledge and others, "The prevalence of non-fatal overdose among people who inject drugs: a multi-stage systematic review and meta-analysis", *International Journal of Drug Policy*, vol. 73 (2019), pp. 172–184.

106 WHO, *Global Hepatitis Report 2017* (Geneva, 2017).

107 UNAIDS, *Global AIDS Update 2020: Seizing the Moment — Tackling Entrenched Inequalities to End Epidemics* (Geneva, 2020).

FIG. 25 Regional patterns in injecting drug use, and HIV and hepatitis C among people who inject drugs, 2019



Sources: UNODC, responses to the annual report questionnaire; progress reports of UNAIDS on the global AIDS response (various years); the (former) Reference Group to the United Nations on HIV and injecting drug use; and published peer-reviewed articles and government reports.

Notes: Bars show prevalence and circles represent numbers of people. Prevalence of PWID is the percentage of the population aged 15–64. The relative size of the circles is to scale for the numbers of PWID and those among this group living with HIV and hepatitis C.

per cent).[108] It is also important to highlight that the health of PWID has an impact on wider society, for example, through the sexual transmission of HIV: outside sub-Saharan Africa, PWID and their sexual partners are estimated to account for approximately one quarter of all people newly infected with HIV.[109]

While the incidence of new HIV infections among the general population (all ages) declined by 25 per cent globally between 2010 and 2017, the incidence of new HIV infections among PWID increased slightly, from 1.2 per cent in 2011 to 1.4 per cent in 2017.[110]

The joint UNODC, WHO, UNAIDS and World Bank estimate of the prevalence of HIV among PWID worldwide in 2019 is 12.6 per cent, amounting to 1.4 million PWID living with HIV. Based on estimates of the prevalence of HIV among PWID from 121 countries, the available data cover 96 per cent of the number of estimated PWID globally. There has been no change in the estimated prevalence of HIV among PWID since the previous estimate, in 2018, which was also 12.6 per cent.

The highest prevalence of HIV among PWID is found in South-West Asia and Eastern Europe, with rates that are 2.3 and 2.1 times the global average, respectively. In terms of actual numbers of PWID living with HIV worldwide, most reside in Eastern Europe (32 per cent), East and South-East Asia (20 per cent) and South-West Asia (15 per cent). In East and South-East Asia, the prevalence of

108 UNAIDS, *Global AIDS Update 2020: Seizing the Moment — Tackling Entrenched Inequalities to End Epidemics*.

109 UNAIDS, *Health, Rights and Drugs: Harm Reduction, Decriminalization and Zero Discrimination for People Who Use Drugs* (Geneva, 2019).

110 Ibid.

both injecting drug use and HIV among PWID are below the global averages,[111] but that subregion is home to a considerable proportion (32 per cent) of the global population aged 15–64. Combined, three countries – China, Pakistan and the Russian Federation – account for 34 per cent of the estimated number of PWID worldwide but are home to 51 per cent of the estimated number of PWID living with HIV.

Outbreaks of HIV among people who inject drugs and common contributory factors

HIV can spread rapidly among PWID. Outbreaks of HIV among PWID can undermine the progress previously achieved in reducing new HIV infections among PWID. They pose new challenges for the control of HIV and underline how vulnerable PWID are to socioeconomic changes and developments in drug markets, and how fragile the success of interventions can be in preventing HIV.[112] The presence of prevention and treatment services

TABLE 1 **Size of outbreaks of HIV among people who inject drugs in cities in Israel, the United States and selected countries in Europe, 2011–2019**

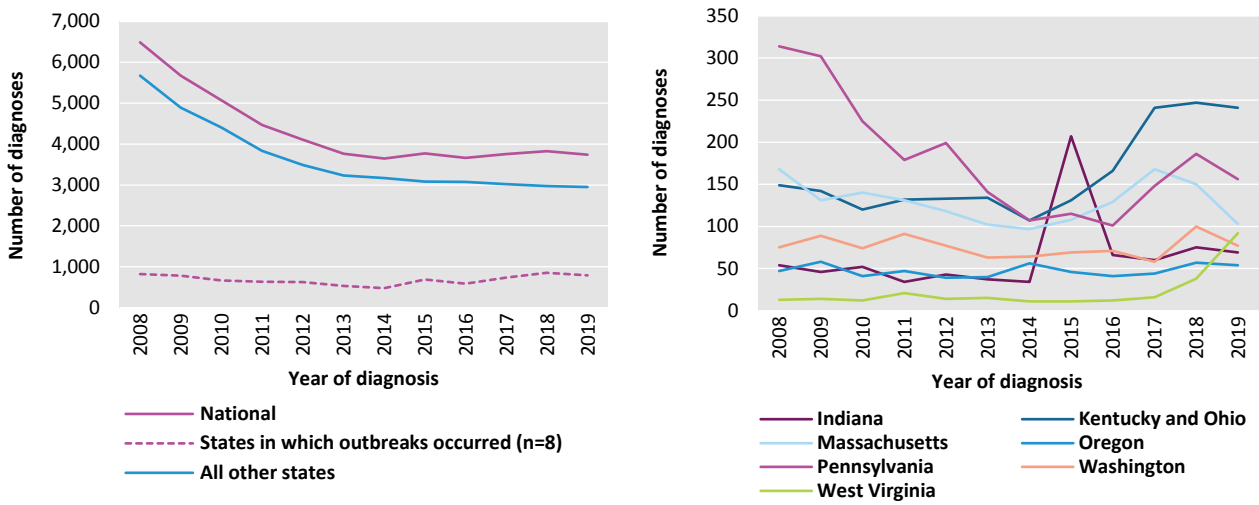
Location	"Annual cases prior to outbreak"	During outbreak	
		Time period	Number
EUROPE			
Germany, North Rhine Westphalia	19 (2016)	2018	55
Greece, Athens	10 to 20	2012 (peak year)	525 (peak year)
Ireland, Dublin	10 to 20	2014–2015	57
Luxembourg	Less than 4	2013–2017	68
Romania, Bucharest	5 to 12	2011–2013	308 per year at peak
Scotland, United Kingdom, Glasgow	Less than 10	2015–2017	More than 100
ISRAEL			
Tel Aviv	0 (Jan 2011–Apr 2012)	May 2012–Apr 2013	42
UNITED STATES OF AMERICA			
Indiana, Scott County	0 to 1	2015–2017	227
Northern Kentucky / Hamilton County, Ohio	Less than 20	2017–2018	157
Massachusetts, Lawrence / Lowell	Less than 10	2015–2018	159
Oregon, Portland	Approx. 12	Jan 2018–Jun 2019	42
Pennsylvania, Philadelphia	33 (2016)	2017–2018	116
Washington, Seattle	17 (2017)	2018	52
West Virginia, Cabell County	Approx. 2	Jan 2018–Oct 2019	82

Sources: Robert Koch Institut, *Infektionsepidemiologisches Jahrbuch meldepflichtiger Krankheiten für 2018* (Berlin, 2019), p. 130; Don C Des Jarlais and others, "HIV outbreaks among people who inject drugs in Europe, North America, and Israel", *The Lancet HIV*, vol. 7, No. 6 (June 2020), pp. e434–e442; Andrew McAuley and others, "Re-emergence of HIV related to injecting drug use despite a comprehensive harm reduction environment: a cross-sectional analysis", *The Lancet HIV*, vol. 6, No. 5 (May 2019), pp. e315–e324; E. Katchman and others, "Successful control of a large outbreak of HIV infection associated with injection of cathinone derivatives in Tel Aviv, Israel", *Clinical Microbiology and Infection*, vol. 23, No. 5 (May 2017), pp. 336.e5–336.e8; Sheryl B. Lyss and others, "Responding to outbreaks of human immunodeficiency virus among persons who inject drugs: United States, 2016–2019 – perspectives on recent experience and lessons learned", *Journal of Infectious Diseases*, vol. 222, Suppl. No. 5 (October 2020), pp. S239–S249; Charles Alpren and others, "Opioid use fueling HIV transmission in an urban setting: an outbreak of HIV infection among people who inject drugs – Massachusetts, 2015–2018", *American Journal of Public Health*, vol. 110, No. 1 (January 2020), pp. 37–44; and Melissa M. Kim and others, "Understanding the intersection of behavioral risk and social determinants of health and the impact on an outbreak of human immunodeficiency virus among persons who inject drugs in Philadelphia", *Journal of Infectious Diseases*, vol. 222, Suppl. No. 5 (October 2020), pp. S250–S258.

111 However, there is wide variation in the prevalence of HIV among PWID in East and South-East Asia: from 8.4 per cent in China to 29 per cent in the Philippines.

112 Vana Sypsa, "Why do HIV outbreaks re-emerge among people who inject drugs?", *The Lancet HIV,* vol. 6, No. 5 (May 2019), pp. e274–e275.

FIG. 26 HIV diagnoses among people who inject drugs, United States, 2008–2019



Source: United States, Centers for Disease Control and Prevention, National Center for HIV/AIDS, Viral Hepatitis, STD, and TB Prevention AtlasPlus, 11 December 2019. Available at www.cdc.gov/nchhstp/atlas/index.htm.

Note: Diagnoses attributed to injecting drug use, including PWID who are men who have sex with men.

in itself does not necessarily mean that these services are effectively reaching all PWID at risk of HIV.

The past decade has witnessed a number of localized outbreaks, which have been investigated predominantly in the United States and Europe, of HIV among PWID. According to WHO, an outbreak is the occurrence of disease cases in excess of normal expectancy, where the number of cases varies according to the size and type of previous and existing exposure.[113] The size and speed of these outbreaks varied, with the numbers of new HIV infections among PWID during the largest outbreaks in Europe and the United States rising sharply during the first year from typically 10–20 cases per year to 525 during the peak year in Athens, Greece, and from typically 1 case per year to a total of 227 over a three-year period in Scott County, Indiana, United States. In some cases, the outbreaks were sufficiently large that, when combined with overall trends, they had an impact at the national level on new diagnoses of HIV among PWID, as in the case of the United States, countries in Europe, and Israel.

For example, in the United States, the number of new HIV diagnoses among PWID continually declined between 2008 and 2014, with the annual number decreasing by 44 per cent overall during that period.[114] In 2015, a large outbreak of HIV among PWID occurred in Scott County, Indiana.[115] Prompted by this outbreak, the Centers for Disease Control and Prevention conducted an analysis to identify and alert the counties that, in the context of the national opioid crisis, might have been the most vulnerable to HIV outbreaks related to injecting drug use.[116] Since the outbreak in Scott County, increases in new diagnoses of HIV among PWID have occurred across the United States, with additional outbreaks contributing to new infections in (by order of detection) Massachusetts; Northern Kentucky; Hamilton County, Ohio; Washington State; Pennsylvania; West Virginia; and Oregon.[117] A large

113 WHO, Environment, Climate Change and Health, "Disease outbreaks".

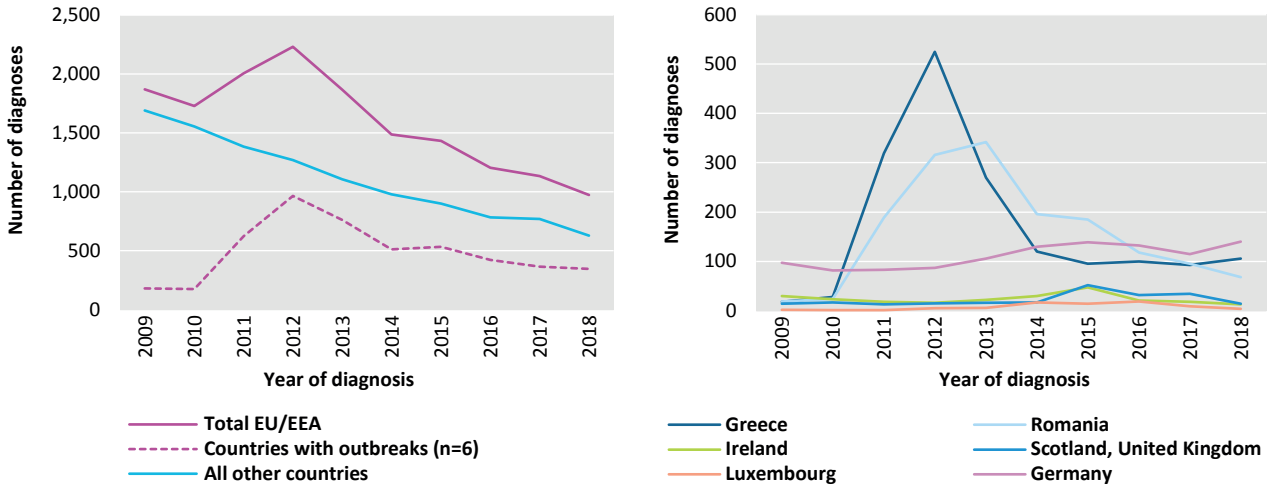
114 United States, Centers for Disease Control and Prevention, National Center for HIV/AIDS, Viral Hepatitis, STD, and TB Prevention AtlasPlus, 11 December 2019. Available at www.cdc.gov/nchhstp/atlas/index.htm.

115 Philip J. Peters and others, "HIV infection linked to injection use of oxymorphone in Indiana, 2014–2015", *New England Journal of Medicine*, vol. 375, No. 3 (2016), pp. 229–239.

116 Michelle M. Van Handel and others, "County-level vulnerability assessment for rapid dissemination of HIV or HCV infections among persons who inject drugs, United States", *Journal of Acquired Immune Deficiency Syndrome*, vol. 73, No. 3 (November 2016), pp. 323–331.

117 Sheryl B. Lyss and others, "Responding to outbreaks of human immunodeficiency virus among persons who inject drugs: United States, 2016–2019 – perspectives on recent experience and lessons

FIG. 27 HIV diagnoses among people who inject drugs, Europe, 2009–2018



Sources: European Centre for Disease Prevention and Control and WHO Regional Office for Europe, HIV/AIDS Surveillance in Europe 2019: 2018 Data (Stockholm, 2019); and United Kingdom, Public Health England, Health Protection Scotland, Public Health Wales and Public Health Agency Northern Ireland, "Shooting up: infections among people who inject drugs in the UK, 2018: accompanying data tables" (London, Public Health England, December 2019).

proportion of the increases in HIV diagnoses among PWID in these states can be attributed to the localized outbreaks. At the national level, this has changed the ongoing trend from decreasing to stabilization.

In the United States, before the outbreak in Scott County, Indiana, prevention and treatment services for HIV were severely limited in that county. No opioid substitution treatment, antiretroviral therapy or needle-syringe programmes existed, as they were illegal at that time.[118, 119]

In all six outbreak settings that occurred in the United States after the outbreak in Indiana, some form of needle and syringe programme was in place at the time of the outbreak and in some cases there were historically strong programmes. However, as part of the outbreak response, gaps were identified in effectively providing all at-risk PWID with sterile needles and syringes, and access and availability were subsequently increased.[120]

In Europe, since 2011, outbreaks of HIV among PWID have occurred in (by order of detection) Athens, Greece; Bucharest, Romania; Dublin, Ireland; Luxembourg; Glasgow, Scotland, United Kingdom; and Munich and Berlin, Germany.[121, 122, 123] A large proportion of the increases in HIV diagnoses among PWID detected in those countries can be attributed to those outbreaks. In Romania, the peak in the number of cases in 2013 can largely be attributed to the outbreak in Bucharest. It is uncertain from the literature when the outbreak ended, although the latest joint HIV surveillance report from the European Centre for Disease Prevention and Control and WHO suggest that the outbreak occurred during the period 2011–2013.[124] Combined cases in all other countries in Europe apart from the six (Greece, Romania, Ireland, Luxembourg, Scotland and Germany) that experienced an outbreak show a consistent and overall large decline in new HIV infections among PWID between

learned", *Journal of Infectious Diseases,* vol. 222, Suppl. No. 5 (October 2020), pp. S239–S249.

118 Peters and others, "HIV infection linked to injection use of oxymorphone in Indiana, 2014–2015".

119 Des Jarlais and others, "HIV outbreaks among people who inject drugs in Europe, North America, and Israel".

120 Lyss and others, "Responding to outbreaks of human immunodeficiency virus among persons who inject drugs: United States, 2016–2019 – perspectives on recent experience and lessons learned".

121 Don C. Des Jarlais and others, "HIV outbreaks among people who inject drugs in Europe, North America, and Israel", *The Lancet HIV*, vol. 7, No. 6 (June 2020), pp. e434–e442.

122 Kirsten Hanke and others, "A recent human immunodeficiency virus outbreak among people who inject drugs in Munich, Germany, is associated with consumption of synthetic cathinones", *Open Forum Infectious Diseases*, vol. 7, No. 6 (June 2020), pp. 1–9.

123 Robert Koch Institut, *Infektionsepidemiologisches Jahrbuch meldepflichtiger Krankheiten für 2018* (Berlin, 2019), p. 130.

124 European Centre for Disease Prevention and Control and WHO Regional Office for Europe, *HIV/AIDS Surveillance in Europe 2019: 2018 Data* (Stockholm, 2019).

2009 and 2018. The combined number of cases in the six countries show the opposite trend over the periods 2010–2012 and 2014–2015, with increases in new HIV diagnoses among PWID, which drove up the total number at the European level over those periods.

In Athens, Greece, the situation before the outbreak showed long-term low levels of coverage of opioid agonist treatment (with extensive waiting lists and lengthy waiting times, of several years), a low level of distribution of needles and syringes for PWID (below 20 needles and syringes per person per year until 2011) and a low uptake of antiretroviral therapy among HIV-positive PWID.[125, 126] In Bucharest, Romania, the outbreak coincided with a significant reduction in HIV prevention services owing to the ending of the international programmes and funding available from the Global Fund to Fight AIDS, Tuberculosis and Malaria. The number of needles and syringes distributed per person per year among PWID in the city halved, from 97 in 2009 to 46 in 2011, and opioid agonist treatment remained at a low level of coverage (approximately 10 per cent).[127]

Established prevention programmes existed at the time of the outbreak in other locations. In Glasgow, Scotland, United Kingdom, there was widespread availability of free-to-access prevention services, including needle-syringe programmes, as well as opioid substitution treatment. At the time of the onset of the outbreak, over 1 million needles and syringes were being distributed every year in the Greater Glasgow and Clyde area. However, the association of the outbreak with homelessness suggests that services may have been difficult to access for those living in precarious circumstances, often with chaotic lifestyles.[128, 129]

In an outbreak in Tel Aviv, Israel, although an effective needle-syringe programme was in place, a sudden shift in drug use patterns overwhelmed it.[130]

While some specific circumstances that contributed to the increased transmission of HIV among PWID during those outbreaks likely varied across geographical areas, common risk factors have been identified in the outbreaks. Some of these factors are related to changes in drug use patterns and increases in homelessness.

Association between outbreaks of HIV among PWID and the use of opioids in the United States

Over the period 2015–2018, some outbreaks occurred in the United States as a result of changing practices in the use of pharmaceutical opioids. The outbreak in Scott County, Indiana, during the period 2015–2017 was linked to a change from non-injecting use to injecting of oxymorphone, a semi-synthetic pharmaceutical opioid. Prepared from dissolved prescription tablets, the large volume of drug solution derived from the dissolved tablets could result in two to four injections within a single injecting episode. Injecting episodes also occurred up to 10 times per day and often involved sharing drugs and injecting equipment.[131, 132, 133]

Other outbreaks were related to a shift to the injection of fentanyl. Between 2000 and 2014, the number of annual diagnoses of HIV among PWID in Massachusetts decreased significantly, by 91 per cent.[134] However, beginning in 2015, HIV diagnoses among PWID increased in the state as a result of an outbreak in the cities of Lawrence and Lowell, shortly after the introduction of fentanyl into the drug market. An increased frequency of injecting, sometimes to more than 10 times per day, was reportedly the result of the introduction of fen-

125 Paraskevis and others, "Economic recession and emergence of an HIV-1 outbreak among drug injectors in Athens metropolitan area: a longitudinal study".

126 EMCDDA, "HIV outbreak among injecting drug users in Greece: an updated report for the EMCDDA on the recent outbreak of HIV infections among drug injectors in Greece".

127 Botescu and others, "HIV/AIDS among injecting drug users in Romania: report of a recent outbreak and initial response policies".

128 McAuley and others, "Re-emergence of HIV related to injecting drug use despite a comprehensive harm reduction environment: a cross-sectional analysis".

129 Manon Ragonnet-Cronin and others, "Recent and rapid transmission of HIV among people who inject drugs in Scotland revealed through phylogenetic analysis", *Journal of Infectious Diseases*, vol. 217, No. 12 (May 2018), pp. 1875–1882.

130 Katchman and others, "Successful control of a large outbreak of HIV infection associated with injection of cathinone derivatives in Tel Aviv, Israel".

131 Peters and others, "HIV infection linked to injection use of oxymorphone in Indiana, 2014–2015".

132 Des Jarlais and others, "HIV outbreaks among people who inject drugs in Europe, North America, and Israel".

133 Dita Broz and others, "Multiple injections per injection episode: high-risk injection practice among people who injected pills during the 2015 HIV outbreak in Indiana", *International Journal on Drug Policy*, vol. 52 (2018), pp. 97–101.

134 Kevin Cranston and others, "Sustained reduction in HIV diagnoses in Massachusetts, 2000–2014", *American Journal of Public Health*, vol. 107, No. 5 (May 2017), pp. 794–799.

tanyl.[135, 136] Similarly, an outbreak in Philadelphia followed a change in the drug market in the form of a large influx of fentanyl into the regional drug supply. An increase in the frequency of injecting was identified as increasing the risk of HIV transmission.[137]

Although the specific changes in drug use patterns that might have increased the risk of HIV transmission among PWID are unclear in the outbreaks in Northern Kentucky, Hamilton County, Ohio, and Cabell County, West Virginia, these neighbouring states have been among those most severely affected by the opioid crisis.[138]

Association between outbreaks of HIV among PWID and the use of stimulants in Israel and some countries in Europe

In Europe, outbreaks of HIV among PWID over the past decade have been linked to the injecting of stimulants, in particular the injecting of stimulant NPS and of cocaine, at a time when the supply of high-purity cocaine on the European market was high.[139]

The increased injecting of cocaine has been associated with several European outbreaks. In 2015, for example, the Greater Glasgow and Clyde area in Scotland, United Kingdom, experienced the largest outbreak of HIV among PWID seen in the United Kingdom for 30 years. Glasgow experienced a rapid rise in the prevalence of HIV among its PWID population, which was most strongly associated with a major shift towards injecting powder cocaine. An increasing trend towards injecting cocaine was observed based on successive surveys among PWID attending services providing clean injecting equipment, with the proportion of PWID injecting cocaine increasing from 16 per cent in 2011 to 50 per cent in 2018.[140] Outbreaks in Luxembourg[141] and Athens, Greece,[142] were also related to an increase in injecting cocaine, as a replacement for opioids, which was associated with a higher frequency of injecting.

Outbreaks have also been associated with the injection of stimulant NPS, mainly in the form of synthetic cathinones, generally in response to changes in the drug markets, in Tel Aviv, Israel,[143] Bucharest, Romania,[144, 145] Cologne and Munich, Germany,[146] and Dublin, Ireland.[147, 148] In Tel Aviv, a limited supply and escalating prices of heroin led to a surge in the use of synthetic cathinones. The outbreak in Bucharest followed a change in drug use patterns, with the initiation of the injecting of recently introduced NPS, most of which were synthetic cathinones. Synthetic cathinones are associated with a short duration of action, resulting in a high frequency of injecting; PWID questioned during the outbreak in Tel Aviv reported injecting 30 times or more per day.

Homeless PWID are those most affected by HIV outbreaks among PWID

Homelessness or unstable housing have been linked to the development of substance use disorders, relapse

135 Charles Alpren and others, "Opioid use fueling HIV transmission in an urban setting: an outbreak of HIV infection among people who inject drugs – Massachusetts, 2015–2018", *American Journal of Public Health*, vol. 110, No. 1 (January 2020), pp. 37–44.

136 Kevin Cranston and others, "Notes from the field: HIV diagnoses among persons who inject drugs – northeastern Massachusetts, 2015–2018", *Morbidity and Mortality Weekly Report*, vol. 68, No. 10 (March 2019), pp. 253–254.

137 Melissa M. Kim and others, "Understanding the intersection of behavioral risk and social determinants of health and the impact on an outbreak of human immunodeficiency virus among persons who inject drugs in Philadelphia", *Journal of Infectious Diseases*, vol. 222, Suppl. No. 5, (October 2020), pp. S250–S258.

138 Nana Wilson and others, "Drug and opioid-involved overdose deaths: United States, 2017–2018", *Morbidity and Mortality Weekly Report*, vol. 69, No. 11 (March 2020), pp. 290–297.

139 EMCDDA, *Recent Changes in Europe's Cocaine Market: Results from an EMCDDA Trendspotter Study* (Luxembourg, Publications Office of the European Union, 2018).

140 Andrew McAuley and others, "Re-emergence of HIV related to injecting drug use despite a comprehensive harm reduction environment: a cross-sectional analysis", *The Lancet HIV*, vol. 6, No. 5 (May 2019), pp. e315–e324.

141 Vic Arendt and others, "Injection of cocaine is associated with a recent HIV outbreak in people who inject drugs in Luxembourg", *PLoS One*, vol. 14, No. 5 (May 2019), pp. 1–14.

142 EMCDDA, "HIV outbreak among injecting drug users in Greece: an updated report for the EMCDDA on the recent outbreak of HIV infections among drug injectors in Greece" (Lisbon, 2012).

143 E. Katchman and others, "Successful control of a large outbreak of HIV infection associated with injection of cathinone derivatives in Tel Aviv, Israel", *Clinical Microbiology and Infection*, vol. 23, No. 5 (May 2017), pp. 336.e5–336.e8.

144 Andrei Botescu and others, "HIV/AIDS among injecting drug users in Romania: report of a recent outbreak and initial response policies" (Lisbon, EMCDDA, 2012).

145 Iulia Niculescu and others, "Recent HIV-1 outbreak among intravenous drug users in Romania: evidence for cocirculation of CRF14_BG and subtype F1 strains", *AIDS Research and Human Retroviruses*, vol. 31, No. 5 (May 2015), pp. 488–495.

146 Hanke and others, "A recent human immunodeficiency virus outbreak among people who inject drugs in Munich, Germany, is associated with consumption of synthetic cathinones".

147 Coralie Giese and others, "Injection of new psychoactive substance snow blow associated with recently acquired HIV infections among homeless people who inject drugs in Dublin, Ireland, 2015", *Euro Surveillance*, vol. 20, No. 40 (October 2015), pp. 1–6.

148 EMCDDA, *An Analysis of Drugs in Used Syringes from Sentinel European Cities: Results from the ESCAPE Project, 2018 and 2019* (Luxembourg, Publications Office of the European Union, 2021).

among people who had stopped injecting, and higher rates of sharing of needle and syringes than among people in stable housing.[149, 150, 151, 152, 153]

Prior to the outbreak in Athens, an increase in homelessness had occurred among PWID in the context of a huge economic downturn;[154] in Dublin, homelessness in general worsened in the year before the outbreak, with a 28 per cent increase in the number of people accessing emergency accommodation;[155] in Glasgow, there was an increase in homelessness in general;[156] and in Philadelphia, United States, the number of homeless persons and those living with no shelter increased prior to the outbreak.[157]

Homeless PWID have been recognized as a highly vulnerable subgroup during the HIV outbreaks, with a concentration of new HIV infections among PWID particularly affecting those who experienced homelessness in nearly all the outbreaks, with the exception of those in Bucharest, Munich, Cologne and Scott County, Indiana, United States. Indeed, in studies that quantified the risk factors associated with specific outbreaks, homelessness featured prominently. A study conducted among 1,404 PWID in Athens during the outbreak in 2012 found that homelessness was strongly associated with an increased risk of HIV infection, with 33.0 per cent of those who were homeless at the time of the survey testing positive, compared with 15.2 per cent of those who were not. Homelessness was a stronger predictor of HIV infection than a lower level of education, a higher frequency of injection, sharing needles and syringes on most occasions or using a previously used syringe to divide and share drugs among users.[158] A separate study of almost 4,000 PWID, looking at four surveys conducted between 2011 and 2018, examined risk factors associated with the outbreak in Glasgow. The study highlighted that the strongest predictors of HIV infection were the injecting of cocaine and recent (within the previous six months) experience of homelessness; these were stronger predictors than a history of incarceration or a higher frequency of injecting.[159]

Homelessness, or unstable housing, has been identified as a barrier to appropriate HIV care, access and adherence to antiretroviral medications, and also to achieving the sustained viral suppression that significantly reduces the risk of onward transmission of HIV.[160] In some outbreaks in the United States, the percentage of PWID who achieved or maintained viral suppression was very low (less than 30 per cent) in the first few months of the response to the outbreak and sometimes remained low despite enhanced efforts.[161]

In all six outbreak settings that occurred in the United States after the outbreak in Indiana, some form of needle and syringe programme was in place at the time of the outbreak and in some cases there were historically strong programmes. However, as part of the outbreak response, gaps were identified in effectively providing all at-risk PWID with sterile needles and syringes, and access and availability were subsequently increased.[162]

149 Don C. Des Jarlais, Naomi Braine and Patricia Friedmann, "Unstable housing as a factor for increased injection risk behavior at US syringe exchange programs", *AIDS and Behavior,* vol. 11, Suppl. No. 2 (April 2007), pp. 78–84.

150 Vana Sypsa and others, "Homelessness and other risk factors for HIV Infection in the current outbreak among injection drug users in Athens, Greece", *American Journal of Public Health*, vol. 105, No. 1 (January 2015), pp. 196–204.

151 Des Jarlais and others, "HIV Outbreaks Among People Who Inject Drugs in Europe, North America, and Israel".

152 Angela A. Aidala and others, "Housing status and HIV risk behaviors: implications for prevention and policy", *AIDS and Behavior*, vol. 9, No. 3 (September 2005), pp. 251–265.

153 EMCDDA, *An Analysis of Drugs in Used Syringes from Sentinel European Cities: Results from the ESCAPE Project, 2018 and 2019*.

154 Dimitrios Paraskevis and others, "Economic recession and emergence of an HIV-1 outbreak among drug injectors in Athens metropolitan area: a longitudinal study", *PLoS One*, vol. 8, No. 11 (November 2013), pp. 1–10.

155 Giese and others, "Injection of new psychoactive substance snow blow associated with recently acquired HIV infections among homeless people who inject drugs in Dublin, Ireland, 2015".

156 McAuley and others, "Re-emergence of HIV related to injecting drug use despite a comprehensive harm reduction environment: a cross-sectional analysis".

157 Kim and others, "Understanding the intersection of behavioral risk and social determinants of health and the impact on an outbreak of human immunodeficiency virus among persons who inject drugs in Philadelphia".

158 Sypsa and others, "Homelessness and other risk factors for HIV infection in the current outbreak among injection drug users in Athens, Greece".

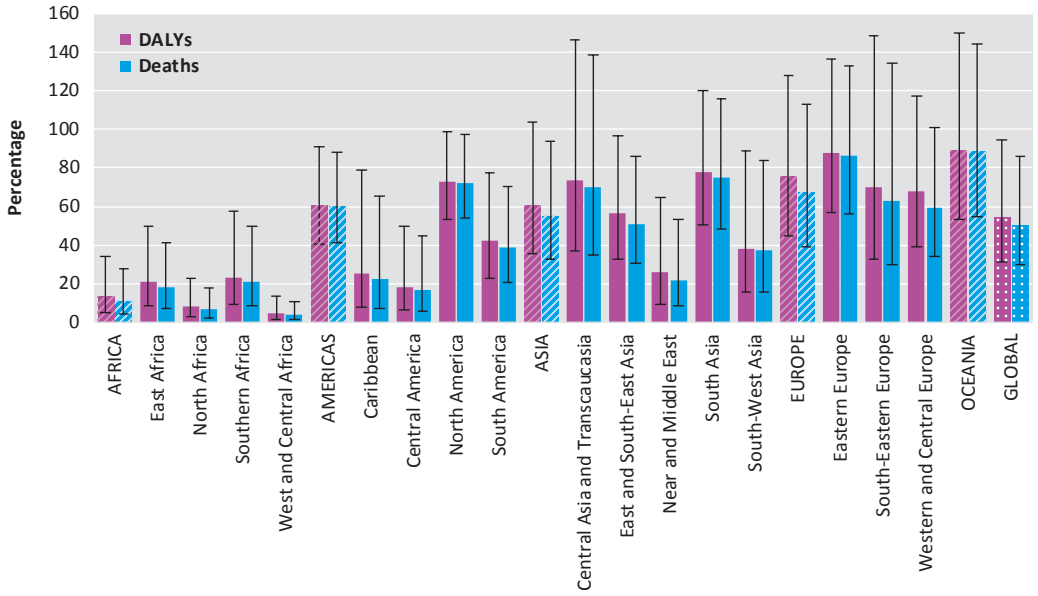
159 McAuley and others, "Re-emergence of HIV related to injecting drug use despite a comprehensive harm reduction environment: a cross-sectional analysis".

160 Angela A. Aidala and others, "Housing status, medical care, and health outcomes among people living with HIV/AIDS: a systematic review", *American Journal of Public Health*, vol. 106, No. 1 (January 2016), pp. e1–e23.

161 Lyss and others, "Responding to outbreaks of human immunodeficiency virus among persons who inject drugs: United States, 2016–2019 – perspectives on recent experience and lessons learned".

162 Lyss and others, "Responding to outbreaks of human immunodeficiency virus among persons who inject drugs: United States, 2016–2019 – perspectives on recent experience and lessons learned".

FIG. 28 **Deaths and disability-adjusted life years caused by hepatitis C attributable to drug use, 2019**



Source: Elaboration from Department of Global HIV, hepatitis and STIs programmes, WHO, based on Institute for Health Metrics and Evaluation, "Global Burden of Disease Study 2019 Data Resources: GBD Results Tools".

Note: The upper and lower bounds of the estimates in the graph are calculated as follows: Lower bound = "lower number of DALYs from drug use" divided by "upper number of total DALYs"; and Upper bound = "upper number of DALYs from drug use" divided by "lower number of total DALYs".

Approximately half of all people who inject drugs are living with hepatitis C

Hepatitis C is an infectious disease caused by a blood-borne virus. Left untreated, hepatitis C can lead to liver cancer, cirrhosis and other chronic liver diseases, and premature death.

Injecting drug use is a major contributor to the hepatitis C epidemic globally. Projections based on data modelling suggest that as many as two out of five new hepatitis C infections (or about 43 per cent) globally could be prevented if the risk of transmission through injecting drug use was removed.[163] The prevalence of hepatitis C among PWID is 37.2 times greater than the prevalence of hepatitis C among the general population. This difference is more pronounced in East and South-East Asia, Western and Central Europe and the Caribbean. While people who currently inject drugs account for an estimated 5.5 per cent (range 2.7 to 12.1 per cent) of the 71 million people living with hepatitis C globally, the proportion of those with hepatitis C who have a history of injecting drugs at some point in their lives is much larger.[164]

Globally, more than half (54.3 per cent) of all healthy years of life lost due to disability and premature death (DALYs) and deaths (50.1 per cent) resulting from liver cancer, cirrhosis and other chronic liver diseases caused by hepatitis C are attributable to drug use.[165]

The joint UNODC, WHO, UNAIDS and World Bank estimate of the prevalence of hepatitis C among PWID worldwide in 2019 is 50.2 per cent, corresponding to an estimated 5.6 million PWID living with hepatitis C. This estimate is based on information on the prevalence of hepatitis C among PWID from 108 countries, covering 94 per cent of the estimated global PWID population. The previous estimate for the prevalence of hepatitis C among PWID, for 2018, was 48.5 per cent; however, any trend

163 Adam Trickey and others, "The contribution of injection drug use to hepatitis C virus transmission globally, regionally, and at country level: a modelling study", *The Lancet Gastroenterology and Hepatology*, vol. 4, No. 6 (June 2019), pp. 435–444.

164 Polaris Observatory, Viremic HCV infections. Polaris Observatory (2017). Available at https://cdafound.org/polaris/.

165 Institute for Health Metrics and Evaluation, "Global Burden of Disease Study 2019 Data Resources: GBD Results Tools".

data should be viewed with caution, as methodologies may have changed.

More than one third (35 per cent) of PWID living with hepatitis C worldwide reside in East and South-East Asia, the subregion with the largest number of PWID and a high prevalence of hepatitis C among PWID. Similarly, North America and Eastern Europe are subregions with relatively large numbers of PWID and a comparatively high prevalence of hepatitis C among PWID; they respectively account for 18 per cent and 16 per cent of PWID living with hepatitis C globally.

Among PWID who are living with HIV, an estimated 82 per cent, or 1.2 million, are also living with hepatitis C. By contrast, among people in the general population living with HIV, an estimated 2.4 per cent are also living with hepatitis C. People living with HIV experience more rapid hepatitis C disease progression, and hepatitis C co-infection may complicate HIV treatment.[166]

In 2016, the World Health Assembly endorsed the first global health sector strategy on viral hepatitis.[167] The aim of the strategy is to eliminate hepatitis C as a global public health threat by 2030 by reducing new infections by 90 per cent and mortality by 65 per cent. Given the high prevalence and adverse health consequences resulting from hepatitis C among PWID, this population is regarded as a priority in efforts towards achieving these targets.[168, 169, 170]

Since the introduction of direct-acting antiviral therapies in 2013, the treatment of hepatitis C has profoundly changed and improved, providing new opportunities for controlling hepatitis C. The new oral therapies have a shorter treatment duration and are much more effective, far less toxic and better-tolerated than previous interferon-based therapies. The number of countries that have developed national hepatitis plans has increased, from 17 in 2012 to 124 in 2019. However, there is limited understanding regarding the progress of hepatitis C testing and treatment for the most affected populations, such as PWID.[171]

PWID constitute a key population in the strategy to eliminate hepatitis C as a major public health threat in Europe. However, the coverage of needle-syringe programmes and opioid substitution treatment to prevent hepatitis C remains low in many European Union countries. In 2017, 4 countries provided a level of coverage above the 2020 WHO targets for sterile needle-syringe distribution (200 needles and syringes per person per year for PWID) and 11 did so for opioid substitution treatment (40 per cent of opioid users receiving treatment).[172, 173]

Hepatitis B is also a potentially life-threatening liver infection but, unlike hepatitis C, for which no vaccine is available, the disease can be prevented with vaccines that are both safe and effective.[174] The joint UNODC, WHO, UNAIDS and World Bank global estimate for 2019 of the prevalence of hepatitis B[175] among PWID is 8.7 per cent; in other words, an estimated 0.97 million PWID worldwide are living with active hepatitis B infection. This estimate is based on information on the prevalence of hepatitis B among PWID from 94 countries, covering 71 per cent of the estimated global PWID population.

166 Lucy Platt and others, "Prevalence and burden of HCV co-infection in people living with HIV: a global systematic review and meta-analysis", *Lancet Infectious Diseases*, vol. 16, No. 7 (July 2016), pp. 797–808.

167 WHO, *Global Health Sector Strategy on Viral Hepatitis 2016–2021: Towards Ending Viral Hepatitis* (Geneva, 2016).

168 Trickey and others, "The contribution of injection drug use to hepatitis C virus transmission globally, regionally, and at country level: a modelling study".

169 Graham S. Cooke and others, "Accelerating the elimination of viral hepatitis: a *Lancet Gastroenterology and Hepatology* Commission", *The Lancet Gastroenterology and Hepatology*, vol. 4, No. 2 (February 2019), pp. 135–184.

170 Jason Grebely and others, "Elimination of HCV as a public health concern among people who inject drugs by 2030: what will it take to get there?", *Journal of the International AIDS Society*, vol. 20, No. 1 (July 2017), pp. 1–8.

171 WHO, "Access to hepatitis C testing and treatment for people who inject drugs and people in prisons: a global perspective", Policy Brief (Geneva, 2019).

172 EMCDDA, *Monitoring the Elimination of Viral Hepatitis as a Public Health Threat Among People Who Inject Drugs in Europe: The Elimination Barometer*, Technical Reports Series (Luxembourg, Publications Office of the European Union, 2019).

173 EMCDDA, *Drug-related Infectious Diseases in Europe: Update from the EMCDDA Expert Network*, Technical Reports Series (Luxembourg, Publications Office of the European Union, 2019).

174 WHO, "Hepatitis B vaccines: WHO position paper – July 2017", *Weekly Epidemiological Record*, vol. 92, No. 27 (2017), pp. 369–392.

175 The prevalence estimate for hepatitis B is intended to refer to active infection (HBsAg), rather than anti-HBc, which indicates previous exposure. However, it is not always possible to differentiate that in the data reported to UNODC.

Dramatic rise in acute hepatitis C infections in the United States linked to the opioid crisis and associated injecting drug use

Research suggests that the opioid crisis is undermining efforts to reduce hepatitis C virus infections at the national level in the United States. The number of cases of acute hepatitis C (the acute phase of infection being the period directly after transmission and representing new infection rather than new diagnosis) among the general population (all ages) has increased rapidly, with the annual national rate quadrupling from 2009 to 2018.[a] Rising cases have mirrored increasing injecting of methamphetamine and opioids related to the country's opioid crisis.[b, c, d, e]

In the United States, injecting drug use is the most common route of transmission of hepatitis C.[f] Among acute hepatitis C cases for which risk factor information was available, the percentage of cases among PWID increased from an average of 65 per cent between 2004 and 2010 to more than 75 per cent of cases between 2011 and 2014, reaching 84 per cent in 2014.[d]

Hepatitis C infection can occur rapidly after the initiation of injecting drug use. A meta-analysis examining the time from initial injection to hepatitis C virus infection found that 28 per cent of PWID become infected within the first year of starting to inject drugs.[g]

Research by the Centers for Disease Control and Prevention, data on admissions for substance use disorder treatment, found substantial simultaneous increases at the national level in acute hepatitis C virus infections and the injection of opioids between 2004 and 2014.[d] Increases in new hepatitis C virus infections and opioid injection were statistically significant among young adults and both men and women. While non-Hispanic White persons accounted for the highest number of acute hepatitis C virus infections, American Indian or Alaska Native persons had the highest rates (by far) of acute hepatitis C between 2004 and 2014.[d, h]

There was evidence that the injecting of opioids increased between 2004 and 2014. Nationally, the number of people admitted to drug treatment reporting the injection of any opioid almost doubled over that period, from 182,000, when they represented 10.1 per cent of total admissions, to 313,000, when they represented 19.4 per cent of total admissions. The injection of heroin significantly increased by 85 per cent, and that of pharmaceutical opioids by 258 per cent among people admitted to drug treatment who reported injecting any opioid. The increases in the number and proportion of admissions of people reporting injecting any opioid are consistent with the 130 per cent increase in the number of past-year heroin users, from 398,000 in 2004 to 914,000 in 2014. No significant change over time was found in the number of people admitted to drug treatment who injected drugs other than opioids.[d, i]

The findings of the research strongly suggest that the national increase in acute hepatitis C virus infection is related to the ongoing opioid crisis in the United States and associated increases in injecting drug use.

a A. Blythe Ryerson and others, "Vital signs: newly reported acute and chronic hepatitis C cases — United States, 2009–2018", *Morbidity and Mortality Weekly Report*, vol. 69, No. 14 (April 2020), pp. 399–404.

b Jon E. Zibbell and others, "Increases in hepatitis C virus infection related to injection drug use among persons aged ≤30 years: Kentucky, Tennessee, Virginia, and West Virginia, 2006–2012", *Morbidity and Mortality Weekly Report*, vol. 64, No. 17 (May 2015), pp. 453–458.

c Shauna Onofrey and others, "Hepatitis C virus infection among adolescents and young adults: Massachusetts, 2002-2009", *Morbidity and Mortality Weekly Report*, vol. 60, No. 17 (May 2011), pp. 537–541.

d Jon E. Zibbell and others, "Increases in acute hepatitis C virus infection related to a growing opioid epidemic and associated injection drug use, United States, 2004 to 2014", *American Journal of Public Health*, vol. 108, No. 2 (2018), pp. 175–181.

e Christofer M Jones and others, "Increases in methamphetamine use among heroin treatment admissions in the United States, 2008-17", *Addiction*, vol. 115, No. 2 (February 2020), pp. 347-353.

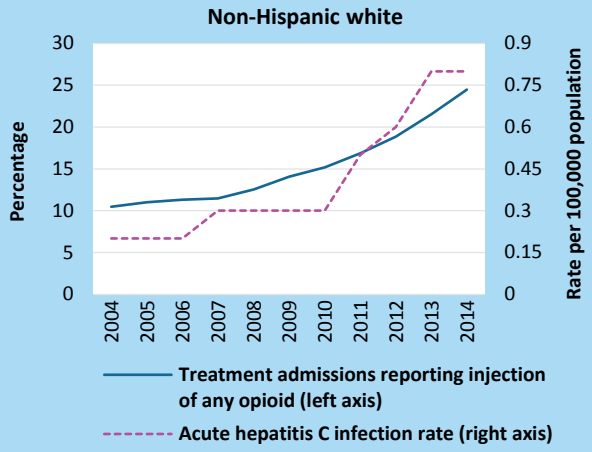
f Centers for Disease Control and Prevention, *Viral Hepatitis Surveillance: United States, 2018* (Atlanta, Georgia, 2018).

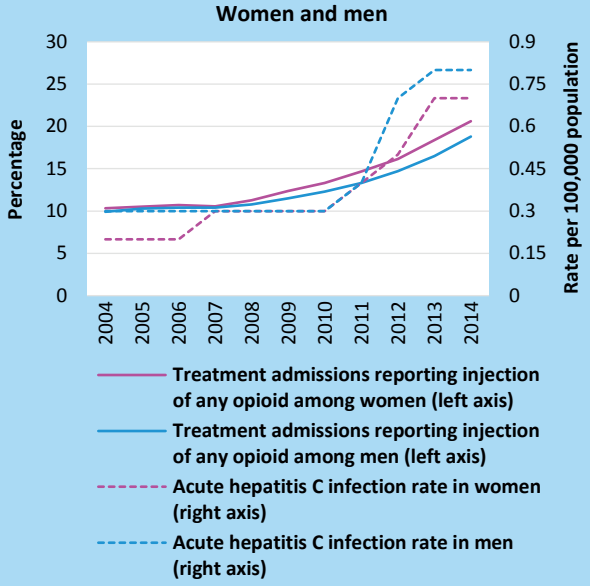
g Holly Hagan and others, "Meta-regression of hepatitis C virus infection in relation to time since onset of illicit drug injection: the influence of time and place", *American Journal of Epidemiology*, vol. 168, No. 10 (November 2008), pp. 1099–1109.

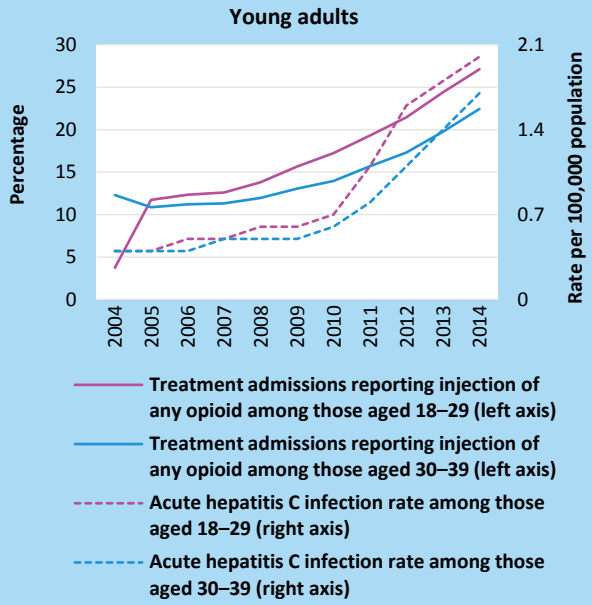
h Centers for Disease Control and Prevention, National Center for HIV/AIDS, Viral Hepatitis, STD, and TB Prevention, "Increase in hepatitis C infections linked to worsening opioid crisis", 21 December 2017.

i United States, Substance Abuse and Mental Health Services Administration, *Key Substance Use and Mental Health Indicators in the United States: Results from the 2019 National Survey on Drug Use and Health* (Rockville, Maryland, 2020).

Trends in acute hepatitis C and opioid injection in substance use treatment admissions among non-Hispanic white people, women and young adults, United States, 2004–2014







Sources: Jon E. Zibbell and others, "Increases in acute hepatitis C virus infection related to a growing opioid epidemic and associated injection drug use, United States, 2004 to 2014", *American Journal of Public Health*, vol. 108, No. 2 (February 2018), pp. 175–181; and Centers for Disease Control and Prevention, National Center for HIV/AIDS, Viral Hepatitis, STD, and TB Prevention, "Increase in hepatitis C infections linked to worsening opioid crisis", 21 December 2017.

Note: For non-Hispanic white people, the number of people admitted to treatment for substance use disorder reporting the injection of any opioid increased over this time period from 106,000 to 238,000. For women, the corresponding increase was from 59,000 to 112,000 and for men, the increase was from 123,000 in 2004 to 200,000 in 2014; for those aged 18–29, the increase was from 62,000 to 148,000; and for those aged 30–39, from 49,000 to 94,000.

Drug production and trafficking

Cannabis continues to be the most widely cultivated illicit crop worldwide. Since 2010, the illicit cultivation of cannabis has been reported, directly or indirectly, by 151 countries across all regions, covering 96 per cent of the global population. By comparison, direct and indirect evidence of the illicit cultivation of opium poppy has been observed in 55 countries and of coca bush in 9 countries. Having said that, the illicit cultivation of opium poppy is mainly concentrated in just three countries, as is the illicit cultivation of coca bush.

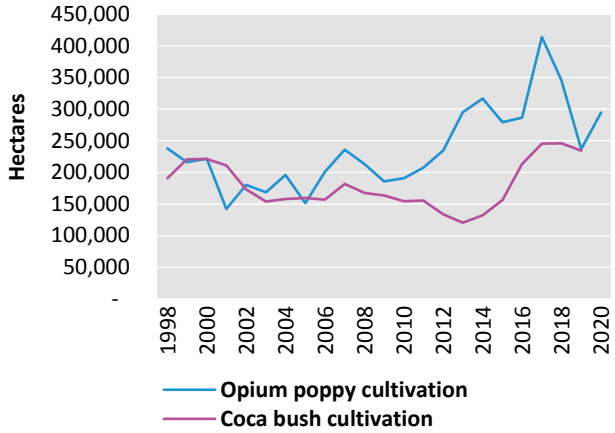
Opium poppy and coca bush cultivation areas reached similar levels in 2019, while cultivation of opium poppy increased again in 2020

Irrespective of significant annual fluctuations, estimates show an overall increase in the global area under opium poppy cultivation over the past two decades, in particular after 2009. Following a decline in the area under illicit opium poppy cultivation from a peak in 2017, global opium poppy cultivation rebounded in 2020, rising by 24 per cent compared with the previous year, to reach 295,000 ha. This rise was primarily the result of an increase in opium poppy cultivation by 37 per cent in Afghanistan, the country in which the vast majority of opium is produced. Nonetheless, the global area under opium poppy cultivation in 2020 remained 29 per cent below the peak in 2017.[176]

The global area under coca bush cultivation declined by 45 per cent over the period 2000–2013, before more than doubling over the period 2013–2018. In 2019, however, coca bush cultivation fell by 5 per cent, the first such decline since 2013. This was primarily the result of a decline of 9 per cent in the area under coca bush cultivation in Colombia, the country that accounted for two

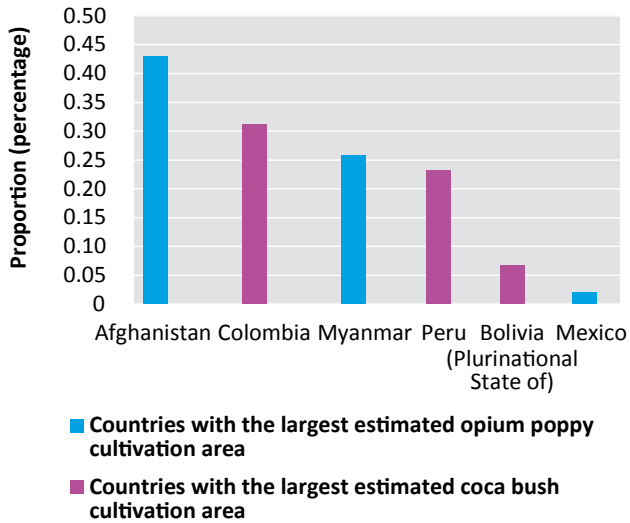
176 UNODC and Afghanistan, Ministry of Counter Narcotics, *Afghanistan Opium Survey 2020: Cultivation and Production* (forthcoming), and previous years.

FIG. 29 Total area under opium poppy and coca bush cultivation, 1998–2020



Sources: UNODC coca and opium surveys in various countries; UNODC, responses to the annual report questionnaire; and United States Department of State, *International Narcotics Control Strategy Report*, various years.

FIG. 30 Proportion of total agricultural area dedicated to the cultivation of opium poppy and coca bush in the countries with the largest estimated cultivation areas, 2019



Sources: UNODC, opium and coca surveys; and Food and Agriculture Organization of the United Nations, FAOSTAT.

thirds of the global area under coca bush cultivation in 2019. The second year-on-year decline in a row in the area under coca bush cultivation in Colombia, this went hand in hand with an intensification of manual coca bush eradication in 2019.[177]

Generally speaking, only a small proportion of the land available for agricultural purposes is dedicated to the cultivation of opium poppy or coca bush. While the average ranges from 0.02 to 0.4 per cent in the countries where most opium poppy and coca bush are cultivated, in communities where there is illicit cultivation of opium poppy or coca bush, the proportion can be significant. In Afghanistan, for example, 22 per cent of agricultural land in Helmand Province, the main opium-producing province in the country, was under opium poppy cultivation in 2020.

Global opium production has stabilized since 2018

Irrespective of a long-term upward trend, global opium production has stabilized since 2018, amounting to 7,410 tons in 2020. The stabilization in production occurred despite an increase in the area under opium poppy cultivation and was mainly the result of declining yields in Afghanistan, which more than offset the increase in the area under opium poppy cultivation.[178]

The production of opium in Afghanistan, Mexico and Myanmar combined is estimated to have accounted for roughly 96 per cent of estimated global opium production in 2020, with Afghanistan alone accounting for 85 per cent of the global total.

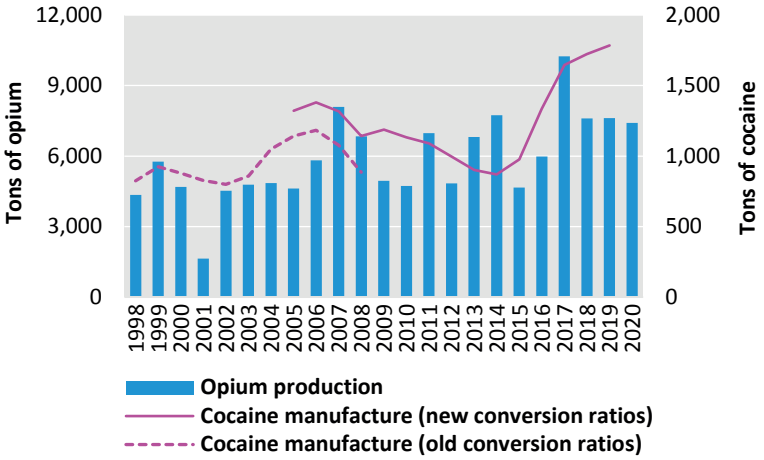
Cocaine manufacture has reached its highest level, but growth is slowing

Global cocaine manufacture, which had fallen by 37 per cent over the period 2006–2014, more than doubled over the period 2014–2019, rising by 4 per cent in 2019 to reach an estimated 1,784 tons (expressed at a purity of 100 per cent). Annual growth in the manufacture of cocaine continued declining, however, from an increase of 358 tons in 2016 to an increase of 61 tons in 2019.

177 UNODC and Colombia: *Monitoreo de Territorios Afectados por Cultivos Ilícitos 2019* (July 2020).

178 UNODC and Afghanistan, Ministry of Counter Narcotics, *Afghanistan Opium Survey 2020: Cultivation and Production* (forthcoming), and previous years.

FIG. 31 Global opium production and cocaine manufacture, 1998–2020



Sources: UNODC coca and opium surveys in various countries; responses to the annual report questionnaire; and United States Department of State, *International Narcotics Control Strategy Report*, various years.

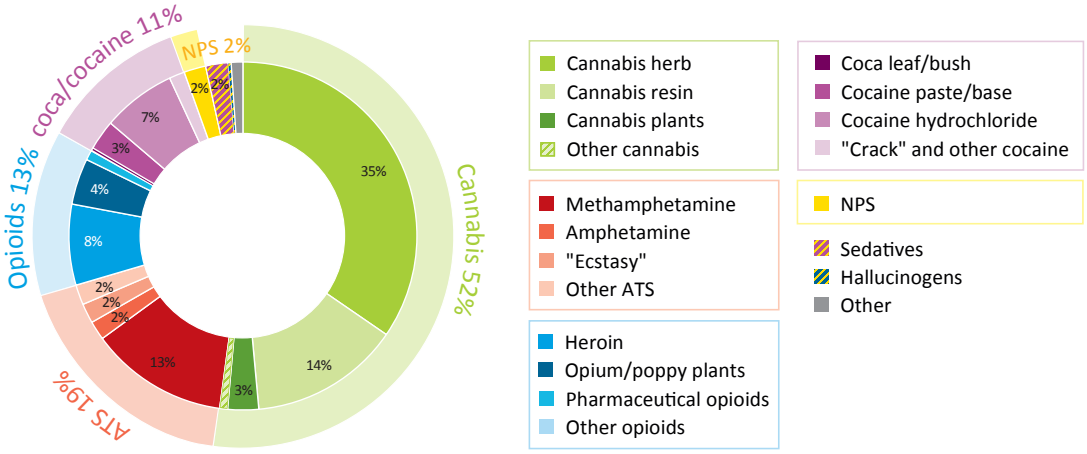
The marked increase in global cocaine manufacture since 2014 has primarily been the result of changes in Colombia, which accounts for the majority (64 per cent in 2019) of the global estimated manufacture of cocaine. Increases in cocaine manufacture in 2018 and 2019 took place despite declines in the area under coca bush cultivation in Colombia during that period, owing to ongoing increases in "productive areas" under coca bush cultivation and improvements in the yield.

Quantities of synthetic drugs seized show the strongest long-term growth rates

The quantities of most drug types seized have increased over the past two decades. The most marked increase has been in synthetic drugs, most notably synthetic NPS, pharmaceutical opioids (semi-synthetic or synthetic opioids) and ATS. Compared with 2001, when the first seizures of synthetic NPS, which mimic substances under international control but are not under international control themselves, were reported to UNODC, the amount of synthetic NPS seized in 2019 was 170 times larger. The extent of this growth rate should be interpreted with caution, however, as national control systems vary for NPS and increases in the amounts of NPS seized may reflect, at least partially, changes in legislation and the implementation of such laws.

Between 1998 and 2019, the quantity of synthetic opioids seized rose more than 300-fold (12-fold since 2001) and

FIG. 32 Global distribution of drug seizure cases by drug types, 2017–2019



Source: UNODC, responses to the annual report questionnaire.

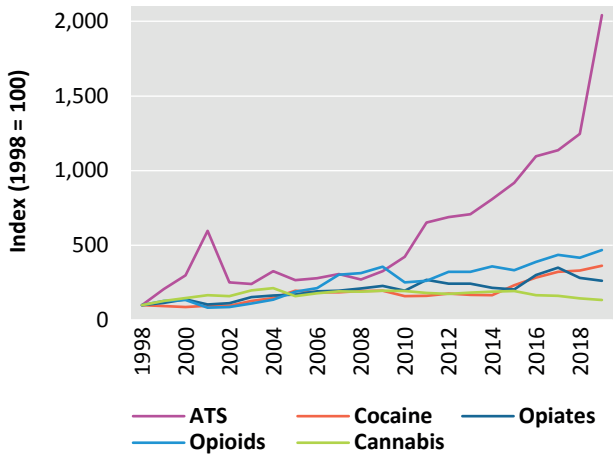
Note: Based on data from 92 Member States reporting, on average, 2.5 million seizure cases per year to UNODC over the period 2017–2019.

that of ATS 20-fold, while the quantities of opiates and cocaine seized tripled. The increase in the amounts of cannabis herb and cannabis resin seized was far more moderate (33 per cent since 1998). That smaller increase may reflect shifting law enforcement priorities, linked to the process of decriminalization and the legalization of cannabis[179] in several jurisdictions in the Americas, which went hand in hand with a decline in the quantities of cannabis herb seized over the past decade in North America. Such a decline is possibly also linked to more domestic production and thus less cross-border trafficking as a result of changed policies on cannabis.[180]

Mixed trends in quantities of drugs seized: ATS, cocaine, pharmaceutical opioids and plant-based NPS on the increase while cannabis and synthetic NPS declining

The quantities of most drug types seized at the global level have increased over the last five years. The largest increases, of more than tenfold, were reported for plant-based NPS, most notably khat, followed by pharmaceutical opioids and ATS, most notably methamphetamine, which both showed a twofold increase. Next came cocaine, with the quantities seized rising by more than 50 per cent over the period 2015–2019, the consequence of a marked expansion of the supply of cocaine in recent years.

FIG. 33 Long-term trends in quantities of drugs seized, 1998–2019



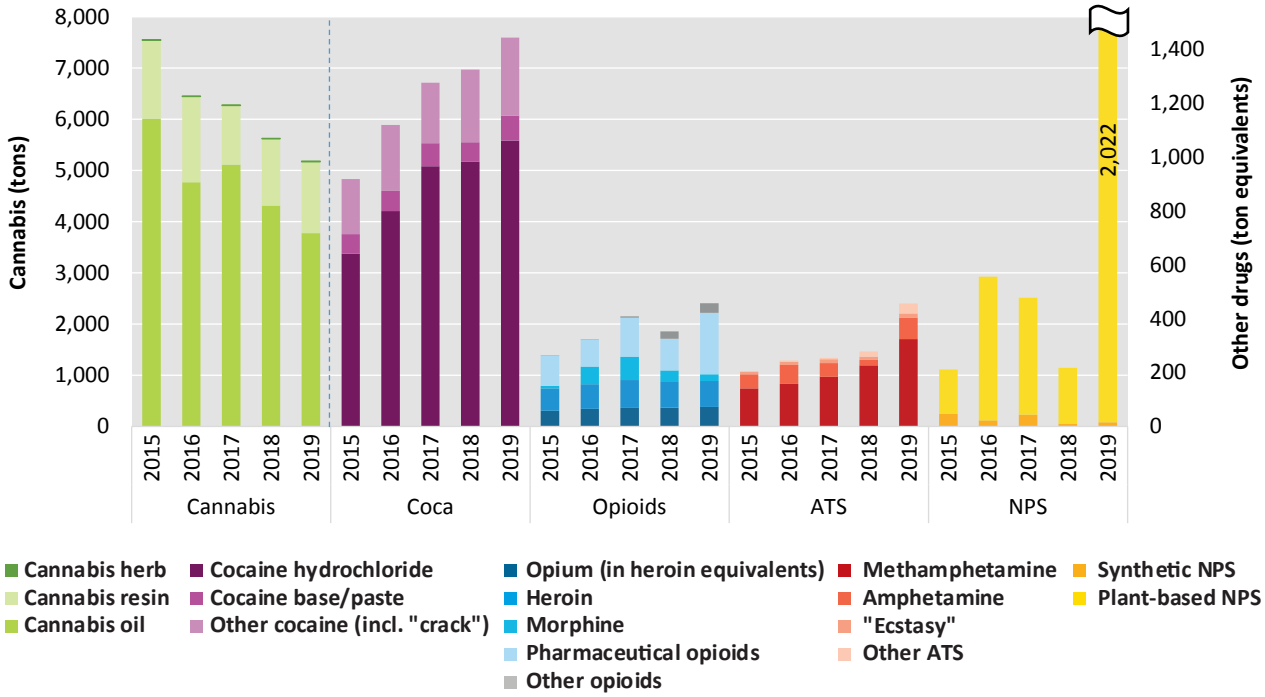
Source: UNODC, responses to the annual report questionnaire.

Notes: Based on reporting from 202 countries and territories (an average of 152 per year) of quantities of drugs seized in kilogram equivalents. Changes in total quantities seized over time may also reflect changes in reporting countries.
ATS: methamphetamine, amphetamine and "ecstasy".
Cocaine: cocaine hydrochloride, "crack" cocaine, cocaine base, paste and salts, coca paste and cocaine base.
Opioids: opiates, plus pharmaceutical opioids and other opioids.
Opiates: opium expressed in heroin equivalents, plus morphine and heroin.
Cannabis: cannabis herb and resin.

179 United States Government Accountability Office, Report to Congressional Requesters, *State Marijuana Legalization: DOJ Should Document Its Approach to Monitoring the Effects of Legalization*, GAO-16-1 (December 2016).

180 For more information, see UNODC, *World Drug Report 2017*, booklet 3, *Market Analysis of Plant-based Drugs: Opiates, Cocaine and Cannabis* (United Nations publication, 2017).

FIG. 34 Trends in global quantities of drugs seized, 2015–2019



Source: UNODC, responses to the annual report questionnaire.

By contrast, the quantity of cannabis seized declined by 31 per cent over that period, mainly as a consequence of smaller quantities of cannabis herb seized in North America (decline of 74 per cent).

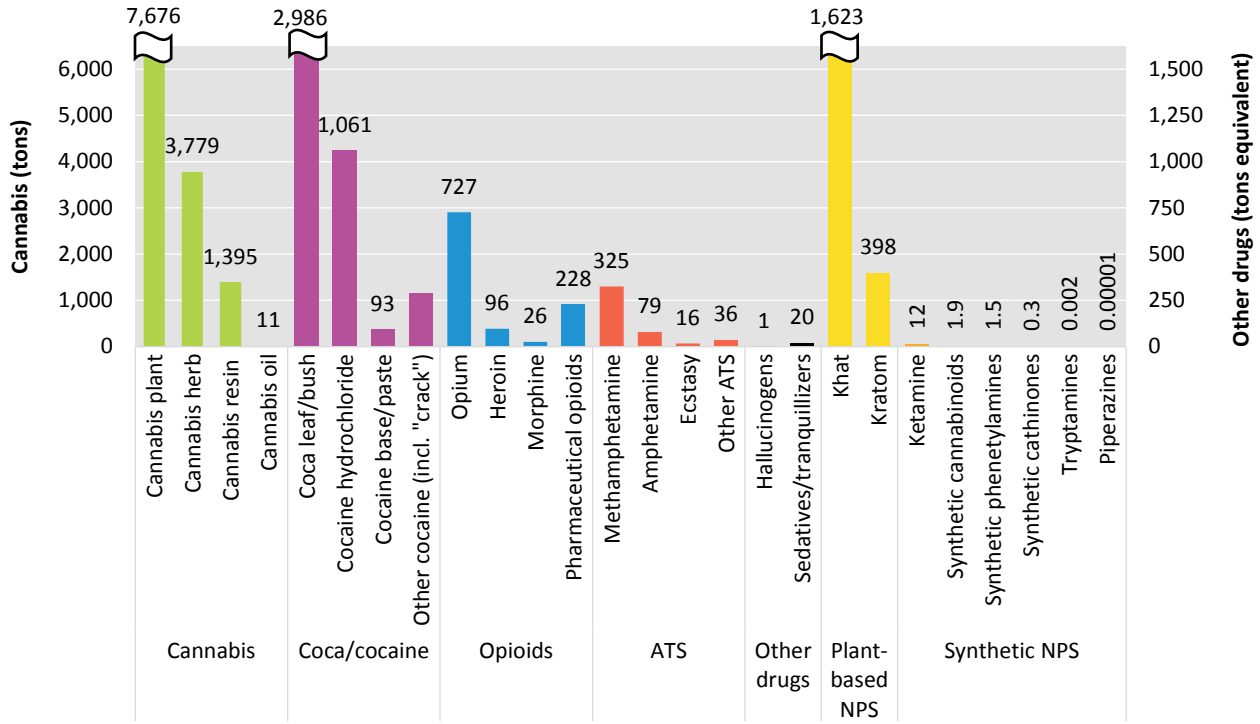
Even stronger declines in the quantities seized were reported for synthetic NPS, which fell by more than 60 per cent over the period 2015–2019, reflecting an almost 50 per cent decline in the quantity of ketamine seized and a more than 90 per cent decline in the quantities of synthetic cannabinoids, cathinones, tryptamines and piperazines seized. Only the quantities of various phenethylamines seized showed a significant increase over the period 2015–2019, to emerge as the third most-seized category of NPS in 2019 after ketamine and synthetic cannabinoids, ahead of synthetic cathinones. As explained above, these trends should be interpreted with caution because changes in legislation can affect seizures over time, particularly if the legal status of substances that accounted for a significant share of the overall seizures of NPS changed, meaning that they ceased to be classified as NPS.

Cannabis continues to be seized in the largest quantities globally, followed by coca- and cocaine-related substances

Cannabis continues to dominate the total quantities of drugs seized globally. In 2019, cannabis herb continued to be seized in much larger quantities than cannabis resin and cannabis oil. The largest quantities of cannabis herb seized in 2019 (which totalled 3,779 tons) were reported by the United States, followed by Paraguay, Colombia, India, Nigeria and Brazil. The largest quantities of cannabis resin seized (which totalled 1,395 tons) were reported by Spain, followed by Morocco, Afghanistan, Pakistan and the Islamic Republic of Iran.

In 2019, the quantities of cocaine hydrochloride seized continued to be larger than those of coca base and paste and “crack” cocaine. The largest quantities of cocaine-type products (cocaine hydrochloride, “crack” cocaine, cocaine base and paste, totalling 1,436 tons, not adjusted for purity) intercepted in 2019 were reported by Colombia, followed by the United States, Brazil, Panama and Belgium.

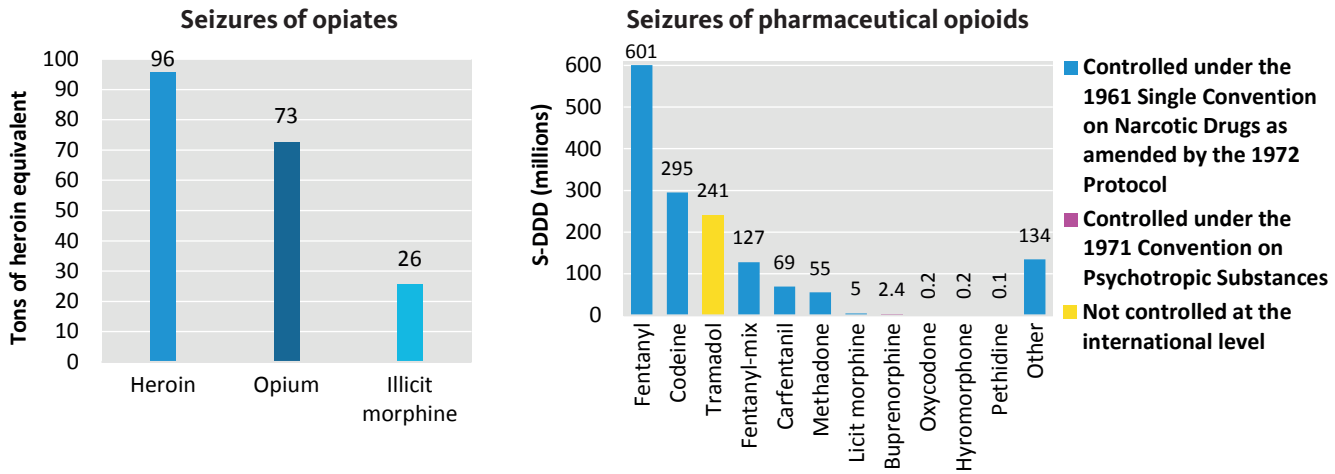
FIG. 35 Global quantities of drugs seized, by drug, 2019



Source: UNODC, responses to the annual report questionnaire.

Notes: Based on information from 115 countries. The quantities seized were not adjusted for purity or potency.

FIG. 36 Global quantities of opiates seized, in tons of heroin equivalent, and of pharmaceutical opioids seized (purity adjusted), in S-DDD, 2019



Sources: UNODC calculations based on responses to the annual report questionnaire; INCB, *Narcotic Drugs: Estimated World Requirements for 2020 – Statistics for 2018* (E/INCB/2019/2); and INCB, *Psychotropic Substances: Statistics for 2018 – Assessments of Annual Medical and Scientific Requirements for Substances in Schedules II, III and IV of the Convention on Psychotropic Substances of 1971* (E/INCB/2019/3).

Notes: S-DDDs refers to "defined daily doses for statistical purposes" as defined by INCB. S-DDDs are "technical units of measurement" for the purposes of statistical analysis and are not recommended daily prescription doses; actual doses may differ based on treatments required and medical practices. Details of S-DDDs used for these calculations are provided in the methodological annex of the present report.

The largest quantities of opioids seized were of opium, although when expressed in heroin equivalents (using a 10:1 ratio for the conversion of opium into heroin), the quantities of opium seized are smaller than those of heroin. For the second year in a row, if taken together, the largest quantities of heroin and illicit morphine seized in 2019 were reported by the Islamic Republic of Iran.

For decades, the quantities of heroin seized have tended to be larger than those of pharmaceutical opioids,[181] but data for 2019 show that, for the third time in the past five years, the total quantity of pharmaceutical opioids seized (228 tons) was larger than the total quantity of heroin seized (93 tons). The pharmaceutical opioids seized in the largest quantities, were codeine, followed by tramadol (an opioid not under international control), fentanyl and methadone. The largest quantities of pharmaceutical opioids seized in 2019 were reported by Bangladesh (mostly codeine), followed by Benin (mostly tramadol, which tends to be re-exported from there to other countries in West Africa), India (mostly codeine), Malaysia (mostly codeine) and the United States (mostly fentanyls). In terms of doses of pharmaceutical opioids,[182] fentanyls accounted for the majority seized in recent years, at more than 50 per cent of the total amount of pharmaceutical opioids seized in 2019 (expressed in S-DDD), owing to the fact that fentanyls are more potent than most other opioids and that far more doses can be obtained from a given weight of fentanyl and its analogues. This figure takes into account the fact that the fentanyl found in the United States is heavily cut and has an average purity of just 9 per cent.[183] Most of the fentanyls seized in 2019 were seized in the United States (92 per cent of the total), followed by Mexico, Canada, and by Estonia and China with comparatively small amounts seized.

The largest quantities of ATS seized in 2019 were of methamphetamine, followed by amphetamine and "ecstasy"; they were reported by the United States, followed by Thailand, Mexico, Burkina Faso, China, Saudi Arabia, Myanmar, Indonesia, Guatemala and the Islamic Republic of Iran.

Most of the sedatives and tranquillizers seized in 2019 were GHB, a central nervous system depressant, followed by benzodiazepines, methaqualone and barbiturates. The largest quantities of GHB seized in 2019 were intercepted in Sweden, followed by the United States, New Zealand, Canada, China and Australia. Benzodiazepines were mostly seized in Malaysia, followed by Sweden, China, Canada and the United States. Methaqualone continued to be seized mainly in India and barbiturates were seized mainly in the United States, followed by Indonesia, Canada and Australia

Dominated in the past by LSD, seizures of hallucinogens in 2019 were dominated by psilocybin and DMT. The largest amounts of psilocybin seized were reported by Canada, followed by Australia; the largest quantities of DMT were reported to have been seized in the Netherlands, followed by Canada, Ireland and Italy. The largest LSD seizures in 2019 were reported by India, the Bolivarian Republic of Venezuela, Australia and Argentina. This contrasts with the situation in the period 2010–2012, when the largest amounts of LSD seized were reported in North America, most notably by the United States.

Plant-based NPS: quantities of khat seized reach a record level

The largest quantities of plant-based NPS seized in 2019 were mainly of khat, followed by kratom and, at lower levels, by ayahuasca, kava (*Piper methysticum*) and *Salvia divinorum*. Most of the khat was seized in the countries of the Arabian Peninsula, followed by countries in North America, Europe and Africa. Most of the kratom was seized in Malaysia, followed by Thailand. Seizures of plant-based NPS in the past decade have been dominated by khat, which is not under international control, although it is under national control in a number of countries. Khat's principal active components, cathinone and cathine, two stimulants closely related to amphetamine, are controlled under the Convention on Psychotropic Substances of 1971. Khat production takes place in a limited geographical area, mainly on the Arabian Peninsula (most notably Yemen) and in East Africa[184] (most notably Ethiopia, Kenya and Somalia);[185] however, khat seizures have been reported

181 Substances reported by Member States in their responses to the UNODC annual report questionnaire under the category "pharmaceutical opioids". Not all of these substances, however, are necessarily intended for medical use in humans; some are also used in veterinary medicine. Among the fentanyl analogues approved as pharmaceutical drugs for human use are alfentanil, fentanyl, remifentanil and sufentanil. One (carfentanil) is approved for veterinary use. Under this category, some Member States also report substances (such as furanylfentanyl) that are, in general, not approved for medical use.

182 Expressed as S-DDD, as defined by INCB; S-DDD is the conventional unit used to analyse the availability of pharmaceutical opioids for medical use (see booklet 3 of the present report).

183 United States, Drug Enforcement Administration, *2020 National Drug Threat Assessment* (March 2021).

184 EMCDDA, "Khat drug profile". Available at www.emcdda.europa.eu.

185 UNODC, responses to the annual report questionnaire.

by countries across the world over the past decade. In contrast to the situation in most years in the past decade, when khat was largely seized in North America (in particular in the United States), followed by Europe, the largest amounts of khat seized in 2019 were seized in the Near and Middle East, most notably in Oman and Saudi Arabia, countries located closer to the areas in which the plant is produced.

Data also show the increasing amounts of kratom, a substance that has both opioid-like and stimulant-like effects, seized since 2015. While khat seizures dominated plant-based NPS seizures over the period 1980–2015 and again in 2019, during the period 2016–2018, most of the plant-based NPS seized at the global level were kratom. In terms of the geographical spread of its trafficking, however, kratom still plays a less significant role than khat, which was seized in 53 countries across all regions during the past decade, while interceptions of kratom were reported by just 11 countries. Initially, those countries were only in South-East Asia (in particular, Malaysia, Myanmar and Thailand) but, in recent years, smaller quantities of kratom have also been seized in other countries, most notably in Europe. Seizures of small amounts of kratom made in South-East Asia also involved shipments intended for final destinations in North America (notably the United States) and Oceania (notably Australia). Nonetheless, more than 99 per cent of kratom seized at the global level over the past decade, including in 2019, has been seized in countries in South-East Asia. Although not under international control, kratom is under national control in a number of countries in South-East Asia, including Malaysia, Myanmar and Thailand;[186] moreover, it is not permitted to trade kratom as a traditional medicine or health supplement across ASEAN countries.[187] In the United States, kratom has not been approved for medical use and imports are confiscated;[188] in Canada, it is not permitted to market kratom for any use involving its ingestion.[189, 190, 191]

186 EMCDDA, "Kratom drug profile". Available at www.emcdda.europa.eu.

187 ASEAN, "Annex I: ASEAN guiding principles for inclusion into or exclusion from the negative list of substances for traditional medicines and health supplements" (June 2014).

188 C. Michael White, "Pharmacologic and clinical assessment of kratom", *American Journal of Health-System Pharmacy*, vol. 75, No. 5 (March 2018), pp. 216–267.

189 Health Canada, "Unauthorized products may pose serious health risks (kratom)", 21 October 2020.

190 Phil Heidenreich, "Kratom, a controversial herbal product, seized from 2 Edmonton stores: Health Canada", Global News, 27 June 2017

191 Health Canada, Drugs and Health Products, "Health product advertising complaints".

Other plant-based NPS have also been seized to date, but in comparatively very small quantities. In 2019, they included: ayahuasca, a substance with some hallucinogenic properties (containing DMT) used in South America; kava, a sedative and anxiolytic used to produce a drink with anaesthetic and euphoriant properties, which is traditionally used in various Pacific islands; and *Salvia divinorum*, another plant with some hallucinogenic properties, the leaves of which are consumed by chewing, smoking or as a beverage, mainly in South America. Very small seizures of *Datura stramonium*, a hallucinogen likely to have originated in Central America, have also been made over the past decade, and the same is true of ibogaine, which was originally discovered in Central Africa and is used as a psychedelic with dissociative and stimulant properties. Although not approved for medical use and potentially problematic for those at risk of serious heart problems, ibogaine is used in some drug rehabilitation facilities,[192] allegedly preventing withdrawal effects.[193]

Decrease in amounts of synthetic NPS seized in recent years in parallel with geographical shifts in synthetic NPS markets

Seizure data suggest ongoing shifts in NPS markets, both in terms of the most-seized substances and the countries where seizures are made. Seizure trends show a marked increase in the quantities seized after 2000 and a sharp decrease over the period 2015–2019, with only the quantities of phenethylamines seized showing a significant increase over the period 2015–2019, in addition to synthetic NPS opioids.

Seizures of NPS

Seizures of NPS usually take place in countries where the substances are regulated. Variations in the types of NPS seized may therefore reflect changes in national regulation, in addition to changes in supply and in law enforcement capacity, as well as the capacity of Member States to detect and identify such substances.

192 Xaver Koenig and Karlheinz Hilber, "The anti-addiction drug ibogaine and the heart: a delicate relation", *Molecules*, vol. 20, No. 2 (January 2015), pp. 2208–2228.

193 Kenneth R. Alper and others, "Treatment of acute opioid withdrawal with ibogaine", *American Journal on Addictions*, vol. 8, No. 3 (February 1999), pp. 234–242.

Over the years there has been a geographical expansion of trafficking in synthetic NPS, with the number of countries reporting seizures rising from 21 in 2009 to about 50 after 2016, but the centre of the global NPS market seems to have shifted from North America and Western and Central Europe, where it first emerged, to other regions. In the period 2009–2012, 63 per cent of all countries that reported seizures of synthetic NPS (excluding ketamine) were located in Western and Central Europe and North America; however, the share fell to 41 per cent in the period 2016–2019, as more seizures of synthetic NPS started being reported in Asia (rising from 4 countries in the period 2009–2012 to 14 countries in the period 2016–2019), Africa (from none to 4 countries (Egypt, Kenya, Mauritius, South Africa)) and in Latin America (from none to 2 countries (Argentina and Honduras)). In parallel, the proportion of synthetic NPS, excluding ketamine, seized in North America and Western and Central Europe fell, from 92 per cent of the global total in the period 2009–2012 to 72 per cent in the period 2016–2019. If ketamine is included, it fell from 58 per cent of the global total to 42 per cent.

Meanwhile, the proportion of the global quantities of synthetic NPS seized in Asia increased from 38 per cent in the period 2009–2012 to 43 per cent in the period 2016–2019; in Eastern Europe it increased from 1 to 7 per cent, in South-Eastern Europe from 1 to 4 per cent and in Africa from 0 to 2 per cent. By contrast, the proportion seized in Oceania (mostly Australia) declined slightly, from 3 per cent during the period 2009–2012 to 2 per cent in the period 2016–2019.

Shifts in NPS markets have also continued in recent years. Between 2015 and 2019, seizures of synthetic NPS (including ketamine) declined in both North America and Europe. By contrast, strong increases, although from low levels, were reported in Africa (from less than 1 kg to 828 kg), Oceania (from 127 kg to 1,516 kg), Central and South America (from 60 kg to 641 kg) and in some subregions in Asia (from 276 kg to 647 kg in South Asia and from none to 151 kg in the Near and Middle East/South-West Asia). The largest quantities of synthetic NPS seized were reported by countries in East and South-East Asia (10.5 tons in 2019); although twice the amount seized the previous year, that amount was 55 per cent lower than the amount reported seized in 2015.

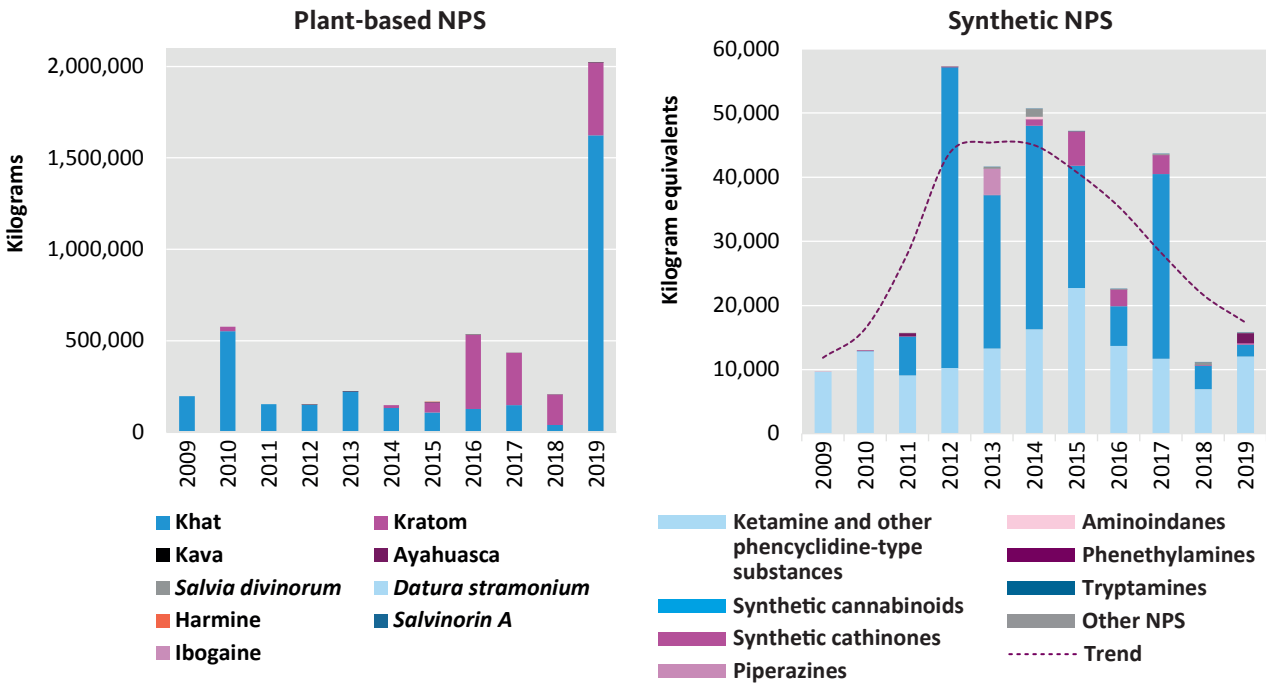
In 2019, most synthetic NPS by weight were seized in China, followed by Australia, Malaysia, Thailand, Myanmar and Egypt. In Australia, seizures of synthetic NPS were dominated by phenethylamines, while in China, Malaysia, Thailand and Myanmar, they were dominated by ketamine. This is in contrast to the situation in 2017, when most synthetic NPS were seized in the United States (mostly synthetic cannabinoids), followed by China (mostly ketamine) and the Russian Federation (mostly synthetic cathinones, in particular metamfepramone, which is also known as dimethylcathinone).

Shifts in NPS markets have been particularly marked in the case of the following substances:

- Synthetic cannabinoids: in contrast to interceptions made in previous years, when synthetic cannabinoids were mostly seized in North America, Western and Central Europe and Australia, the largest amounts of these substances seized in 2019 were in Egypt, Turkey and the Russian Federation;
- Synthetic cathinones: although mostly seized in the Russian Federation in recent years, in 2019, the largest quantities of synthetic cathinones were intercepted in Indonesia and Hong Kong, China;
- Tryptamines: most seizures of tryptamines used to be reported by Australia and a number of countries in Europe and the Americas but, in 2019, seizures of tryptamines were only reported by one country in Europe (Romania);
- Piperazines: although they used to be trafficked mainly to Europe and North America from Oceania, in particular New Zealand, piperazines were reported to have been seized only in Canada and Czechia in 2019;
- Ketamine: the largest quantities of synthetic NPS seized in 2019 were, once again, of ketamine, mostly in East and South-East Asia, notably in China, followed by Malaysia, Thailand, Myanmar and India. Ketamine production used to be concentrated in South Asia, but the dismantling of clandestine ketamine laboratories in an increasing number of countries in South-East Asia, accompanied by substantial increases in quantities of the drug seized, point to a partial geographical shift in the manufacture of ketamine from South Asia to South-East Asia.

These geographical shifts are probably occurring for multiple reasons. One could be that NPS have failed to establish a sizeable market of their own in the West, where they originally emerged, because they were only

FIG. 37 Global quantities of new psychoactive substances seized, 2009–2019



Source: UNODC, responses to the annual report questionnaire.

attractive as long as they were, or were perceived to be, novel legal alternatives to other drugs. With national and international controls increasing in the NPS market, their appeal may have lost ground. Some NPS remain on the drug markets in North America and Europe and still represent a challenge to public health,[194] particularly when sold under the same name as traditional drugs or mixed with controlled drugs.[195] However, to date, no single NPS, once placed under national or international control, has established a sizable market of its own that is comparable in size to the markets for traditional drugs.

Some studies have shown that, once NPS are controlled, users tend to revert to traditional drugs.[196] Certain NPS, however, have established markets among some marginalized communities, such as homeless populations, where they continue to pose a high level of harm,[197] but not among large population groups. While the novelty appeal of NPS may have, at least partially, disappeared in North America and Europe, the drugs have begun to represent an alternative in other regions.

The decline in seizures of synthetic NPS at the global level may also reflect the fact that some of the most harmful NPS have been put under national and international control in recent years and are therefore trafficked less than in the past and are no longer categorized as NPS. The amount of the synthetic cathinone mephedrone seized globally, for example, fell from more than 4.2 tons in 2012 to less than 1 ton in 2019 after the substance was placed under international control in 2015. Similarly, the amount of MPDV, another synthetic cathinone that came under international control in 2015, seized globally fell from 205 kg in 2013 to less than 10 kg in 2019. Moreover, the global amount of JWH-018, a synthetic cannabinoid originally found in "spice" preparations, which also came under international control in 2015,[198] seized fell from 229 kg in 2013 to 0.06 kg in 2019.

194 See the chapter entitled "Drug use and health consequences" in the present booklet.

195 For example, NBOMes sold as LSD in Central and South America, in East and South-East Asia and in Oceania;see UNODC, *Global Synthetic Drugs Assessment 2020* (United Nations publication, 2020).

196 UNODC, *World Drug Report 2020*, booklet 4, *Cross-Cutting Issues: Evolving Trends and New Challenges* (United Nations publication, 2020).

197 UNODC, *World Drug Report 2020*, booklet 2, *Drug Use and Health Consequences* (United Nations publication, 2020).

198 Commission on Narcotic Drugs, decision 58/10, entitled "Inclusion of JWH-018 in Schedule II of the Convention on Psychotropic

More than 1,000 NPS have been identified to date

Following the scheduling in 2020 of 2 substances under the Single Convention on Narcotic Drugs of 1961 as amended by the 1972 Protocol and 10 substances under the 1971 Convention, 294 psychoactive substances were under international control by the end of 2020.[199] By comparison, the number of NPS identified by national authorities and forensic laboratories in 126 countries reached a total of 1,047 substances in December 2020[200] – triple the number of substances under international control. It should be noted, however, that many NPS emerge only for a short period of time before disappearing from the market.

Number of newly identified NPS has stabilized but the number of synthetic opioids and benzodiazepine-type NPS is growing

Following a rapid expansion between 2009 and 2015, the number of new substances arriving on the drug markets in individual countries each year has stabilized. In 2019, although 541 different NPS were identified and reported by Member States, many of the substances had in fact come onto the global market in previous years, with just 71 (including five whose effect has not yet been determined) being identified for the first time at the global level in 2019, down from a peak of 163 substances in 2013.[201] There was a sharp decline (by more than 50 per cent) in the number of NPS identified for the first time between 2013 and 2019 in countries in North America, Europe and Asia.[202] While the declines in North America and Europe seem to have gone hand in hand with a shrinking of the respective NPS markets, the decline in Asia may have been the result of a decrease in the number of orders for the manufacture of new substances to supply the NPS markets in North America and Europe, rather than declines in the NPS markets in Asia. The total quantity of synthetic NPS (excluding ketamine) seized in Asia remained largely stable between 2016 and 2019, but was significantly larger in 2019 than in 2013.[203]

The decline in the number of NPS identified for the first time at the global level and the stabilization of the number of NPS reported by Member States have happened in parallel with the adoption in some countries, including Australia, Germany and the United Kingdom, of "generic legislation" on NPS control that covers, ex ante, most, if not all, possible future variants of psychoactive substances under control.[204] There have also been examples of existing "analogue legislation" being applied more strictly than in the past, such as in Canada and the United States, which is aimed at discouraging attempts to skirt the law through molecular tinkering by allowing the courts, ex-post, to determine whether a substance found on the market is similar (in terms of its chemical structure and effects) to a substance already under national control, and thus also falls under the national control system.[205]

Over the period 2015–2019, most identified NPS in Member States were stimulants (mostly cathinones and

Substances of 1971" (see E/2015/28).

199 For the latest scheduling decisions, see the report on the sixty-third session of the Commission on Narcotic Drugs (E/2020/28).

200 This number includes all NPS identified, even those placed under international control in recent years (UNODC early warning advisory on new psychoactive substances).

201 UNODC, "Regional diversity and the impact of scheduling on NPS trends", Global SMART Update, vol. 25 (April 2021).

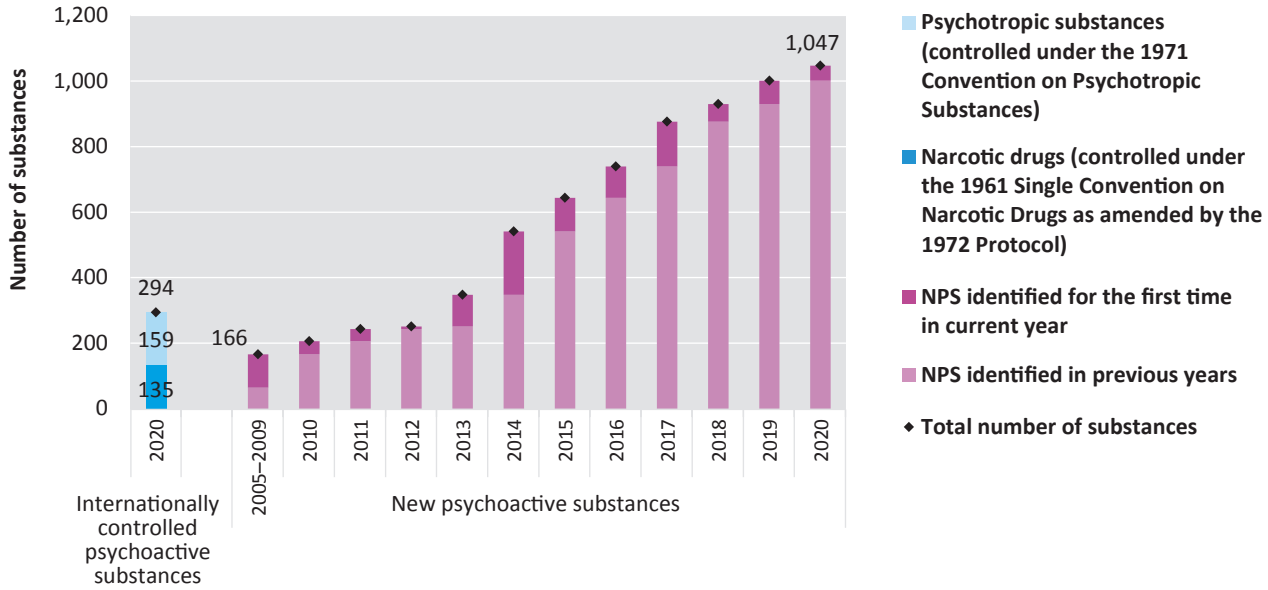
202 Ibid.

203 UNODC, responses to the annual report questionnaire.

204 UNODC, *World Drug Report 2020*, booklet 4, *Cross-Cutting Issues: Evolving Trends and New Challenges* (United Nations publication, 2020).

205 UNODC, *World Drug Report 2013* (United Nations publication, 2013).

FIG. 38 Number of internationally controlled drugs in 2020 and new psychoactive substances identified at the global level, 2005–2020 (cumulative figures)



Sources: UNODC, *World Drug Report 2013* (United Nations publication, 2013); Commission on Narcotic Drugs scheduling decisions; and UNODC early warning advisory on new psychoactive substances.

Number of NPS identified

Three distinct categories exist for measuring the number of NPS:

Total number of NPS ever identified: the global cumulative number of all the different NPS ever reported to the UNODC early warning advisory on new psychoactive substances.

Up until the end of 2020, a total of 1,047 NPS had been reported to UNODC. Several have since disappeared from the market, while others have been placed under international control and are therefore no longer considered NPS.

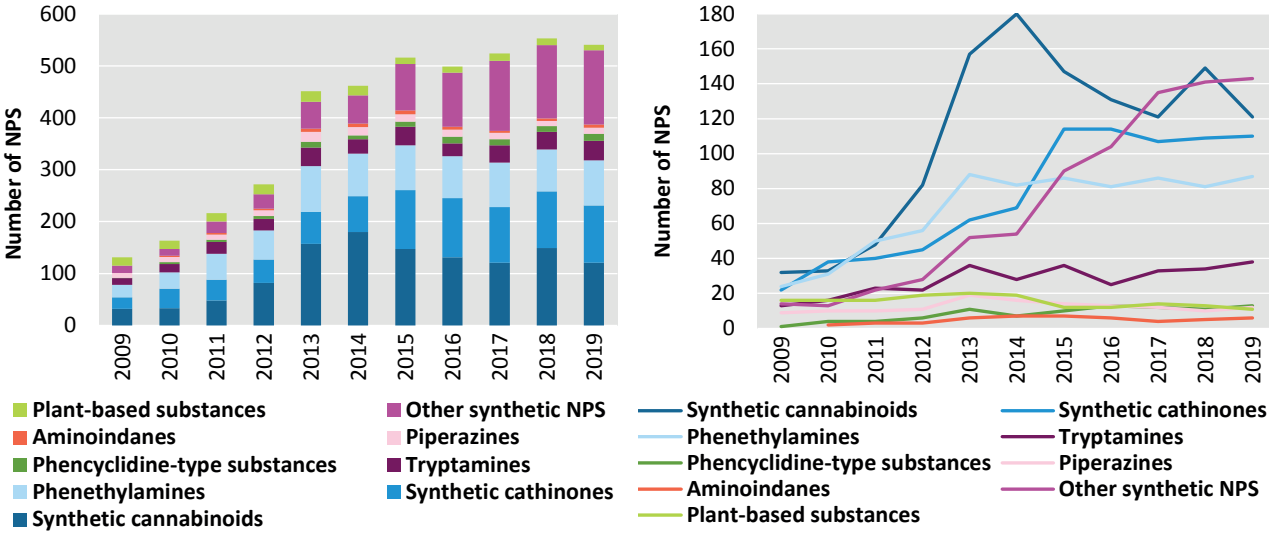
The total number of NPS placed under international control by the Commission on Narcotic Drugs between 2015 and 2020 amounted to 60 substances, including 17 substances (mostly fentanyl analogues) that were added to the Single Convention on Narcotic Drugs of 1961, as amended by the 1972 Protocol, and 43 substances that were added to the Convention of Psychotropic Substances of 1971. An additional eight NPS were placed under international control in March 2021.[a]

Number of different NPS identified in a given year: this number represents how many different, or distinct, substances were reported in a given year worldwide. A total of 541 different NPS were reported to the UNODC early warning advisory on new psychoactive substances in 2019.

Number of newly identified NPS at the global level: NPS identified for the first time anywhere in the world, based on reports to the UNODC early warning advisory on new psychoactive substances, in a given period. In 2019, the number of newly identified NPS at the global level amounted to 71 (including five whose effect has not yet been determined), based on information available (reflecting information received until end December 2020).

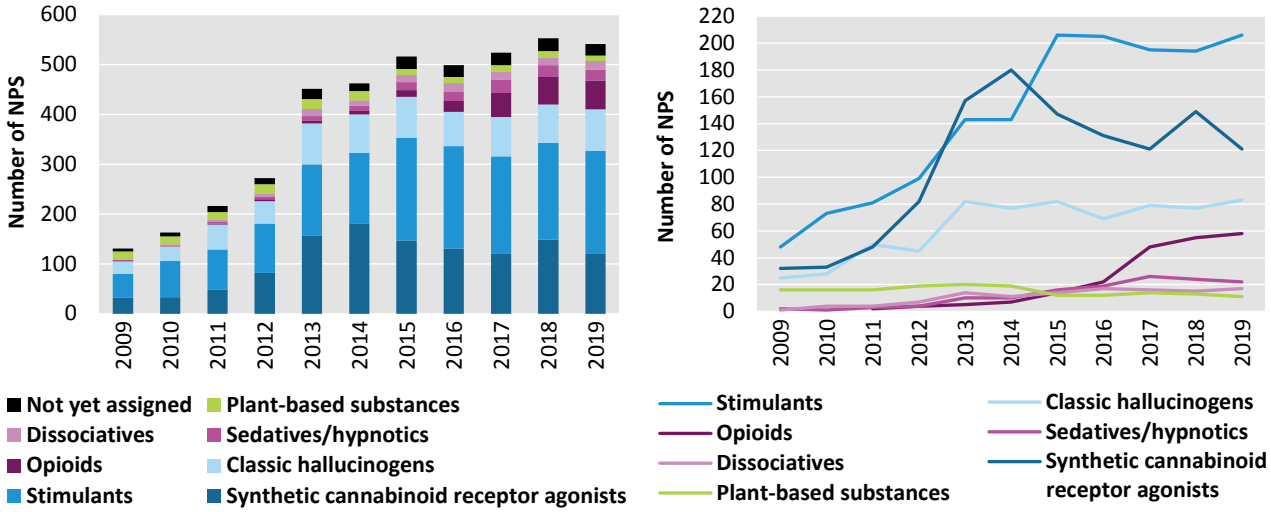
a UNODC, "Regional diversity and the impact of scheduling on NPS trends", Global SMART Update, vol. 25 (April 2021).

FIG. 39 New psychoactive substances identified in Member States, by substance group, 2009–2019



Source: UNODC early warning advisory on new psychoactive substances.

FIG. 40 New psychoactive substances identified in Member States, by effect group, 2009–2019



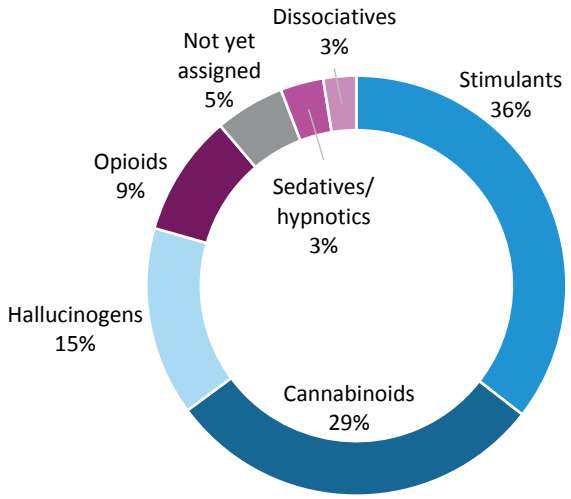
Source: UNODC early warning advisory on new psychoactive substances.

phenethylamines), followed by synthetic cannabinoid receptor agonists, hallucinogens (mostly tryptamines and some phenethylamines) and opioids (mostly fentanyl analogues). While a decrease in the number of new synthetic cannabinoids arriving on the market has been reported in recent years, the number of cathinones and phenetylamines has remained stable and the number of tryptamines and of "other synthetic NPS" (including opioids), in particular, has increased.[206]

The number of opioid NPS in Member States has actually risen sharply in recent years, from just 1 substance in 2009

206 UNODC early warning advisory on new psychoactive substances.

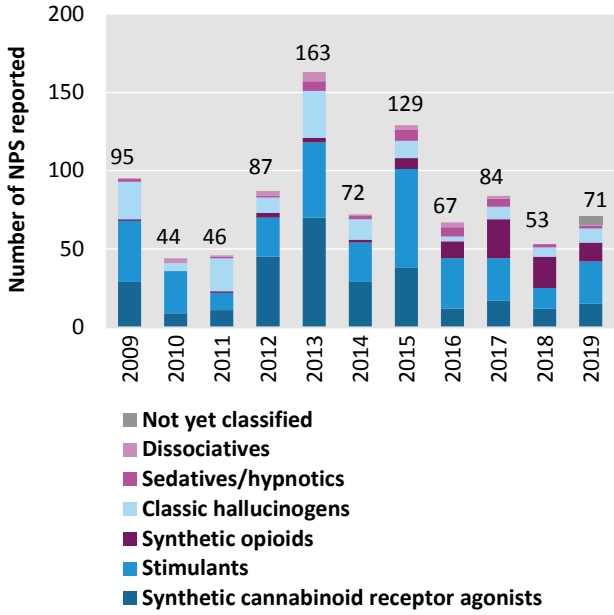
FIG. 41 Distribution of new psychoactive substances, reported for the first time at the global level in 2019, by effect group



Source: UNODC early warning advisory on new psychoactive substances.

Note: The total number of NPS reported for the first time at the global level amounted to 66 substances, in addition to 5 substances which could not, as yet, be assigned to any category; "synthetic cannabinoid receptor agonists" are referred to in the figure above as "cannabinoids".

FIG. 42 Number of new psychoactive substances reported for the first time each year by effect group at the global level, 2009–2019



Source: UNODC, "Regional diversity and the impact of scheduling on NPS trends", Global SMART Update, vol. 25 (April 2021).

to 14 in 2015 and 58 in 2019.[207] In fact, the emergence of new synthetic opioid receptor agonists, which are often fentanyl analogues, and, more recently, other synthetic opioids (opioids belonging to other chemical groups), has been the cause of major concern, as they have proved particularly harmful and have led to an increasing number of NPS-related deaths, in particular in North America and, to a lesser extent, in Europe. The number of countries and territories reporting seizures of these NPS opioids rose from just 1 in 2009 to 33 in 2017, before decreasing slightly to 29 countries in 2018 and 26 in 2019. The countries and territories that reported opioid NPS to UNODC were mainly located in North America and Western and Central Europe, but some opioid NPS were also reported by other countries and territories in Europe (Croatia, Romania, Russian Federation, Ukraine and Turkey), Oceania (Australia), Asia (China, Georgia, Japan, Kazakhstan, Singapore and Hong Kong, China,) and South America (Brazil, Bolivia (Plurinational State of), Chile and Colombia).

Overall, 44 countries and territories have reported 80 different synthetic opioids to UNODC since 2009, of which 58 substances were identified by 26 Member States in 2019. In addition to fentanyl analogues, a number of other synthetic opioids have been identified in recent years in North America and Europe, as well as in Central Asia and Transcaucasia, East and South-East Asia and Oceania. New non-fentanyl NPS opioids of concern include brorphine[208] (a piperidine benzimidazolone) and isotonitazene[209] (a benzimidazole).[210]

Another recent trend has been the increasing importance of NPS with sedative or hypnotic effects, most of which are benzodiazepine-type NPS (based on toxicology reports).[211] Benzodiazepine-type NPS are often sold at

207 Ibid.

208 Center for Forensic Science Research and Education, "New deadly opioid results in over 120 deaths", November 2020.

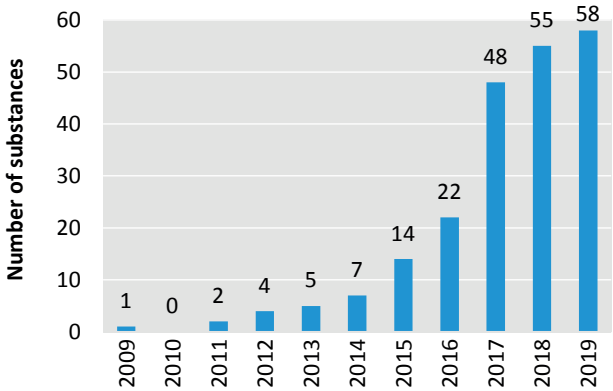
209 EMCDDA, "Isotonitazene: Report on the risk assessment of *N*,*N*-diethyl-2-[[4-(1-methylethoxy)phenyl]methyl]-5-nitro-1*H*-benzimidazole-1-ethanamine (isotonitazene) in accordance with Article 5c of Regulation (EC) No 1920/2006 (as amended)", Risk Assessments, No. 31 (Luxembourg, Publications Office of the European Union, 2020).

210 UNODC, "Current NPS threats", vol. III (Vienna, October 2020).

211 Ibid.

very low prices, sometimes in packaging mimicking existing medicines, have varying dosages of the active ingredients, and contain contaminants as well as highly potent synthetic opioids. There have been reports in Europe of this type of falsified medicines being produced by the same organized crime groups that manufacture and/or traffic other synthetic drugs, such as MDMA, LSD and ketamine.[212]

FIG. 43 **New psychoactive substances with opioid effects identified in Member States, 2009–2019**



Source: UNODC early warning advisory on new psychoactive substances.

212 UNODC, *Global Synthetic Drugs Assessment 2020.*

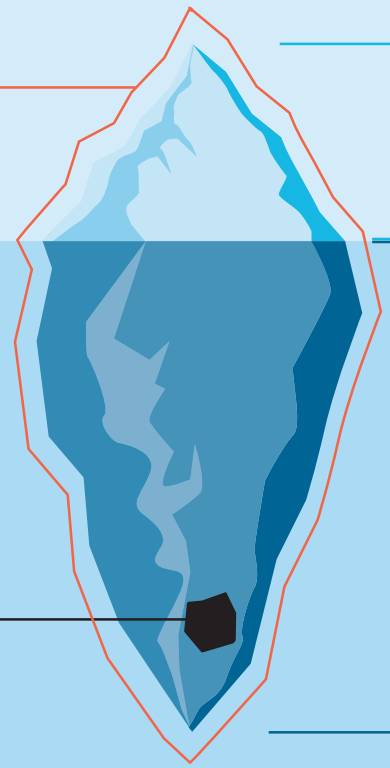
Drug trafficking over the Internet

Increased digital interconnectivity has brought about innovations in how global drug supply chains operate. In particular, evolutions in digital communications platforms have added a new dimension to drug distribution.

Purchasing drugs online arguably brings a number of advantages to traffickers and users as compared with purchases made in person, on the street. Online platforms connect buyers with sellers and can cut out intermediaries, which saves costs and shortens supply chains. Following an online purchase, drugs are delivered to a mailbox or another location in a "dead drop", reducing potentially risky interactions with drug traffickers. Moreover, the use of mail courier services and international trade networks may make detection and interdiction less likely owing to the sheer scale and volume of global trade.

The marketing and sale of controlled drugs and NPS on the Internet can take place at different levels: on the open Internet, also known as the "clear web", sometimes using encrypted communications tools; on certain social

THE INTERNET: CLEAR WEB, DEEP WEB AND DARK WEB



Internet

Infrastructure consisting of a standardized set of data transfer protocols for digital information exchange.

Clear web (surface web)

Content indexed by standard web-search engines, accessible to anyone using the Internet.

- social networks
- public pages /profiles

Deep web

Content not indexed by standard web-search engines; content can be located and accessed by a direct URL or IP address but may require a password or other security access to get past public-website pages; includes many very common uses such as web mail, online banking, private or otherwise restricted access content and profiles.

- online banking
- social networks
- restricted pages /profiles

Dark web (darknets)

Darknets, or overlay networks within the Internet that can only be accessed with specific software, configurations, or authorization, and often use a unique customized communication protocol. Two typical darknet types are social networks (usually used for file hosting with a peer-to-peer connection), and anonymity proxy networks such as Tor via an anonymized series of connections.

media applications; and on darknets, which form part of the deep web.

Drug trafficking over the clear web: the example of substances supplying synthetic drugs markets

While any quantification remains a challenge, it would seem that technology and the Internet may be increasingly serving as an avenue for the advertisement and sale of synthetic substances, including some synthetic drugs and chemicals used in the manufacture of a variety of synthetic drugs. Given enhanced global and digital connectivity, anyone can now order these substances online and have them delivered directly to their door, thereby cutting out intermediaries. This convenience is facilitated by the speed and ease of international shipping and mail services.

The clear web and easily accessible online selling platforms are playing a role in drug markets. While the online selling of traditional drugs such as heroin, ATS, cannabis and cocaine remains confined to anonymized platforms on the deep web, the clear web is used for selling products that feed into the market of these traditional drugs, in particular synthetic drugs. Today, a number of vendors, who operate alone or through well-established online commercial platforms, are openly selling substances that feed the synthetic drug market, including precursors, pre-precursors, NPS and other controlled substances.

These vendors continually change their offer in order to adapt to national and international control systems and government interventions so that they remain legal and can operate in open view. While they may remain loosely within the law, these vendors are clearly associated with the synthetic drugs market, as seen by the way in which they advertise their products and by the typology of the lists they offer. Behind these vendors there may be traffickers who use the clear web to attract buyers towards a larger underground market, or business organizations that use these drug traffickers to offer substances used in the manufacture of synthetic drugs or NPS and to introduce them directly onto the drug market. These vendors have the potential to drive changes in synthetic drug markets with new or adapted substances for the manufacturing of synthetic drugs or for the cutting of drugs. They can also play a role in the NPS market. In any form, these vendors are part of the supply chain of the synthetic drug markets and understanding them helps to disrupt this chain. The analysis below provides an overview of the platforms on the clear web that offer substances for sale that feed into synthetic drug markets.

Rise of the clear web in the sale of controlled and uncontrolled synthetic substances

The online marketing and selling of some synthetic drugs, rather than being restricted to the dark corners of the Internet (dark web), also occurs on the open Internet, or clear web, where fentanyl and its analogues, for example, together with other newly controlled psychoactive substances and NPS, have been readily discoverable for purchase on easily accessible platforms. The sale of fentanyl for non-medical purposes and other unregulated chemical products, for example, started being actively advertised and marketed on the clear web between 2010 and 2011.[213]

A large number of synthetic substances supplying drug markets are advertised for sale on the clear web, including synthetic drugs that are controlled, others that are not controlled (NPS), precursors and other essential chemicals used in the manufacture of synthetic drugs – some, but not all, of which are controlled – and other drug-producing materials such as cutting agents and tablet-binding substances. Such items are relatively easy to find if buyers know what substances they are looking for and which terms to use in search queries. For instance, some advertisements can be found using simple image searches. For controlled substances, many online vendors overlay names and chemical identifiers on stock photos of chemicals.

Listings for the sale of synthetic substances using image searches are often sourced from a variety of clear web sales platforms. From January 2019 to March 2021, an analysis of over 1,000 listings on the clear web for the sale of synthetic substances related to drug markets showed that interactions between buyers and sellers were concentrated on e-commerce websites, online chemical marketplaces and social media.[214] E-commerce platforms, or websites for the buying and selling of products over the Internet, allow sellers to post offers for the sale of a

213 United States Department of Justice, "Fentanyl and related threats", *United States' Attorneys' Bulletin*, vol. 66, No. 4 (July 2018).

214 Michael Lohmuller, Nicole Cook and Logan Pauley, "Lethal exchange: synthetic drug networks in the digital era" (Washington D.C, Center for Advanced Defense Studies, 2020).

IMAGE 1 **Example of an offer for the sale of isopropylbenzylamine, a cutting agent known to be used in methamphetamine manufacture, on an e-commerce platform, April 2021**

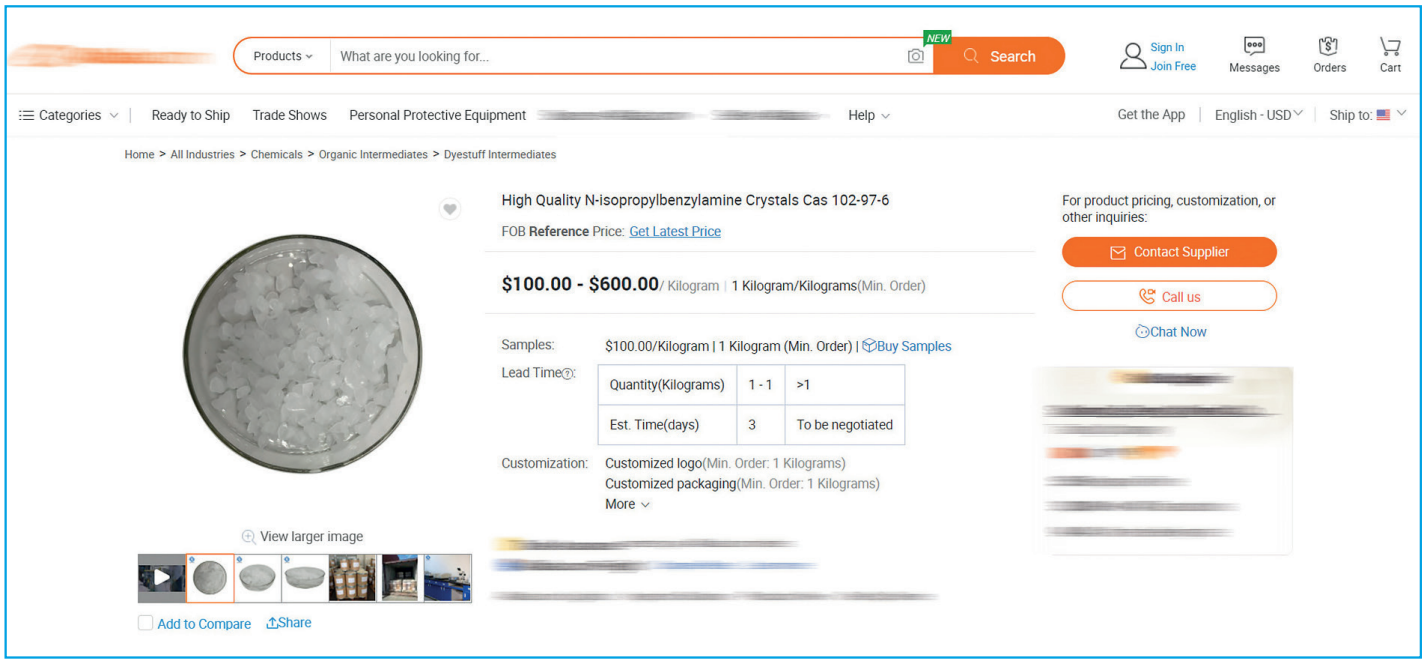
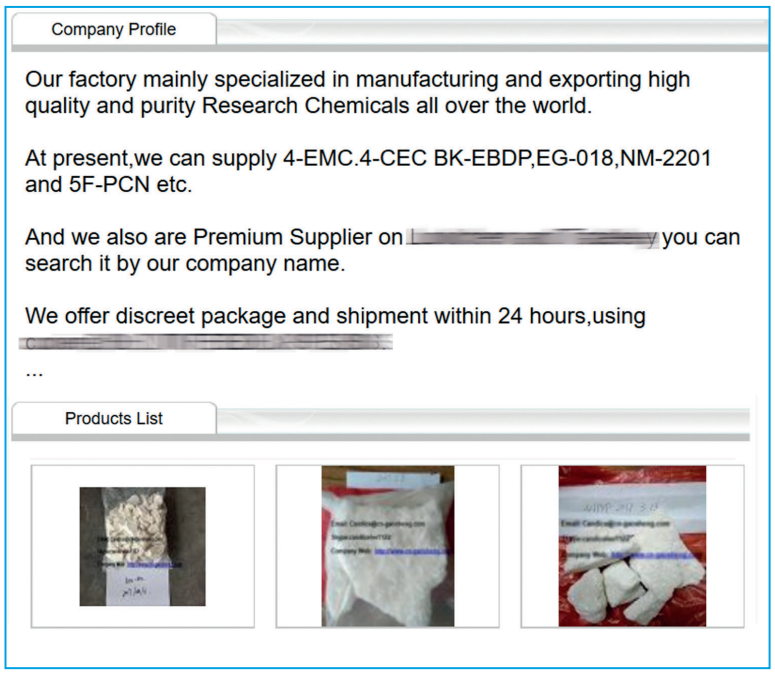


IMAGE 2 **Example of an advertisement for the sale of research chemicals on the clear web, February 2021**



variety of goods. Some platforms for online purchases are not restricted to specific sectors.

Other platforms, however, cater to specific industries; some of them offer a chemical marketplace for suppliers and buyers.

In addition to using e-commerce websites and chemical marketplaces, many vendors of synthetic drugs and related chemicals on the clear web operate independent websites where they list substances for sale. They use social media to help build and cultivate a client base and ultimately direct potential buyers to either their own site or that of an affiliated chemical company to finalize transactions.

Social media applications appear to have played an important role in creating trusted sales networks, with groups serving as forums for sellers and buyers to connect with one another. Analysis of several private groups on a social media platform, for example, found they were used as forums for advertising or reviewing synthetic substances, discussing relevant drug laws and alerting other buyers to potential seller scams (e.g., pointing out

IMAGE 3 Example of a vendor site selling research chemicals in bulk on the clear web, February 2021

IMAGE 4 Example of a site selling chemicals, including fentanyl analogue NPS, on the clear web, February 2021

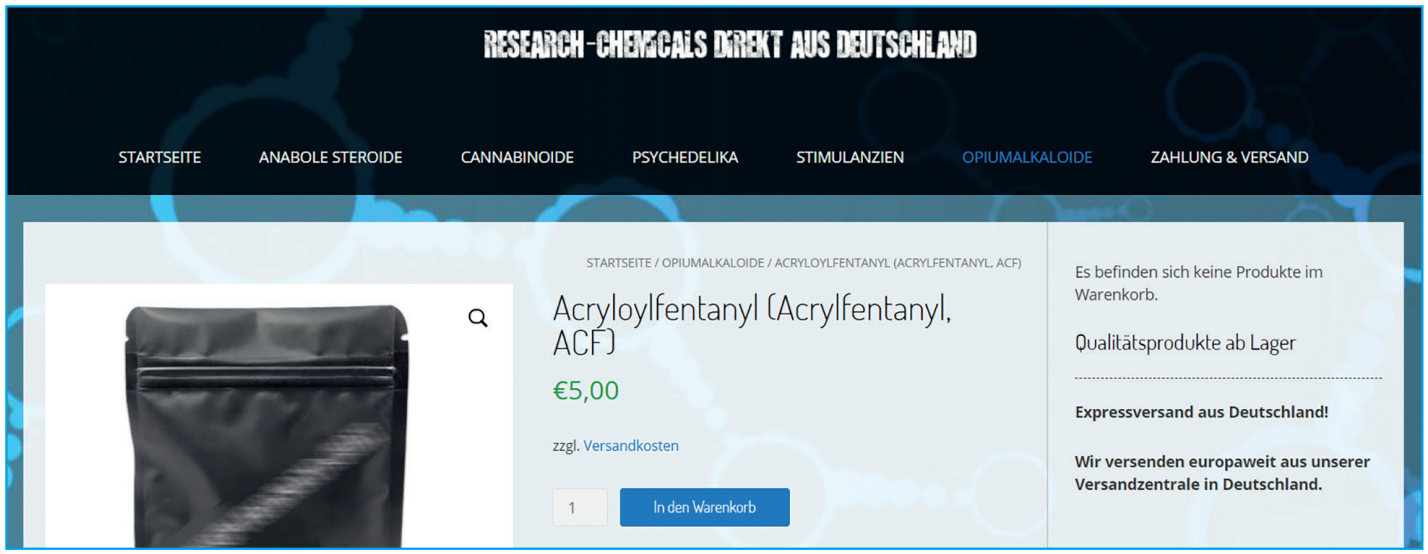
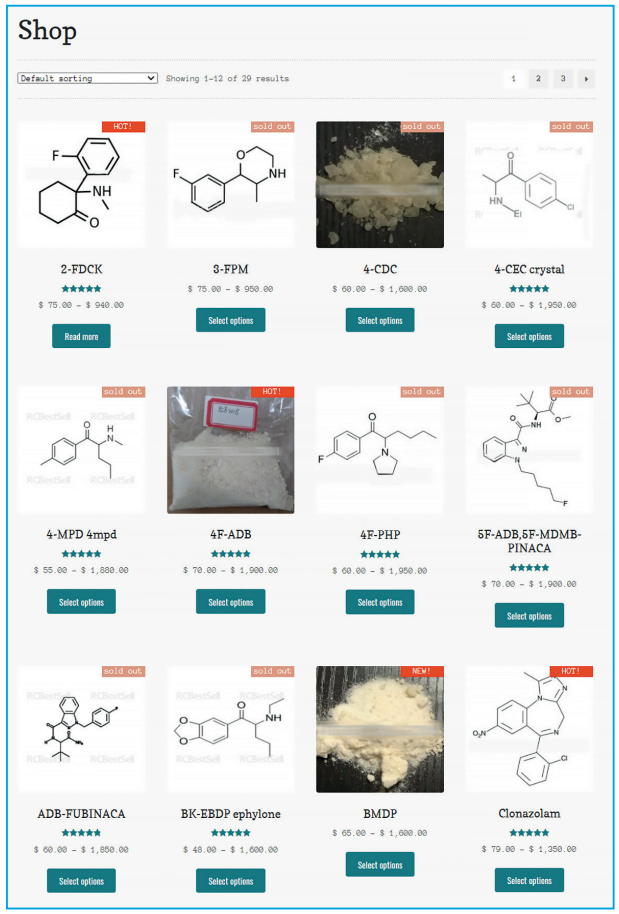


IMAGE 5 **Example of an advertisement for the sale of research chemicals on the clear web, February 2021**



sellers who have not shipped a product after receiving payment).[215]

Myriad encrypted messaging tools and payment tools such as cryptocurrencies facilitate drug transactions on the clear web, offering a layer of anonymization and protection for sensitive or illegal activity.

On sales platforms, vendors often provide information regarding pricing and shipping practices. Payment options typically include the use of commercial money transmission services and more traditional means of making financial transactions, such as wire transfers. Payment in cryptocurrencies, such as bitcoin, is the most popular option.[216] For shipping, commercial mail courier services are commonly listed as preferred methods of distribution.

Vendors on the clear web adapt quickly and constantly seek to exploit legal loopholes

Vendors of synthetic substances supplying drug markets who operate on the clear web have proved quickly adaptable: they respond quickly to law enforcement pressure and new legal restrictions by adjusting their advertising and selling techniques to avoid interdiction. They also offer chemicals with altered formulas that are purported to mimic controlled substances to overcome existing drug controls.

Vendors operate on the border with the law as they continue to respond to new control legislation or law enforcement pressure by changing the substances they sell while still offering chemicals that can be used for drug markets. This behaviour is evident in shifts in how fentanyl analogues are advertised online. For instance, offers on the clear web for the sale of fentanyls (such as fentanyl, carfentanil and sufentanil), which were more frequent before mid-2019, have rarely been seen since then, when numerous online vendors began selling precursors of fentanyls, as well as pre-precursors, including 4-anilinopiperidine (4-AP) and 4-piperidone monohydrate hydrochloride,[217] largely in response to increased legal pressures, stemming in particular from the international and national scheduling of a number of fentanyl analogues since 2019.[218, 219, 220, 221]

215 Analysis from the Center for Advanced Defense Studies.

216 Ibid.

217 Ibid.

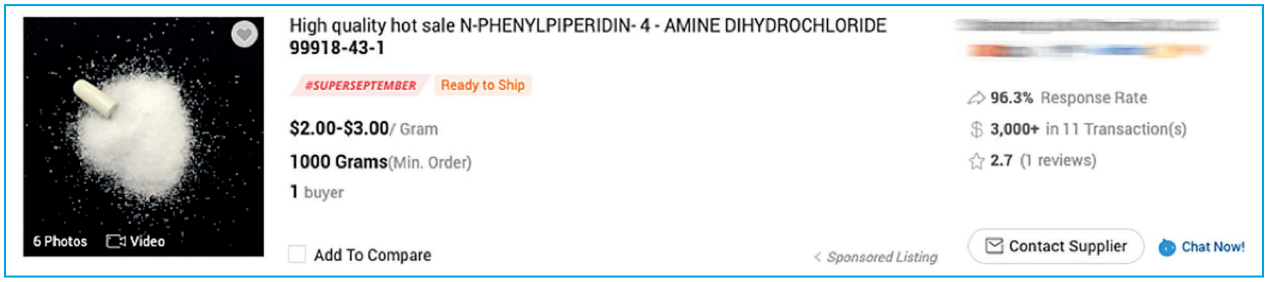
218 United States, Drug Enforcement Administration, "DEA proposes to control three precursor chemicals used to illicitly manufacture deadly fentanyl", press release, 17 September 2019.

219 China, State Council Information Office, "Class scheduling of fentanyl substances from 1 May 2019", People's Daily, 2 April 2019. Available at: http://www.scio.gov.cn/34473/34474/Document/1651166/1651166.htm.

220 Canada, "Regulations amending the Narcotic Control Regulations and the Precursor Control Regulations (Fentanyls and Amphetamines): SOR/2019-120", *Canada Gazette*, part II, vol. 153, No. 10 (May 2019).

221 On the international scheduling of fentanyl analogues since 2019, see CND Decisions 62/1 (parafluorobutyrylfentanyl), 62/2 (orthofluorofentanyl), 62/3 (methoxyacetylfentanyl), 62/4 (cyclopropylfentanyl), 63/2 (crotonylfentanyl), 63/3 (valerylfentanyl). Available in the CND Database on Resolutions and Decisions at: https://www.unodc.org/rddb/en/index.html#?c=%7B%22filters%22:%5B%5D,%22sortings%22:%22%22%7D.

IMAGE 6 Example of an advertisement for 4-AP on an e-commerce platform, September 2019



The increase in the offers for sale of uncontrolled fentanyl precursors on the clear web is indicative of the flexibility and creativity of traffickers of synthetic substances when it comes to exploiting legal loopholes in drug legislation. The ability to adapt and manufacture synthetic drugs (or their precursors) that, although chemically different from controlled substances, produce the desired effect, is demonstrated by the fact that many vendors, including vendors of fentanyls, have diversified their offer and claim to produce or sell a wide array of chemicals, pharmaceuticals and controlled drugs. Since early 2019, the most common drugs advertised alongside fentanyls include synthetic cannabinoids, synthetic cathinones and NPS dissociatives with effects similar to ketamine.[222] Methamphetamine precursors have also been advertised on the clear web, including methyl *alpha*-phenylacetoacetate (MAPA), which was put under international control in November 2020, and P-2-P methyl glycidate (BMK glycidate). This variety not only allows manufacturers to shift from illegal to legal chemical manufacture quickly in order to circumvent controls, but also offers opportunities to mask the subsequent use of the product of a legitimate activity for illicit purposes.

In addition to fentanyl precursors, increased awareness and law enforcement scrutiny of the clear web may have prompted vendors to move away from advertising fentanyl towards other synthetic opioid NPS,[223] which are emerging substances of use in drug markets.[224, 225] This includes synthetic opioids such as isotonitazene,[226] which is structurally similar to etonitazene, an internationally controlled substance whose potency is similar to or greater than fentanyl.[227] However, similar to how outright advertising and sale of fentanyls became less common on the clear web, increased law enforcement scrutiny owing to new control legislation for isotonitazene in the United States and in the European Union[228] has prompted a further shift to other, lesser-known NPS, such as brorphine[229] and metonitazene.[230]

Drug sales on the clear web exhibit common characteristics

Vendors of some synthetic drugs operating on clear web platforms have used a variety of marketing techniques that appear intended to avoid law enforcement scrutiny and obfuscate their true activities. For instance, one commonly used tactic is to market fentanyl and other drugs as "research chemicals," a label ascribed to synthetic

222 Analysis from the Center for Advanced Defense Studies.

223 Matthew P. Prekupec, Peter A. Mansky and Michael H. Baumann, "Misuse of novel synthetic opioids: a deadly new trend", *Journal of Addiction Medicine*, vol. 11, No. 4 (June 2017).

224 Michael H Baumann and others, "U-47700 and its analogs: non-fentanyl synthetic opioids impacting the recreational drug market", *Brain Sciences*, vol. 10, No. 11 (November 2020).

225 Center for Forensic Science Research and Education, "NPS opioids in the United States", *Trend Report*, Q4 2020.

226 WHO, "Critical review report: isotonitazene" (Geneva, 2020).

227 Center for Forensic Science Research and Education, "Potent synthetic opioid: isotonitazene – recently identified in the Midwestern United States" (November 2019).

228 In August 2020, for instance, authorities in the United States, noting a rise of isotonitazene on illicit drug markets, made it a Schedule I controlled substance (United States, Department of Justice, Drug Enforcement Administration, Diversion Control Division, "Schedules of controlled substances: temporary placement of isotonitazene in Schedule I", *Federal Register*, vol. 85, No. 118 (June 2020)). The substance was also banned in the European Union, later in 2020 (see Commission Delegated Directive (EU) 2020/1687 of 2 September 2020 amending the Annex to Council Framework Decision 2004/757/JHA as regards the inclusion of the new psychoactive substance N,N-diethyl-2-[[4-(1-methylethoxy)phenyl]methyl]-5-nitro-1H-benzimidazole-1-ethanamine (isotonitazene) in the definition of "drug").

229 Nick Verougstraete and others, "First report on brorphine: the next opioid on the deadly new psychoactive substances' horizon?", *Journal of Analytical Toxicology*, vol. 44, No. 9 (November 2020).

230 Center for Forensic Science Research and Education, Public Health Alert, "Metonitazene begins proliferation as newest synthetic opioid among latest cycle of non-fentanyl related drugs", 25 January 2021.

Use of the clear web to facilitate licit and illicit trade in drug precursors

By their very nature, most chemicals that are used in the illicit manufacture of drugs also have widespread legitimate uses and are therefore legitimately advertised on and sold over the clear web. As a result, and in contrast to drug end products, the majority of listings related to the sale of chemicals for illicit drug manufacturing purposes are found on the clear web and only a fraction on the dark web.[a]

Legitimate online trade in precursor chemicals can take a variety of forms, ranging from direct sales through the websites and trading platforms of manufacturers that are directly engaged in online sales of chemicals to their customers, to virtual marketplaces where buyers and sellers can connect, although the actual transactions take place outside these marketplaces (B2B platforms).[b] As a result, listings on the clear web of precursor chemicals that can be used for both licit and illicit purposes represent regulatory and law enforcement challenges.

Under national regulations, the owners or operators of chemical trading platforms may be considered as intermediaries, brokers or traders. In many cases, such owners or operators do not fall under any national regulation. Moreover, they might not keep themselves up to date on the applicable control measures in the jurisdiction in which they operate, and might therefore be largely unaware of the possible illicit nature of some of the listings on their sites. As a result, internationally controlled precursors, including acetic anhydride, a heroin precursor, fentanyl precursors such as ANPP and NPP, and MDMA precursors such as derivatives of 3,4-MDP-2-P methyl glycidic acid (PMK glycidic acid), continue to be listed online, with target substances varying over time. For example, in the period 2016–2017, more than 100 suspicious postings by potential buyers asking for at least 700 tons of acetic anhydride were identified.[c] Alternative precursors, including designer precursors, of fentanyl have also been listed for sale on such websites, in some cases involving the same suppliers that are known to have been involved in illicit activities in the past.[d]

However, voluntary cooperation by the private sector with the Governments concerned in such cases is known to yield successful outcomes. This includes instances of voluntary self-regulation by Internet-based trading platforms and the implementation of strict posting policies, reflected in shifts between the platforms being targeted by buyers and sellers.[e] In addition, successful investigations into the suspected misuse of online trading platforms can lead to major seizures of controlled precursors. For example, investigations in India in 2018 led to the seizure of almost 10 tons of acetic anhydride, the largest seizure of the substance in the country in almost two decades.[f] It also led to the amendment of precursor legislation in India to include the regulation of Internet-facilitated trade in such substances.[d]

Only a few countries are currently known to have specific regulations that relate to or regulate the use of the Internet in domestic or international online sales of certain nationally controlled precursors. The legislation in India referred to above requires prior registration with the country's drug control agency for activities involving the offering for sale or distribution, or the mediating in the sale or purchase, of precursors through a website or social media, or in any other manner.[d] In China, regulations introduced in September 2010 require all entities that sell controlled precursors over the Internet to be registered with the competent national authorities.[g] In the United States, since 2004, website providers who assist in arranging transactions of listed chemicals among buyers, sellers or transporters from foreign countries may also be considered as brokers or traders, and be subject to control.[h]

a EMCDDA and Europol, *Drugs and the Darknet: Perspectives for Enforcement, Research and Policy,* Joint Publications Series (Luxembourg, Publications Office of the European Union, 2017), p. 15.

b INCB, *Precursors and Chemicals Frequently Used in the Illicit Manufacture of Narcotic Drugs and Psychotropic Substances: Report of the International Narcotics Control Board for 2017 on the Implementation of Article 12 of the United Nations Convention against Illicit Traffic in Narcotic Drugs and Psychotropic Substances of 1988* (E/INCB/2017/4).

c INCB, *Precursors and Chemicals Frequently Used in the Illicit Manufacture of Narcotic Drugs and Psychotropic Substances: Report of the International Narcotics Control Board for 2018 on the Implementation of Article 12 of the United Nations Convention against Illicit Traffic in Narcotic Drugs and Psychotropic Substances of 1988* (E/INCB/2018/4).

d INCB, *Precursors and Chemicals Frequently Used in the Illicit Manufacture of Narcotic Drugs and Psychotropic Substances: Report of the International Narcotics Control Board for 2020 on the Implementation of Article 12 of the United Nations Convention against Illicit Traffic in Narcotic Drugs and Psychotropic Substances of 1988* (E/INCB/2020/4).

e INCB, "Monitoring of suspicious requests for precursors posted on the Internet", Oral communication, (March 2021).

f INCB, *Precursors and Chemicals Frequently Used in the Illicit Manufacture of Narcotic Drugs and Psychotropic Substances: Report of the International Narcotics Control Board for 2019 on the Implementation of Article 12 of the United Nations Convention against Illicit Traffic in Narcotic Drugs and Psychotropic Substances of 1988* (E/INCB/2019/4).

g INCB, *Precursors and Chemicals Frequently Used in the Illicit Manufacture of Narcotic Drugs and Psychotropic Substances: Report of the International Narcotics Control Board for 2011 on the Implementation of Article 12 of the United Nations Convention against Illicit Traffic in Narcotic Drugs and Psychotropic Substances of 1988* (E/INCB/2011/4).

h United States, Department of Justice, Drug Enforcement Administration, "Use of the Internet to arrange international sales of listed chemicals", in *Federal Register*, vol. 69, No. 31 (17 February 2004), pp. 7348–7349.

substances that are relatively obscure but that is intended to attract buyers, as these substances may have comparable effects to controlled drugs. Similarly, some chemical companies advertise "customized synthesis," whereby clients request substances not included on a list of available products, on demand. While this is a legitimate practice in the pharmaceutical industry, it may be misused by traffickers willing to obtain controlled substances or specifically designed precursors to circumvent existing controls.

Another frequent tactic is the use of a chemical's technical name to advertise controlled substances. That is, rather than risk detection by using the word "fentanyl" or other common drug names, drug sellers advertising on the clear web often use chemical nomenclature from the Chemical Abstract Services (CAS) (a division of the American Chemical Society) or from the International Union of Pure and Applied Chemistry (IUPAC). A CAS number is a unique numerical code that refers to one specific chemical substance. For instance, a common form of controlled fentanyl, fentanyl hydrochloride, has the CAS number 1443-54-5. Another approach used is to advertise substances using the systematic name registered by IUPAC. Fentanyl hydrochloride, for example, has the IUPAC name *N*-phenyl-*N*-[1-(2-phenylethyl)piperidin-4-yl] propanamide;hydrochloride.

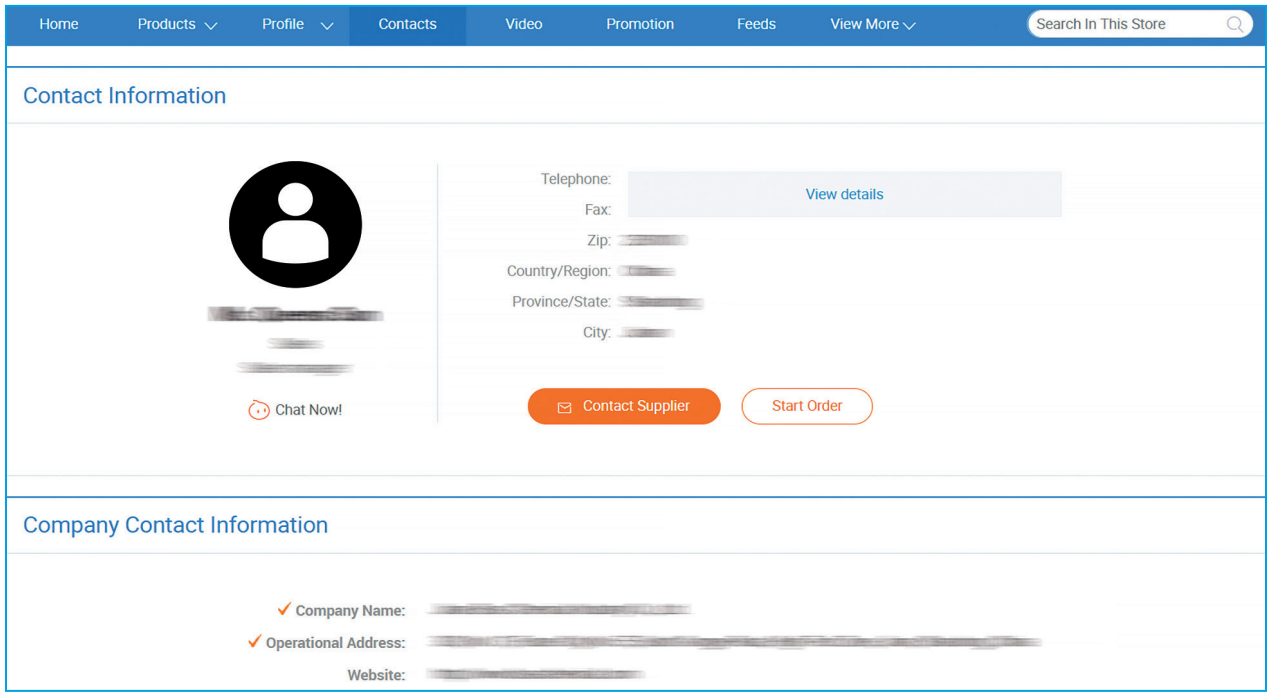
Online sellers of synthetic substances use the complexity and abstract nature of these chemical categorizations to their advantage, often advertising synthetic substances for sale by these identifiers alone as a means of evading scrutiny and detection. In some instances in early 2019, performing a simple web search for the CAS number of a specific fentanyl analogue, would yield hundreds of results for sales listings across a multitude of clear web platforms, even though searching for the substance by its name alone would return few results.[231]

Clear web listings often contain traceable identifying information

Many entities supplying controlled opioids are overt, and actively and openly advertise on the clear web. Despite using obfuscation tactics with regard to how synthetic substances are listed, listings typically include information that may be useful for better understanding

231 Analysis from the Center for Advanced Defense Studies.

IMAGE 7 **Example of a contact page profile on an e-commerce platform, February 2021**

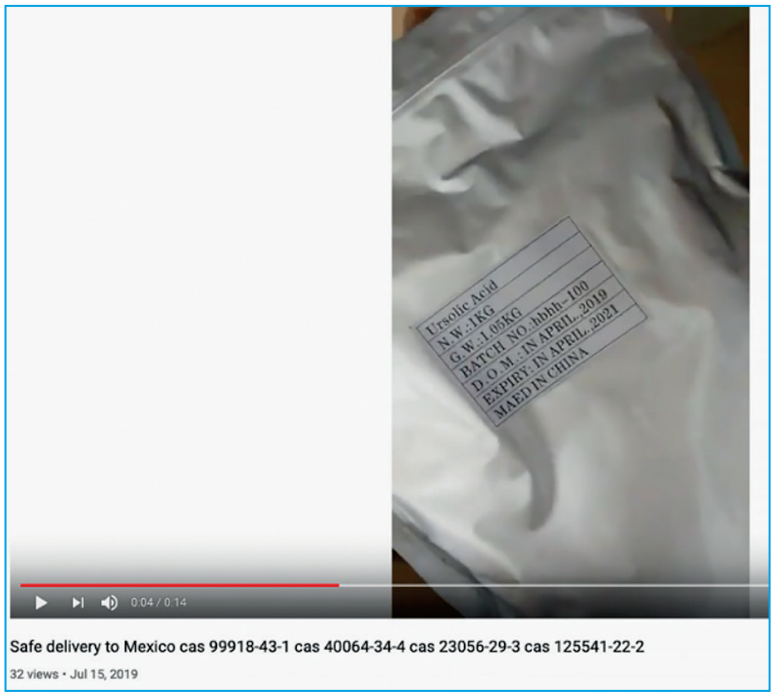


the networks involved in the manufacture and sale of these substances on the clear web.

In contrast to the selling of drugs on darknet platforms, where identity concealment is of prime importance, many listings on the clear web, particularly those on e-commerce platforms and chemical marketplaces, provide company names and other identifiers, including physical addresses or contact information, such as a phone number or email address. In cases where an advertisement contains the name of a specific company, depending on the country, that name may correspond with official records in a corporate registry system. Such records often include information on company shareholders, directors, or subsidiaries, and frequently provide physical addresses or other location information for that business.

Electronic identifiers, such as email addresses or phone numbers, may also be traced in order to identify previously unknown individuals or companies potentially involved in the illicit production and sale of drugs. For example, some companies, which might have no outwardly apparent connection, may use the same email or phone number, suggesting that they are part of the same drug supply network. This may be no different to any legitimate business with layers of ownership, and conglomerates.

IMAGE 8 **Screenshot of a video (publicly available online) advertising fentanyl precursors, including a package labelled as "ursolic acid", July 2019**



For instance, in early 2019, searches for an email address seen in an image search result for the fentanyl analogue acronym 4-FIBF (4-fluroisobutyrfentanyl) found that it was included on a number of other sales listings for fentanyl, some of which provided additional identifiers, such as a company name, company address and phone numbers. In addition, one of the listings contained a website address of a company that was legitimately registered in a national corporate database. The database allowed for official documents to be viewed that provided information on, among other details, company directors.[232] Corporate and electronic identifying information can also be used to obtain publicly available trade records for a known company of interest. Trade records help illuminate the extent and international network of potential synthetic substances manufacturers and vendors; they can also improve understanding of transnational trafficking flows of illicit goods and reveal international entities complicit in the network. For instance, the corporate records and online sales activity of one pharmaceutical and chemical products firm identified as selling controlled substances on the clear web suggested that it was part of a network with three other companies, which also extensively marketed controlled substances and precursor chemicals. A search of trade data aggregators showed that the network of companies had sold to international buyers in at least three countries.[233]

For synthetic substances suppliers, mislabelling goods is a potential method of obfuscating controlled substances that are being transported. Examples of vendors advertising and offering synthetic substances for sale but openly displaying images of mislabelled packages are not uncommon on the clear web.[234]

Similarly, social media is a rich source of information for discovering additional affiliations and entities that are potentially connected, by analysing the "friends" or "followers" of an account or profile. For example, analysis of a profile belonging to an apparent synthetic drug vendor revealed that he had moderated a private group with over 1,100 members in late 2019. Based on communications

232 Ibid.
233 Ibid.
234 Ibid.

and the interrelationship of friends within that group, it was possible to develop a map of related companies, online trade platforms, prospective customers and other social media profiles representing suppliers.[235]

Drug sales on the clear web continue to evolve and may shift to alternative platforms

Recent trends suggest that drug-related sales activity on the clear web may continue transforming and evolving in response to law enforcement and policy action. In particular, in addition to the appearance of new synthetic substances in global supply chains, the use of alternative, less visible, clear web platforms may become increasingly common in the near future.

In early 2020, for instance, many synthetic drug groups on public websites and social media platforms began enforcing strict rules, probably to reduce exposure and detection by law enforcement. These rules often include restricting sourcing (e.g., not allowing members to post their location information or website referrals) and banning users who encourage private messaging. To mitigate growing concerns over law enforcement monitoring, some drug vendors on the clear web have built password-protected websites for trusted individuals to securely and anonymously sell their products. Those websites depend on closed communities of drug buyers that migrate away from more commonly used clear web platforms. Many require registration approval and offer NPS that are analogues of controlled drugs and, in some cases, controlled opioids and other synthetic drugs.

Such websites also offer insight into the emergence of synthetic opioid NPS and other drug analogues, which are often introduced to these closed communities before becoming more mainstream. For example, isotonitazene began being offered on some of these websites as early as February 2020.[236] Others have also offered relatively difficult-to-find opioid NPS, such as metodesnitazene hydrochloride.

235 Ibid.

236 Lohmuller, Cook and Pauley, "Lethal exchange: synthetic drug networks in the digital era".

DRUG SUPPLY

Drug trafficking over the dark web

The characteristics, opportunities and challenges of drug trafficking over the dark web on the darknets have changed little over the years. Indeed, the anonymity offered by specific software (such as the onion router (Tor)), the wide selection of drugs on offer, the dark web's global reach and the use of cryptocurrencies have remained largely the same.

The Tor network is the largest darknet and contains the most sites. In mid-2020, there were approximately 200,000 onion services worldwide. The number of marketplaces in the Tor network increased from 1 in 2011 to 118 in 2019. Just like servers on the clear web, some of these servers host websites, whilst others host file-sharing or email services. Some of these are used for criminal purposes. At the same time, cryptocurrencies and anonymous communication applications have boosted the use of both darknets and the dark web in general, while contributing to the illicit trade in commodities and services, in particular drugs, although there has also been a large increase in the number and variety of products for sale. Products available include drugs, firearms and ammunition, and hacking tools and services. Some marketplaces specialize in the trade of payment card information and counterfeit documents. User interfaces have also become increasingly "vendor-friendly", allowing, for instance, bulk ordering and combining orders of different products into one shipment. Vendors are also

Dark web (darknets) business model

The main characteristic and comparative advantage of darknet markets is their anonymity. Customers intending to buy drugs over the dark web typically access the darknets through software such as the onion router (Tor) in order to ensure that their identities remain concealed. Specialized "darknet explorers" enable customers to access their desired market platform, where goods are then typically paid for in cryptocurrencies, in particular bitcoins, which can be used subsequently to buy other goods and services, or exchanged for various national currencies. The delivery of drugs purchased on the darknets is generally carried out by public and private postal services without their knowledge, with parcels often being sent to anonymous post office boxes, including automated booths, or "pack stations", for self-service collection. In jurisdictions with strong secrecy-of-correspondence laws, drugs are often dispatched in letters.

The main advantage of the dark web (darknets) for both suppliers and customers is the anonymity of the transaction: no physical contact is required and the reticence of some customers to interact with drug dealers is therefore reduced. The need for the customer to go to dangerous places to buy drugs is also removed. As darknet trafficking overcomes the need for sellers and buyers to be in the same location, organizations that sell drugs over the dark web do not need the critical mass of customers necessary to sustain a localized market. Customers also benefit from other customers' feedback about the quality of the drugs sold, which helps them evaluate the reliability of the supplier. Darknet platforms may also guarantee the payment of goods sold, typically by making use of escrow account systems, into which the customer must pay for the required goods, but the finalization of the remuneration to the supplier is postponed until the goods have been received by the customer.

more aware of potential takedowns of marketplaces by authorities, which they counter by operating in multiple markets simultaneously.[237]

Despite the high volatility of darknet marketplaces, sales of drugs over the dark web have increased over the long term

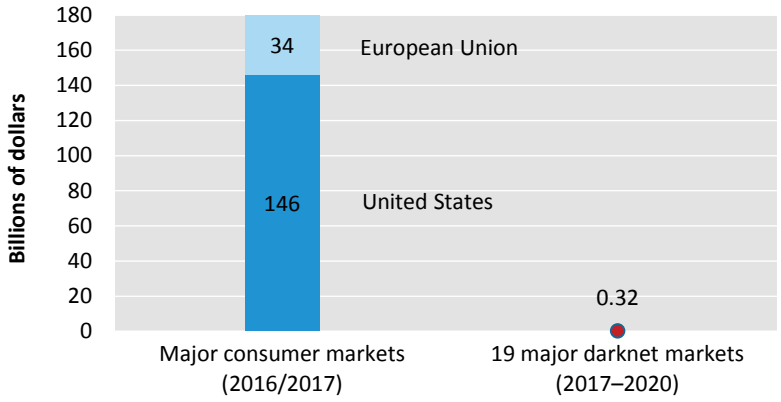
In contrast to legal online trade, for the purposes of which major platforms and markets have become solidly established over the years, darknet marketplaces are characterized by high turnover and volatility. In recent years, major law enforcement operations have led to the dismantling of a number of darknet platforms, and some darknet marketplaces have been the subject of exit scams, whereby their owners remove the funds accumulated in their customer escrow accounts and vanish.[238]

The darknet market ecosystem is both dynamic and resilient, even though it is possible that, without law enforcement intervention, the markets would have grown even faster over the past decade. More than 100 darknet market platforms have emerged over the past decade, but many of them, including the largest, last for only a short period. An analysis of 103 darknet markets over the period 2010–2017 revealed that they were active for, on average, just over eight months.[239] A similar analysis showed that, of more than 110 darknet drug markets that were active during the period 2010–2019, just 10 remained fully operational in 2019. Most of them were only started in 2018,[240] and almost all of those that became major darknet markets had disappeared by December 2020.[241]

Despite this high volatility, analysis based on web-crawling techniques of 19 major darknet markets predominantly selling drugs that were operating between 2011 and 2020[242] suggests that there was an overall upward trend in darknet sales over the period 2011–2020, except in 2019, when there was a decline. About 74 per cent of the transactions, or about 90 per cent of darknet sales, were drug-related. This analysis suggests erratic trends in drug sales from one year to the next, probably caused by the high volatility of markets that appear and disappear from the dark web. Nevertheless, on average, all darknet marketplaces taken together showed an overall increase in drug sales, with the annual minimum doubling and the average estimated total increasing almost fourfold between the early years of the dark web (2011 to mid-2017) and more recent years (mid-2017 to 2020).

Nonetheless, overall sales on these major darknet markets appear to have remained modest when compared with overall illicit drug sales. During the period 2017–2020, such darknet sales amounted to, on average, $350 million per year (rounded), of which about 90 per cent, or $315 million, was drug related, that is about 0.2 per cent of the combined estimated illicit annual retail drug sales in the United States and the European Union. Even in 2018, in which the peak of total sales on these major darknet markets, at about $725 million, was reached, such sales (adjusted for drugs only) would have still amounted to just 0.40 per cent of the combined estimated illicit

FIG. 44 Annual illicit retail drug sales in the United States and the European Union compared with annual illicit drug sales on major darknet markets



Sources: UNODC estimates based on: Gregory Midgette and others, *What America's Users Spend on Illegal Drugs, 2006–2016* (Santa Monica, California, RAND Corporation, 2019); EMCDDA and Europol, *EU Drug Markets Report 2019*; and UNODC analysis and estimates, based on data from Hikari Labs.

237 UNODC, *Darknet Cybercrime Threats to Southeast Asia 2020* (Vienna, 2020).

238 EMCDDA and Europol, *EU Drug Markets Report 2019* (Luxembourg, Publications Office of the European Union, 2019).

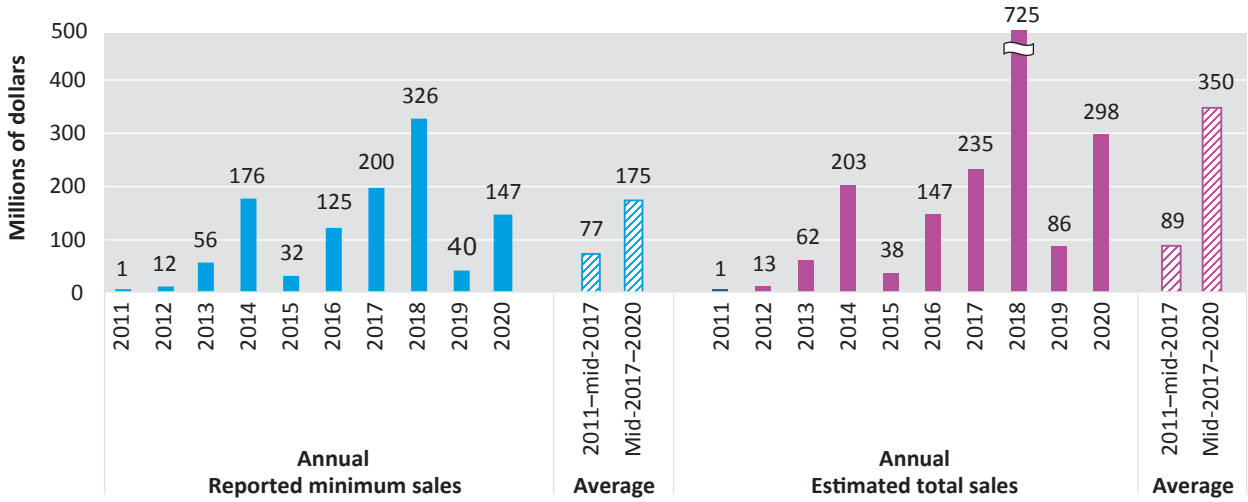
239 EMCDDA and Europol, *Drugs and the Darknet: Perspectives for Enforcement, Research and Policy* (Luxembourg, Publications Office of the European Union, 2017).

240 EMCDDA and Europol, *EU Drug Markets Report 2019*.

241 UNODC analysis, based on original data from Hikari Labs. The bulk of the subsequent analysis in this chapter is based on data from Hikari Labs, which, building on a decade of research at Carnegie Mellon University (United States) on methods to systematically analyse darknet markets, uses web-crawling techniques to identify and collect data from darknet markets, "scraping" relevant information from such sites. For further details, see the methodological annex in the online version of the present report.

242 UNODC analysis, based on original data from Hikari Labs.

FIG. 45 Darknet sales on major marketplaces where drugs are sold: reported minimum sales and estimated total sales, 2011–2020



Source: UNODC analysis and estimates, based on data from Hikari Labs.

Note: Based on data from 19 major darknet markets (Agora, AlphaBay, Berlusconi Market, Black Market Reloaded, Cannazon, Dark Market, Dream Market, Empire, Evolution, Hydra, Hydra Market, Pandora, Silk Road and Silk Road 2, TradeRoute, Valhalla, Versus, Wallstreet and Whitehouse). For more details on the calculation of the estimated total sales, see the methodological annex in the online version of the present report. All data reported reflect "minimum" sales as the current web-crawler techniques do not cover all sites on a specific market and customers may purchase not just one but various units of a drug offered for sale over the darknet and this information may not necessarily be contained in the feedback received that is used for the analysis. The challenge of web-crawler techniques not covering all sites on a specific market can be overcome if it is assumed that the investigated "pages" contain approximately the same information as the ones that the web-crawlers could not investigate. The challenge arising from the fact that customers may purchase various units of a drug, in practice, is not thought to lead to dramatically incorrect results, as drugs are offered in categories of quantity, such as 1 tablet, 5 tablets, 10 tablets, 20 tablets, 50 tablets, etc. and there are some indications suggesting that most customers purchase drugs in the amounts offered.

retail drug sales in the United States and the European Union, falling to 0.04 per cent of such sales (adjusted for drugs only) in 2019 before increasing to some 0.15 per cent in 2020 (adjusted for drugs only).[243]

Emergence and demise of major darknet markets

Major marketplaces devoted to drug sales emerged and disappeared between 2010 and 2019, partly as a result of law enforcement action[244] causing tangible disruptions to the trade, although this was often overcome within months by other markets absorbing their many customers. The instability of darknet marketplaces and the associated volatility of drug sales over the dark web are related not only to law enforcement operations but also to exit scams by the owners and "voluntary shutdowns", sometimes triggered by the spreading of rumours, as illustrated by the example of Dream Market. Founded in late 2013, this marketplace became the world's largest darknet market in 2017, but reports in the media of customers losing money drastically reduced drug sales over the platform for a short period in the fourth quarter of 2017. However, that did not prevent the market from re-emerging as the world's most popular darknet platform and achieving in July 2018 the highest daily sales of any darknet platform ever reported. Nonetheless, Dream Market was forced to close its operations in April 2019 after rumours emerged that it had sold customer data.[245]

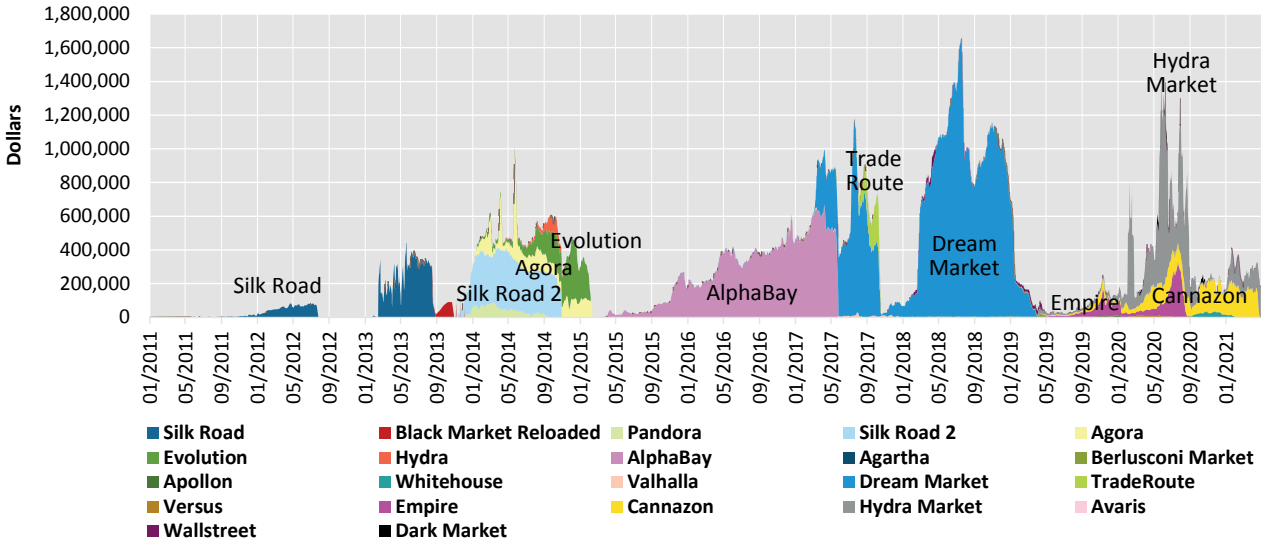
After the closure of Dream Market, daily drug sales on the major darknet markets under analysis fell sharply, before starting to rise again after April 2019. Over the first few months of 2020, during the first wave of movement restrictions related to the COVID-19 pandemic, daily sales over the darknet increased further, which has been

243 UNODC estimates, based on: Gregory Midgette and others, *What America's Users Spend on Illegal Drugs, 2006–2016* (Santa Monica, California, RAND Corporation, 2019); EMCDDA and Europol, EU Drug Markets Report 2019; and UNODC calculations, based on original data from Hikari Labs.

244 For more details, see UNODC, *World Drug Report 2020*, booklet 4, chapter "Drug trafficking over the darknet" (United Nations publication, 2020).

245 Olivia von Westernhagen, "Seltsame Vorgänge bei Dream Market: Darknet-Marktplatz kündigt Schließung an", Heise online, 29 March 2019.

FIG. 46 Daily drug sales (minimum) on major darknet markets, 2011–April 2021



Source: UNODC analysis and estimates, based on data from Hikari Labs.

Note: Data refer to minimum stacked market sales and are presented as seven-day averages. "Hydra" refers to a darknet market that was taken down in 2014; not to be confused with Hydra Market, which targets Russian-speaking customers and which remained active in 2020. All data shown reflect minimum sales as the current web-crawler techniques do not cover all sites on a specific market and customers may purchase not just one but various units of a drug offered for sale over the darknet and this information may not necessarily be contained in the feedback received that is subsequently used for the analysis.

linked to growing sales on Empire and Cannazon (mainly of cannabis) and rapidly growing sales on Hydra Market, which emerged in 2020 as the world's largest darknet market, mainly supplying Russian-speaking customers. After a peak in July 2020, sales on Empire fell and sales on most other markets also fell, notably after the closure of Empire, in August 2020. Sales on Hydra Market also appear to have declined in the second half of 2020. Sales on Cannazon, by contrast, showed an increase in the fourth quarter of 2020, when the platform emerged as the world's largest darknet market.[246]

The apparent decline in darknet sales in the last quarter of 2020, shown for the largest darknet markets identified during the period 2011–2020, may not necessarily point to a significant decline in darknet activities during the last quarter of 2020; it is possible that significant darknet market activities shifted to other, less well-known, markets later in 2020. In June 2020, drugs were already available for sale on a number of other darknet markets, including Deep Sea Market, Majestic Garden, Monopoly Market, DarkOde Reborn, Dark Fox Market, Big Blue Market, Asean Market, Daeva Market and Vice City Market, in addition to a number of identified "scam markets" and "fraud resources", as well as country- or territory-specific markets, such as the Tor Market (New Zealand) or the Grateful Chemicals market (Hong Kong, China).[247]

Large variations in size of individual darknet markets

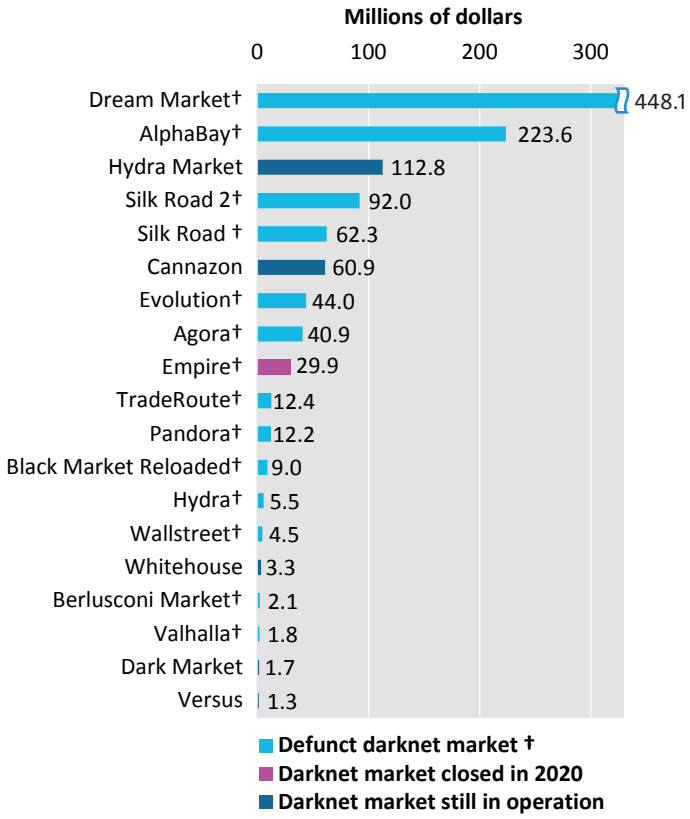
Sales data suggest that Dream Market, which was in operation from 2013 to early 2019, was the largest platform during the lifespan of the 19 major darknet marketplaces analysed, ahead of AlphaBay and clearly larger than other well-known early platforms, such as Silk Road (also known later as Silk Road 1), Silk Road 2 or Evolution.

The main active darknet market throughout 2020 was Hydra Market, followed by Cannazon (specialized in cannabis) and, at far lower levels, Whitehouse, Dark Market and Versus. The latter markets are much smaller than Dream Market and AlphaBay. This also applies to Empire, the

246 UNODC analysis, based on original data from Hikari Labs.

247 DarknetStats, Markets List. Available at www.darknetstats.com/markets-list/.

FIG. 47 Minimum sales on 19 major darknet markets during their lifespans, 2011–April 2021



Source: UNODC analysis and estimates, based on data from Hikari Labs.

Note: "Hydra" refers to a darknet market that was taken down in 2014; not to be confused with Hydra Market, which targets Russian-speaking customers and which remained active in 2020. All data shown reflect a lower bound estimate of sales as the current web-crawler techniques do not cover all sites on a specific market and customers may purchase not just one but various units of a drug offered for sale over the darknet and this information may not necessarily be contained in the feedback received that is subsequently used for the analysis.

Alternatives to darknet markets

In parallel with the closure of key darknet markets, there has been a rise in single-vendor shops on the dark web. Well-established vendors on darknet markets with high levels of trust and a good reputation have set up their own hidden service platforms and continued to do business with the clientele who previously frequented those key darknet markets. There has also been a general trend towards more fragmented darknet markets operating through the onion router.[a]

In addition, the development of encrypted communications applications that bypass traditional darknet markets may have contributed to enhancing single-vendor trade on the dark web by enabling closed communication with users.[a] For example, Europol reported a large operation conducted by France and the Netherlands, in cooperation with other European countries and Europol, against a "cryptophone" company, EncroChat,[b] which sold encrypted communications services and devices used by criminal networks involved in drug trafficking and other forms of organized crime.[c]

a Europol, European Cybercrime Centre, *Internet Organised Crime Threat Assessment (IOCTA) 2019* (The Hague, 2019).

b Europol and Eurojust, "Dismantling of an encrypted network send shockwaves through organized crime groups across Europe", press release, 2 July 2020.

c Judith Aldridge and others, *Drugs in the Time of COVID: The UK Drug Market Response to Lockdown Restrictions* (London, Release, 2021).

largest darknet market serving the non-Russian-speaking world, selling more than one drug, in 2020, before it ceased operations in August of that year.[248]

Cannabis dominates drug transactions on the dark web and has been gaining in importance

Cannabis accounts for the largest share of drug transactions made on the 19 major darknet markets analysed over the period 2011–2020 and its share has been increasing. After cannabis, the substances accounting for the largest shares are synthetic stimulants (mostly amphetamine, dexamphetamine, Ritalin (methylphenidate), Adderall (i.e., tablets containing amphetamine), Modafinil (a substitute for amphetamine), methamphetamine and various cathinones, such as mephedrone, MDPV, methylone or α-PVP), "ecstasy" and cocaine.

Opioids sold on the dark web include oxycodone, hydromorphone, hydrocodone, codeine, buprenorphine, methadone, tramadol, tapentadol, fentanyl and heroin.[249]

248 UNODC analysis, based on original data from Hikari Labs.

249 Ibid.

Most drugs sold over the dark web are shipped from Europe and North America

Analysis of the "country of shipment" (country from which the drugs offered for sale are shipped), which was known in 95 per cent of the drug transactions that took place on the 19 major darknet markets analysed over the period 2011–2020, suggests that the most frequently mentioned "country of shipment" was the United States (29 per cent of all drug transactions), followed by the United Kingdom (21 per cent), Germany (13 per cent), the Netherlands (9 per cent), Australia (7 per cent) and Canada (5 per cent).[250] As discussed below, many transactions on the dark web take place within the same region.

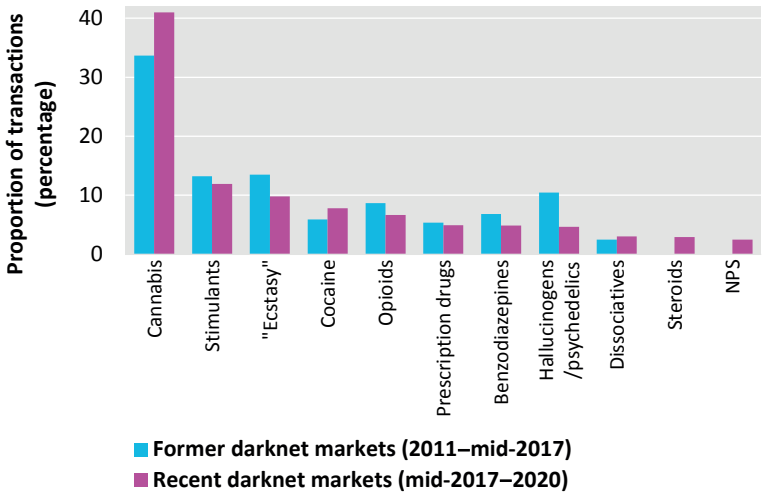
A lack of information on the countries of shipment exists with regard to Hydra Market, which serves Russian-speaking customers, as vendors on this platform seem to be unwilling to reveal the country in which they are operating and from which they are shipping their commodities.

Although it cannot be guaranteed that the countries of shipment are accurately advertised, it is not generally in the vendors' interest to state it inaccurately as they risk receiving negative feedback from customers regarding deliveries taking a long time to arrive when the vendor was advertised to be located in the same country or in the immediate neighbourhood. This does not exclude, however, the possibility that vendors from countries facing stiff controls from abroad pretend to be from a neighbouring country, although this forces them to first smuggle parcels to the neighbouring country, thus creating an additional layer of complexity that makes them more vulnerable to detection.

More than half (57 per cent) of the drug transactions made over the dark web during the period 2011–2020 (for which the shipment location was recorded) mentioned Europe as the region of shipment, most notably the United Kingdom, followed by Germany and the Netherlands. This is likely an underrepresentation of the share of Europe as a region of shipment as data do not include transactions made on Hydra Market. Indeed, the overwhelming number of customers on Hydra Market communicate in Russian, likely indicating that the countries of shipment are countries where Russian is spoken. In terms of specific countries of shipment in Europe, data show that almost all European countries were recorded as departure points

250 Ibid.

FIG. 48 Distribution of drug transactions on 19 major darknet markets, by drug, 2011–mid-2017 and mid-2017–2020



Source: UNODC analysis and estimates, based on data from Hikari Labs.

Note: Stimulants refer to synthetic stimulants such as amphetamines and cathinones. Data were readjusted to take account of cocaine and "ecstasy" transactions categorized as transactions of stimulants in some markets. The markets analysed from 2011 to mid-2017 were (listed by dates of operation, from oldest to most recent): Silk Road, Silk Road 2, Pandora, Hydra, Black Market Reloaded, Agora, Evolution and AlphaBay. The markets analysed from mid-2017 to 2020 were (listed by dates of operation, from oldest to most recent): Berlusconi Market, TradeRoute, Valhalla, Wallstreet, Dream Market, Cannazon, Empire, Dark Market, Hydra Market, Versus and Whitehouse.

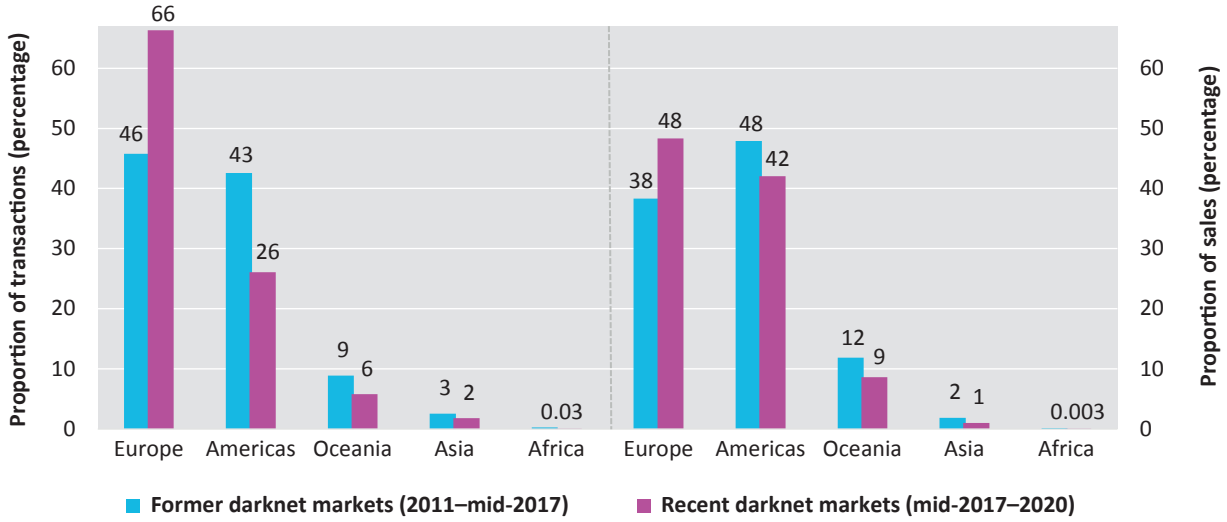
for shipments of drugs purchased from the major darknet markets analysed during that period.[251]

About one third (34 per cent) of all shipments resulting from drug transactions on the 19 major darknet markets analysed over the period 2011–2020 departed from the Americas, principally the United States, followed by Canada, Brazil, Argentina, Mexico and Colombia. The bulk of drug-related shipments in Oceania were from Australia. In Asia, the most frequently mentioned countries or territories of shipment of drugs sold on the 19 major darknet markets analysed were China and India, followed by Hong Kong, China, Singapore, Afghanistan and Thailand. In Africa, most drug shipments appear to have departed from South Africa, followed by Morocco and Kenya.[252]

It seems that the share of both transactions and sales of drugs departing from Europe has increased over time. In the early years of the dark web (2011 to mid-2017), the main departure countries for sales made on darknets were

251 Ibid.
252 Ibid.

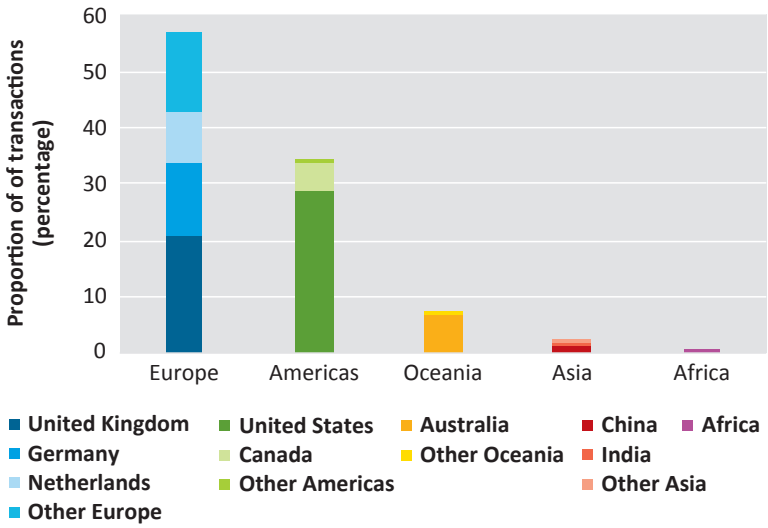
FIG. 49 Regional distribution of departure countries of shipments in drug transactions and minimum sales made on 19 major darknet markets, 2011 to mid-2017 and mid-2017 to 2020



Source: UNODC analysis and estimates, based on data from Hikari Labs.

Note: Former darknet markets: based on analysis of 134,000 transactions and minimum sales of $381 million generated between 2011 and mid-2017 on the following darknet markets (listed by dates of operation, from oldest to most recent): Silk Road, Silk Road 2, Pandora, Hydra, Black Market Reloaded, Agora, Evolution and AlphaBay. Recent darknet markets: based on analysis of 160,000 transactions and (minimum) sales of $494 million generated between mid-2017 and 2020 on the following darknet markets (listed by dates of operation, from oldest to most recent): Berlusconi Market, TradeRoute, Valhalla, Wallstreet, Dream Market, Cannazon, Empire, Dark Market, Hydra Market, Versus and Whitehouse.

FIG. 50 Departure location of shipments mentioned in drug transactions on 19 major darknet markets, 2011–2020



Source: UNODC analysis and estimates, based on data from Hikari Labs.

Note: Based on analysis of 294,000 drug transactions on 19 major darknet markets (Hydra Market, Whitehouse, Dark Market, Versus, Cannazon, Empire, Berlusconi Market, Wallstreet, Black Market Reloaded, Dream Market, Valhalla, TradeRoute, AlphaBay, Evolution, Agora, Silk Road 2, Pandora, Hydra and Silk Road).

located in the Americas, while more recently (mid-2017 to 2020), transactions and sales made on darknets in Europe have dominated.

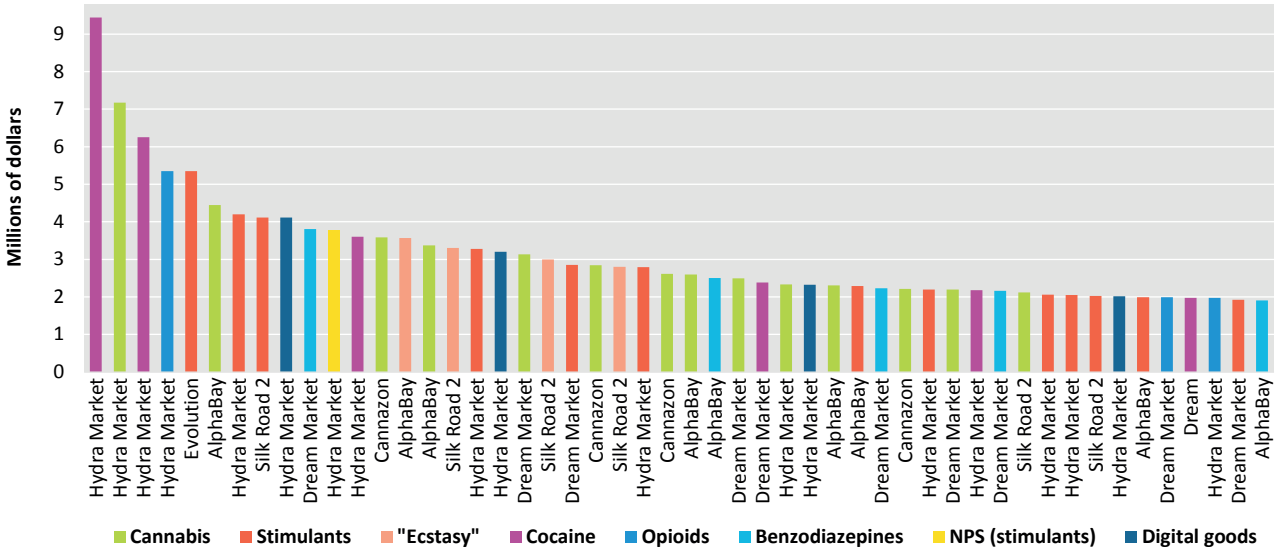
In contrast to information on the countries of shipment, no comparable information on the dark web is available regarding the "destination countries (countries of the purchasers). In quite a large number of cases, vendors have imposed restrictions that limit the sale of drugs to purchasers within the same country, or within the same region.[253] This would suggest that sales over the dark web are mostly the result of intraregional trafficking (and, in large countries, the result of domestic trafficking), and that interregional trafficking would be more the exception than the rule.

Leading darknet vendors each sold drugs worth several million dollars

Drug vendors on the darknet tend to offer a variety of drugs. Among the "top" 50 vendors, reporting the largest sales on the 19 major darknet markets analysed, vendors

253 Ibid.

FIG. 51 Total minimum sales by the "top" 50 vendors (in terms of sales) operating on 19 major darknet markets, 2011–2020



Source: Source: UNODC analysis and estimates, based on data from Hikari Labs.

Notes: Stimulants refer to synthetic stimulants, such as amphetamines and cathinones. Based on the analysis of 19 major darknet markets (Hydra Market, Whitehouse, Dark Market, Versus, Cannazon, Empire, Berlusconi Market, Wallstreet, Black Market Reloaded, Dream Market, Valhalla, TradeRoute, AlphaBay, Evolution, Agora, Silk Road 2, Pandora, Hydra and Silk Road). Each bar represents the total sales of a vendor on the specified darknet market and the colour represents the main substance sold by that vendor. "Top 50 vendors" refers to the leading 50 vendors in terms of sales volume. All data shown reflect a lower bound estimate of sales as the current web-crawler techniques do not cover all sites on a specific market and customers may purchase not just one but various units of a drug offered for sale over the darknet and this information may not necessarily be contained in the feedback received that is subsequently used for the analysis.

of benzodiazepines, cannabis and "ecstasy" tended to be specialized in the sale of just one or two drugs, while vendors of cocaine, stimulants, opioids and NPS tended to offer a broader range of drugs for sale.[254]

A number of vendors each sold drugs worth several million dollars while active on the 19 major darknet markets analysed over the period 2011–2020. Of the total drug sales by the 50 vendors who accounted for the largest sales volumes on those markets over this period, 28 per cent of such sales concerned vendors who primarily sold cannabis, 24 per cent who primarily sold "stimulants" (mainly amphetamine, cathinones, methamphetamine and, in a number of cases, MDMA), 17 per cent who primarily sold cocaine, 8 per cent who primarily sold benzodiazepines, 8 per cent who primarily sold "ecstasy" and 6 per cent who primarily sold opioids.[255]

While per capita sales of the "top" 20 vendors on the major darknet markets operating during the period mid-2017 to 2020 ($4 million)[256] were some 40 per cent higher than those of the "top" 20 vendors on the major darknet markets operating during the period 2011 to mid-2020 ($2.8 million), their proportion of the total sales on these markets remained relatively modest (0.6 per cent in both periods), suggesting no change in the market concentration in recent years.

In 2020, after Hydra Market (up to $9.4 million, mainly cocaine), the vendors with the largest sales volumes on the major darknet markets operating in 2020 were found on Cannazon (up to $3.6 million, mainly cannabis), Empire (up to $563,000 mainly cannabis), Whitehouse (up to $378,000, mainly cocaine), Versus (up to $134,000, mainly cannabis) and Dark Market (up to $90,000, mainly stimulants).[257]

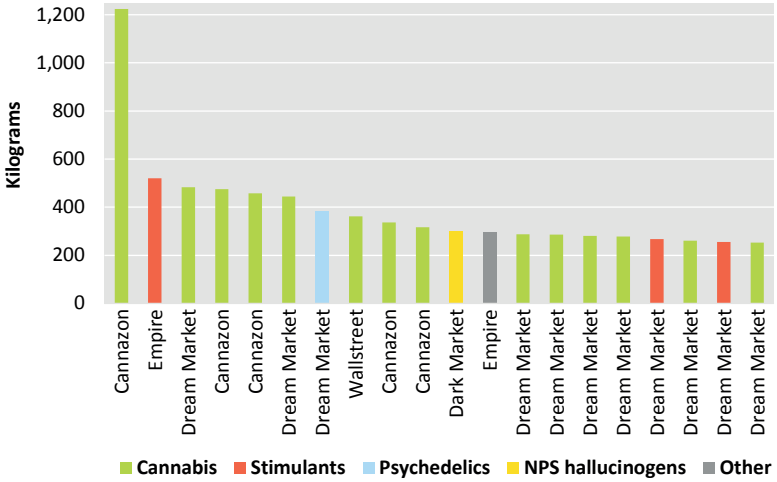
254 Ibid.

255 Hikari Labs data show the overall sales figures of a vendor as well as the main category sold. The proportions mentioned here are only minimum estimates as sellers typically sell more than one drug.

256 From older to newer: TradeRoute, Valhalla, Dream Market, Wallstreet, Berlusconi Market, Empire, Versus, Dark Market, Hydra Market, Cannazon and Whitehouse.

257 UNODC analysis, based on original data from Hikari Labs (as at 30 April 2021).

FIG. 52 Minimum quantities of substances sold by the "top" 20 vendors operating on 11 major darknet markets, from mid-2017 to April 2021



Source: UNODC analysis and estimates, based on data from Hikari Labs.

Notes: Based on analysis of 11 major darknet markets (Hydra Market, Whitehouse, Dark Market, Versus, Cannazon, Empire, Berlusconi Market, Wallstreet, Dream Market, Valhalla and TradeRoute). Although 11 darknet markets were included in this analysis, only vendors on 5 markets made it into the "top" 20 vendors in terms of quantities of drugs sold. Each bar represents the total sales made by a vendor in terms of quantity on the specified darknet market and the colour represents the substance sold by the vendor. Here, stimulants include all drugs with a stimulant effect, including amphetamines, cathinones, "ecstasy" and cocaine. All data shown reflect a lower bound estimate of sales as the current web-crawler techniques do not cover all sites on a specific market and customers may purchase not just one but various units of a drug offered for sale over the darknet and this information may not necessarily be contained in the feedback received that is subsequently used for the analysis.

In contrast to the size of the quantities of drugs trafficked by non-digital means, which can reach several tons, the largest quantities of drugs trafficked over the dark web amounted to 1.2 tons of cannabis and steroids by a seller from the United Kingdom operating on Cannazon between March 2019 and April 2021, while the largest quantities trafficked by other sellers amounted to 200–500 kg per vendor, most of whom were selling cannabis, as reflected in the transactions of the "top" vendors from mid-2017 to April 2021.[258] However, the possibility cannot be excluded that some people or organizations have multiple avatars on the dark web.

Major darknet markets in 2020 and early 2021

Set up in 2015, Hydra Market was the largest darknet market in terms of sales in 2020, accounting with $91 million for 59 per cent of the total (minimum) sales on the nine major darknet markets analysed in 2020. Mainly targeting Russian-speaking customers, it accounted for 2 per cent of all drug-related transactions and 7 per cent of total drug-related sales on the 19 major darknet markets analysed over the period 2011–2020.

The proportion of drugs in all sales made on Hydra Market has been rising steadily since 2017, when drugs accounted for 15 per cent of all types of sales made on the platform; in 2020, they accounted for 81 per cent. The percentage of Hydra Market in terms of sales made on the major darknet markets analysed has also been increasing, from less than 1 per cent of the total in 2018 to 12 per cent in 2019 and 59 per cent in 2020.[259]

The drugs most widely trafficked on Hydra Market in 2020 were stimulants (ATS such as amphetamine, MDMA and methamphetamine; and cathinones, notably mephedrone and α-PVP), which accounted for about 30 per cent of all sales that year, followed by cannabis and cocaine (22 per cent each) and opioids (5 per cent). This contrasts with initial sales patterns on Hydra Market, which used to be largely dominated by opioids (79 per cent of all sales in 2016), followed by hallucinogens (18 per cent). Sales on Hydra Market, although lower than the peaks reported in the past on Dream Market, exceeded the levels reported for transactions made on Empire.[260]

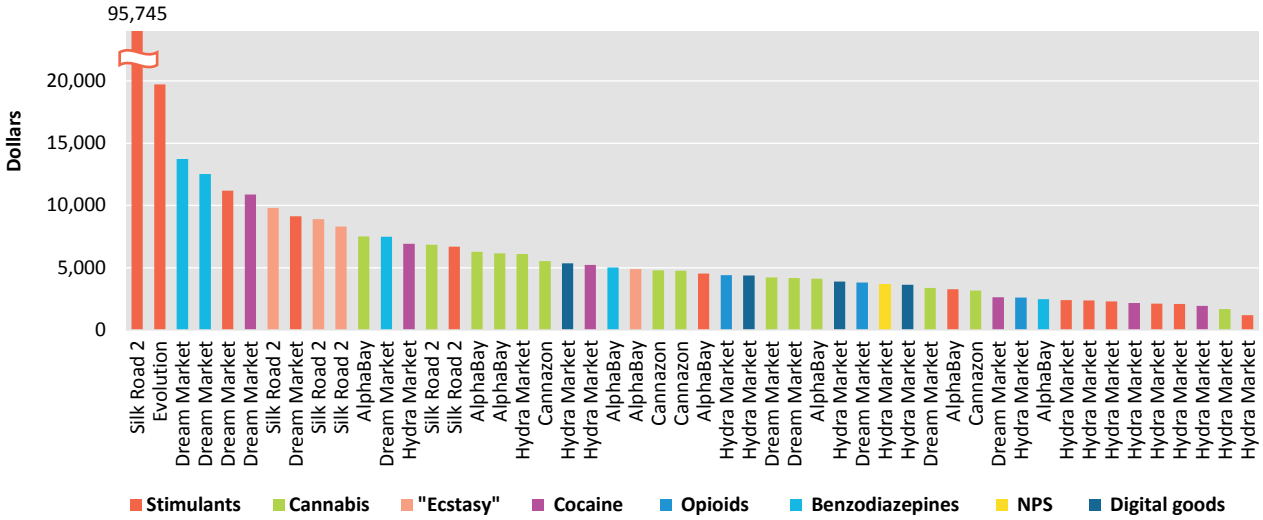
The second largest darknet market in 2020 was Cannazon, a market mainly specializing in the sale of just one substance, cannabis. Cannazon is the largest cannabis market on the dark web, accounting for 58 per cent of cannabis sales on the nine major darknet markets analysed in 2020.[261]

The next largest darknet market in 2020, Empire, showed a marked increase in sales in the second half of 2019 and in the first half of 2020 before its demise in August of that year. The bestselling drugs on Empire in 2020 were cannabis, which accounted for more than 30 per cent of total sales over the period January–August 2020, followed by synthetic stimulants (mostly amphetamines), at 18 per cent of the total, and cocaine, at about 15 per cent of the total.[262]

258 Ibid.

259 Ibid.
260 Ibid.
261 Ibid.
262 Ibid.

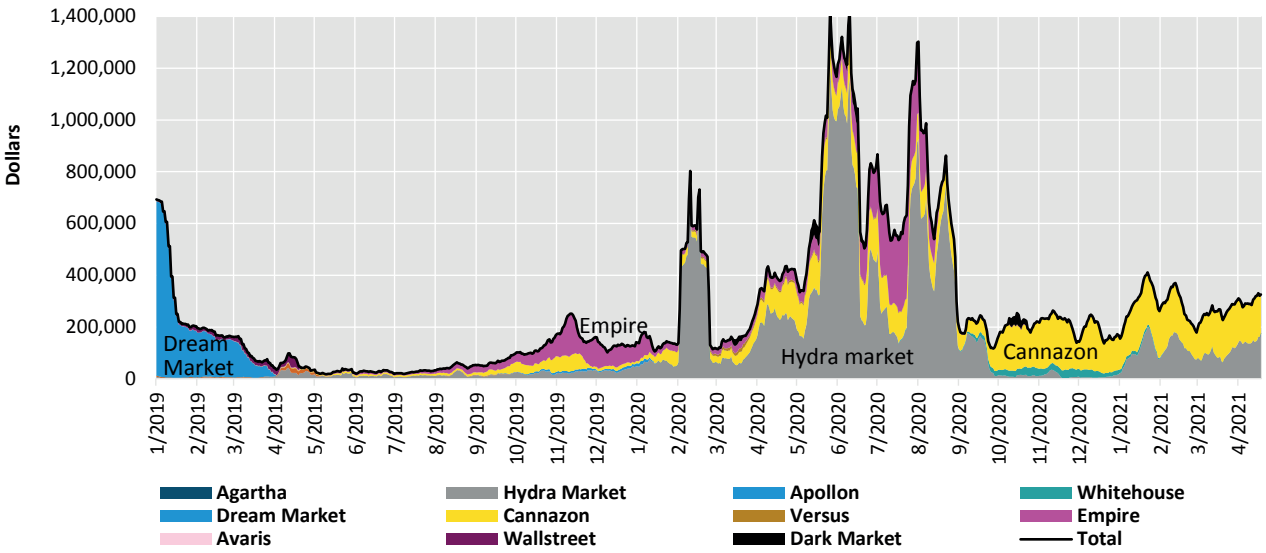
FIG. 53 Minimum daily drug sales by the "top" 50 vendors on 19 major darknet markets, 2011–2020



Source: Source: UNODC analysis and estimates, based on data from Hikari Labs.

Notes: Based on analysis of 19 major darknet markets (Hydra Market, Whitehouse, Dark Market, Versus, Cannazon, Empire, Berlusconi Market, Wallstreet, Black Market Reloaded, Dream Market, Valhalla, TradeRoute, AlphaBay, Evolution, Agora, Silk Road 2, Pandora, Hydra and Silk Road). Each bar represents the aggregated daily sales of a vendor on the specified darknet market and the colour represents the substance sold by that vendor. "Top 50 vendors" refers to the "top" 50 vendors in terms of sales volume. Here, stimulants include all drugs with a stimulant effect, including amphetamines, cathinones, "ecstasy" and cocaine, unless cocaine and "ecstasy" have been reported separately for a specific darknet market. All data shown reflect a lower bound estimate of sales as the current web-crawler techniques do not cover all sites on a specific market and customers may purchase not just one but various units of a drug offered for sale over the dark web and this information may not necessarily be contained in the feedback received that is subsequently used for the analysis.

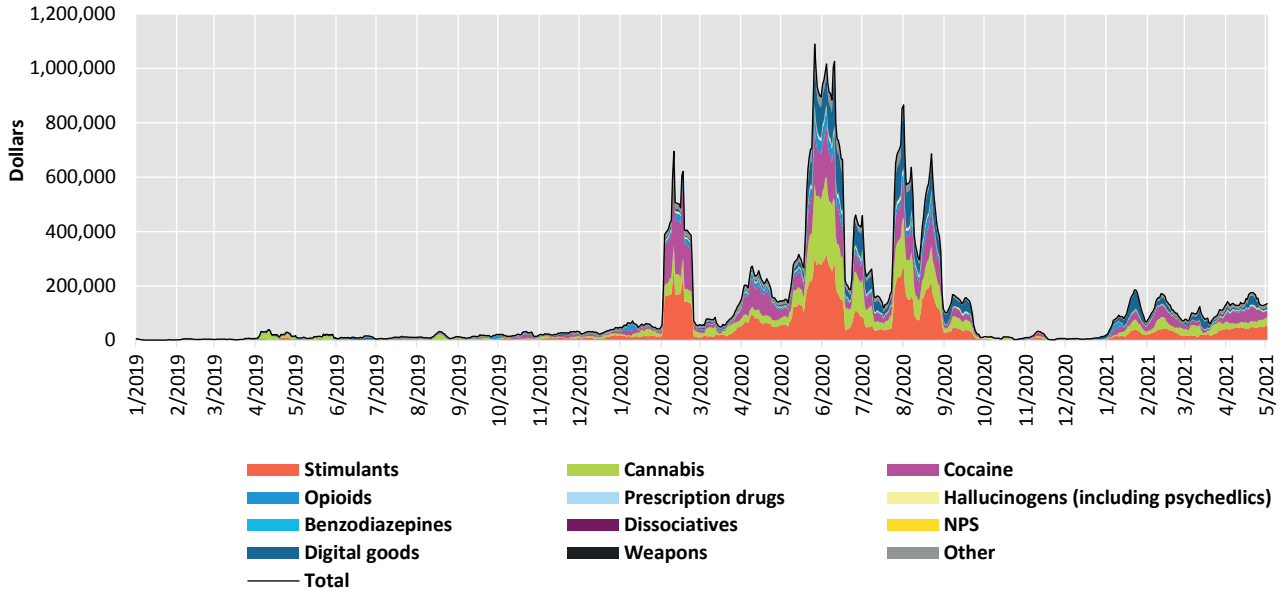
FIG. 54 Minimum daily sales on 11 major global darknet markets, January 2019–April 2021



Source: UNODC analysis and estimates, based on data from Hikari Labs.

Note: Data refer to minimum stacked market sales. Data are presented as seven-day averages. All data shown reflect a lower bound estimate of sales as the current web-crawler techniques do not cover all sites on a specific market and customers may purchase not just one but various units of a drug offered for sale over the dark web and this information may not necessarily be contained in the feedback received that is subsequently used for the analysis.

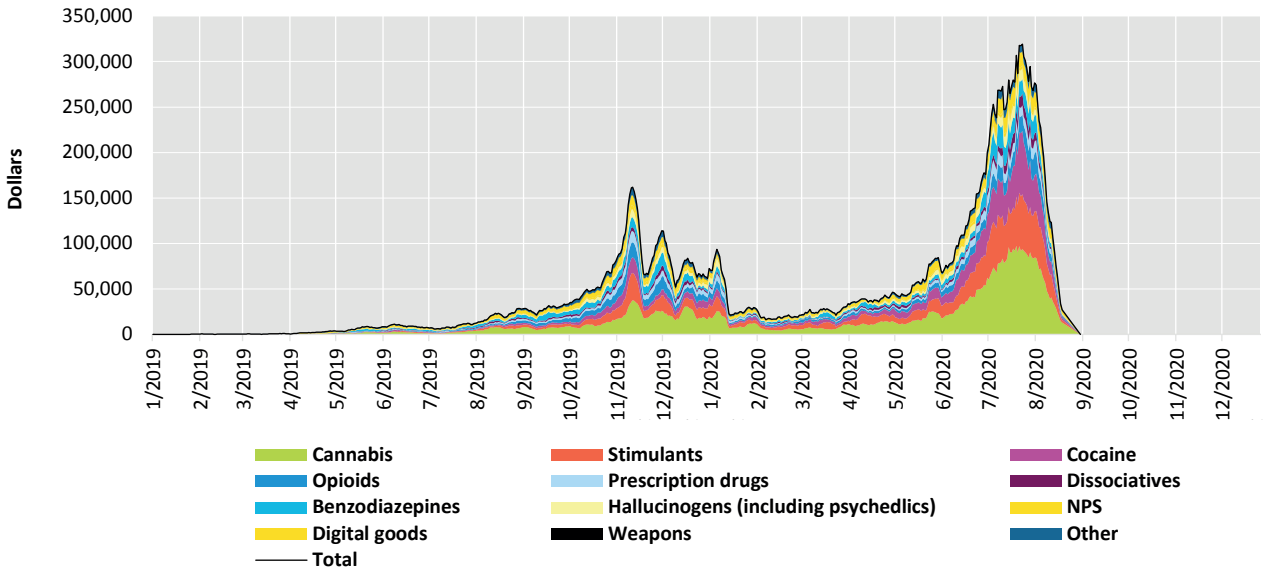
FIG. 55 Minimum daily sales on Hydra Market, January 2019–April 2021



Source: Source: UNODC analysis and estimates, based on data from Hikari Labs.

Notes: Data refer to minimum stacked market sales. Data are presented as seven-day averages. All data shown reflect a lower bound estimate of sales as the current web-crawler techniques do not cover all sites on a specific market and customers may purchase not just one but various units of a drug offered for sale over the dark web and this information may not necessarily be contained in the feedback received that is subsequently used for the analysis.

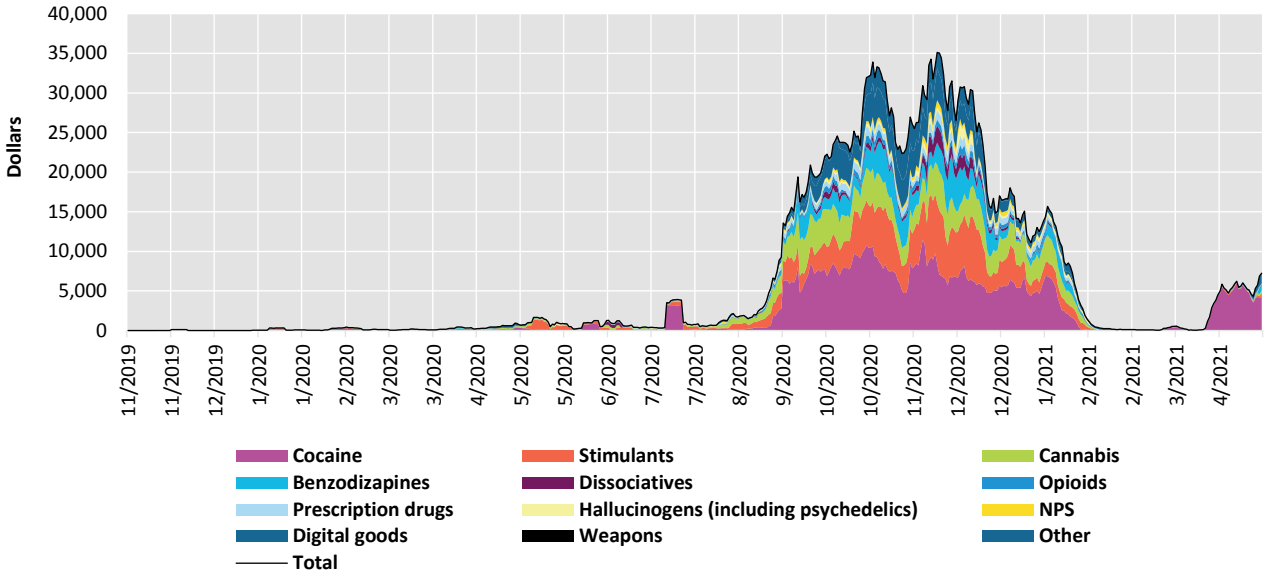
FIG. 56 Minimum daily sales on Empire, 2019–2020



Source: Source: UNODC analysis and estimates, based on data from Hikari Labs.

Note: Data refer to minimum stacked market sales. Data are presented as seven-day averages. All data shown reflect a lower bound estimate of sales as the current web-crawler techniques do not cover all sites on a specific market and customers may purchase not just one but various units of a drug offered for sale over the dark web and this information may not necessarily be contained in the feedback received that is subsequently used for the analysis.

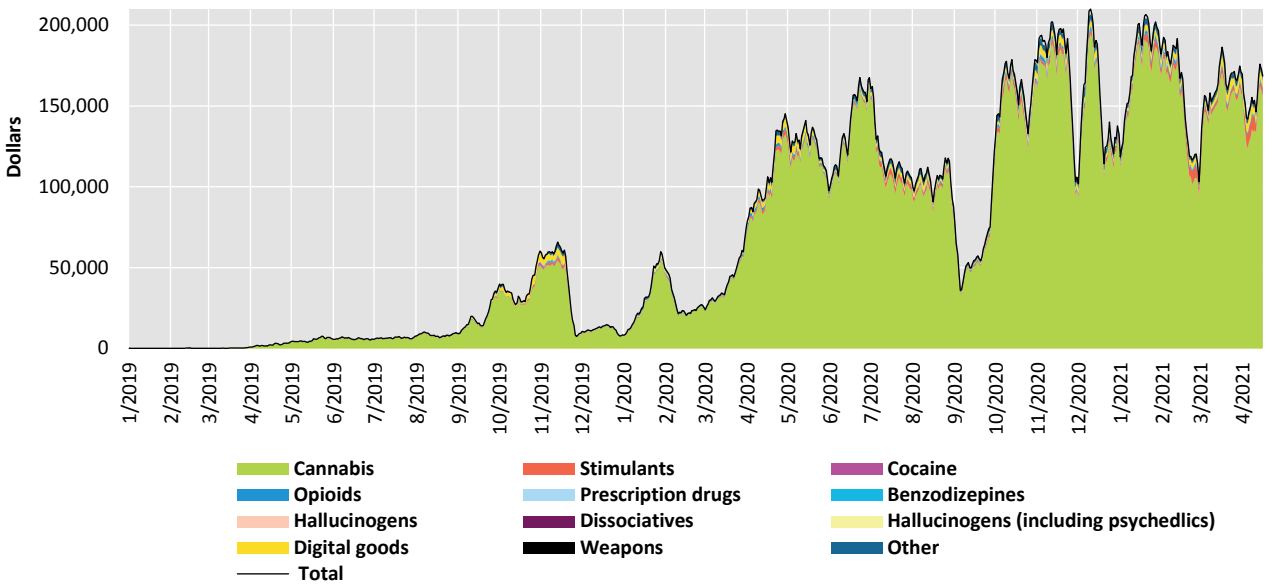
FIG. 57 Minimum daily sales on Whitehouse, November 2019–April 2021



Source: UNODC analysis and estimates, based on data from Hikari Labs.

Notes: Data refer to minimum stacked market sales. Data are presented as seven-day averages. All data shown reflect a lower bound estimate of sales as the current web-crawler techniques do not cover all sites on a specific market and customers may purchase not just one but various units of a drug offered for sale over the dark web and this information may not necessarily be contained in the feedback received that is subsequently used for the analysis.

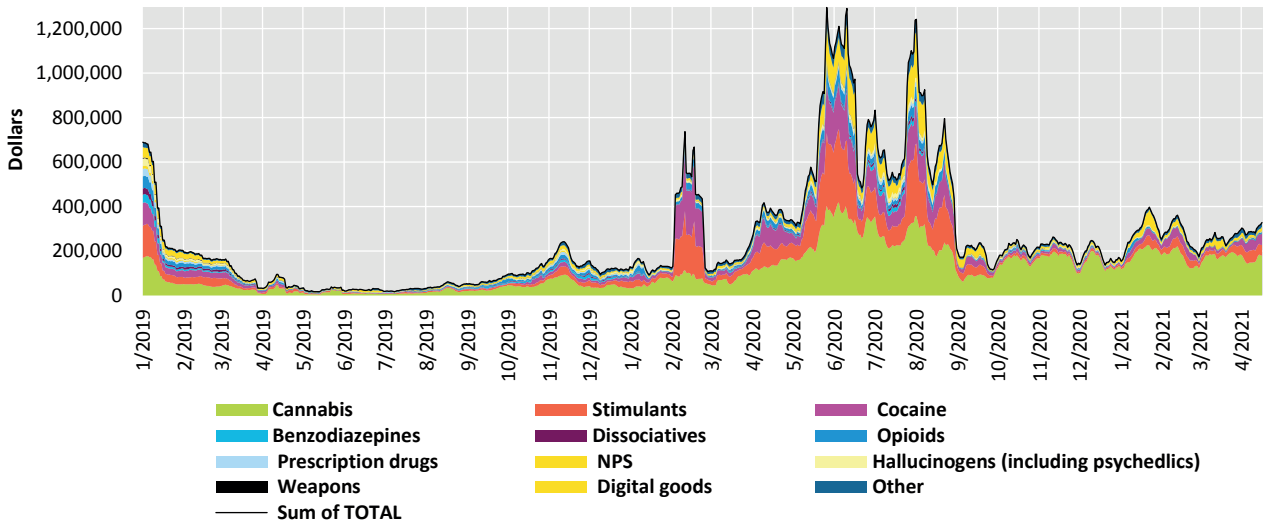
FIG. 58 Minimum daily sales on Cannazon, January 2019–April 2021



Source: UNODC analysis and estimates, based on data from Hikari Labs.

Notes: Data refer to minimum stacked market sales. Data are presented as seven-day averages. All data shown reflect a lower bound estimate of sales as the current web-crawler techniques do not cover all sites on a specific market and customers may purchase not just one but various units of a drug offered for sale over the dark web and this information may not necessarily be contained in the feedback received that is subsequently used for the analysis.

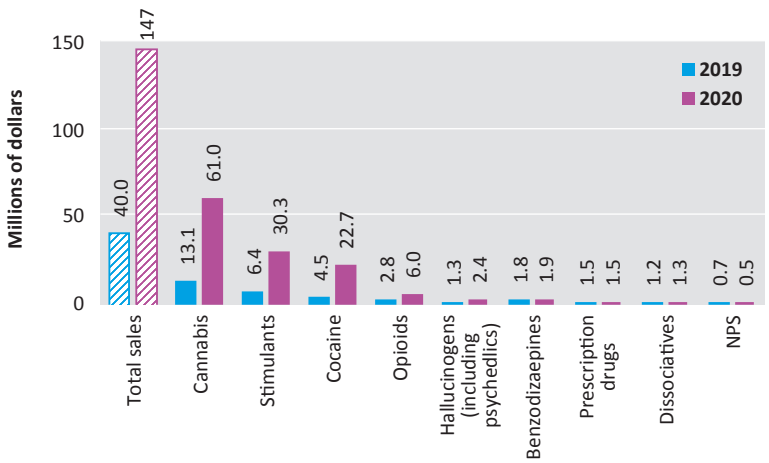
FIG. 59 Minimum daily sales on nine major global darknet markets, January 2019–April 2021



Source: UNODC analysis and estimates, based on data from Hikari Labs.

Note: Aggregate minimum sales on nine major darknet markets operating, at least partially, between January 2019 and the first quarter of 2021, ranked in terms of minimum sales over this period: Hydra Market, Cannazon, Empire, Dream Market, Whitehouse, Wallstreet, Dark Market, Versus and Berlusconi Market. The marked decline of darknet sales after August 2020 reflects the demise of Empire. Stimulants refers to synthetic stimulants, including ATS and cathinones. All data shown reflect a lower bound estimate of sales as the current web-crawler techniques do not cover all sites on a specific market and customers may purchase not just one but various units of a drug offered for sale over the dark web and this information may not necessarily be contained in the feedback received that is subsequently used for the analysis.

FIG. 60 Minimum drug sales on nine major global darknet markets, by drug type, 2019 and 2020



Source: UNODC analysis and estimates, based on data from Hikari Labs.

Note: Aggregate minimum sales on nine major darknet markets operating, at least partially, between January 2019 and the first quarter of 2021, ranked in terms of minimum sales over this period: Hydra Market, Cannazon, Empire, Dream Market, Whitehouse, Wallstreet, Dark Market, Versus and Berlusconi Market. Stimulants refers to synthetic stimulants, including ATS and cathinones. All data shown reflect a lower bound estimate of sales as the current web-crawler techniques do not cover all sites on a specific market and customers may purchase not just one but various units of a drug offered for sale over the dark web and this information may not necessarily be contained in the feedback received that is subsequently used for the analysis.

Whitehouse was established around February 2019 and is one of the few darknet marketplaces that accepts the virtual currency monero, rather than bitcoin, as its only form of payment. Whitehouse showed marked increases in its activities after July 2020, when it may have benefited from the demise of Empire in the previous month. A number of vendors shifted their operations to Whitehouse[263] and sales peaked towards the end of October and November 2020. Drugs accounted for more than 80 per cent of total sales on Whitehouse in 2020, cocaine making up the largest share (30 per cent of total sales), followed by stimulants (20 per cent), cannabis (14 per cent) and benzodiazepines (9 per cent).[264] Preliminary data for the first four months of 2021 signal that the relative importance of cocaine further increased while sales of other drugs on Whitehouse appear to have declined.[265]

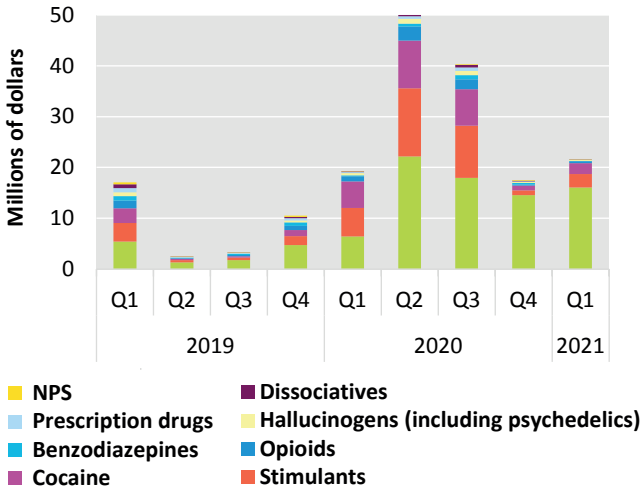
Sales of drugs on the dark web continued to fluctuate in 2020. Aggregated minimum drug sales made on the nine major darknet markets that were at least partially

263 DarknetStats, "White House Market", 12 December 2020. Available at www.darknetstats.com.

264 UNODC analysis, based on original data from Hikari Labs.

265 Ibid.

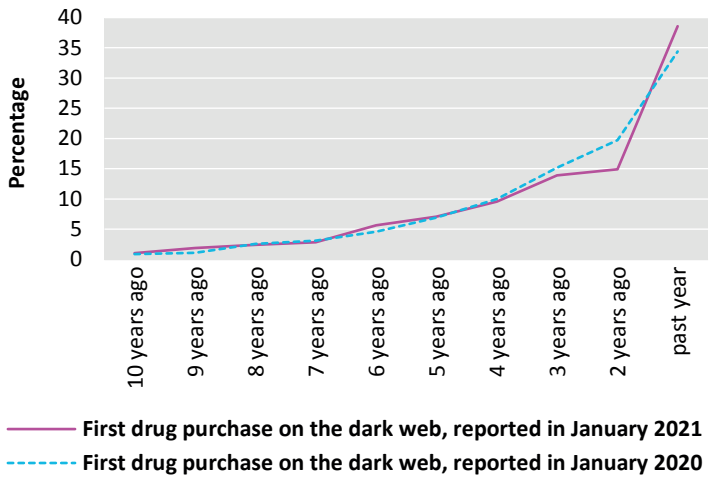
FIG. 61 Minimum quarterly drug sales on nine major global darknet markets, 2019 and first quarter of 2021



Source: UNODC analysis and estimates, based on data from Hikari Labs.

Note: Aggregate minimum sales on nine major darknet markets operating, at least partially, between 2019 and the first quarter of 2021, ranked in terms of minimum sales over this period: Hydra Market, Cannazon, Empire, Dream Market, Whitehouse Wallstreet, Dark Market, Versus and Berlusconi Market. The marked decline of darknet sales after August 2020 reflects the demise of Empire. Stimulants refers to synthetic stimulants, including amphetamines and cathinones. All data shown reflect a lower bound estimate of sales as the current web-crawler techniques do not cover all sites on a specific market and customers may purchase not just one but various units of a drug offered for sale over the dark web and this information may not necessarily be contained in the feedback received that is subsequently used for the analysis.

FIG. 62 First year of drug purchase on the dark web among surveyed Internet users who purchased drugs on the dark web, January 2020 and January 2021



Source: Global Drug Survey 2021 data: detailed findings on drug cryptomarkets.

active over the period January 2019 to April 2021[266] showed some fluctuations after a steep decline following the demise of Dream Market in early 2019, before reaching a peak during the summer of 2020. Overall, the volume of drug sales on these nine darknet markets increased almost fourfold from 2019 to 2020, with a close to fivefold increase in sales of cannabis, stimulants and cocaine and a doubling reported in sales of opioids, while sales of prescription drugs, benzodiazepines and dissociatives (mainly ketamine) remained largely stable and those of NPS fell by almost a quarter in 2020.

Purchasing drugs on darknet markets seems to have become more popular among Internet users who use drugs

Global data on people who use drugs, based on a non-representative convenience sample of roughly 100,000 self-selected people from more than 50 countries (mostly developed countries) each year, suggest an upward trend in the proportion of Internet users who use drugs who purchase drugs on the dark web since 2014; the proportion more than tripled, from 4.7 per cent in January 2014 to 14.5 per cent in January 2021,[267] with increases reported across all regions.[268]

The analysis also continues to show that most people who purchase drugs over the dark web only started to do so recently: over one third in the past year, about half in the past two years and two thirds in the past three years. These basic patterns have not changed much over the years, although there was a larger proportion (38 per cent) in January 2021 than in January 2020 (34 per cent) of new users who had recently started to use the dark web for drug purchasing purposes,[269] suggesting that the dark web may have grown in popularity in 2020, the year of the onset of the COVID-19 pandemic and related movement restrictions, among people who use drugs as a new source of drug supply.

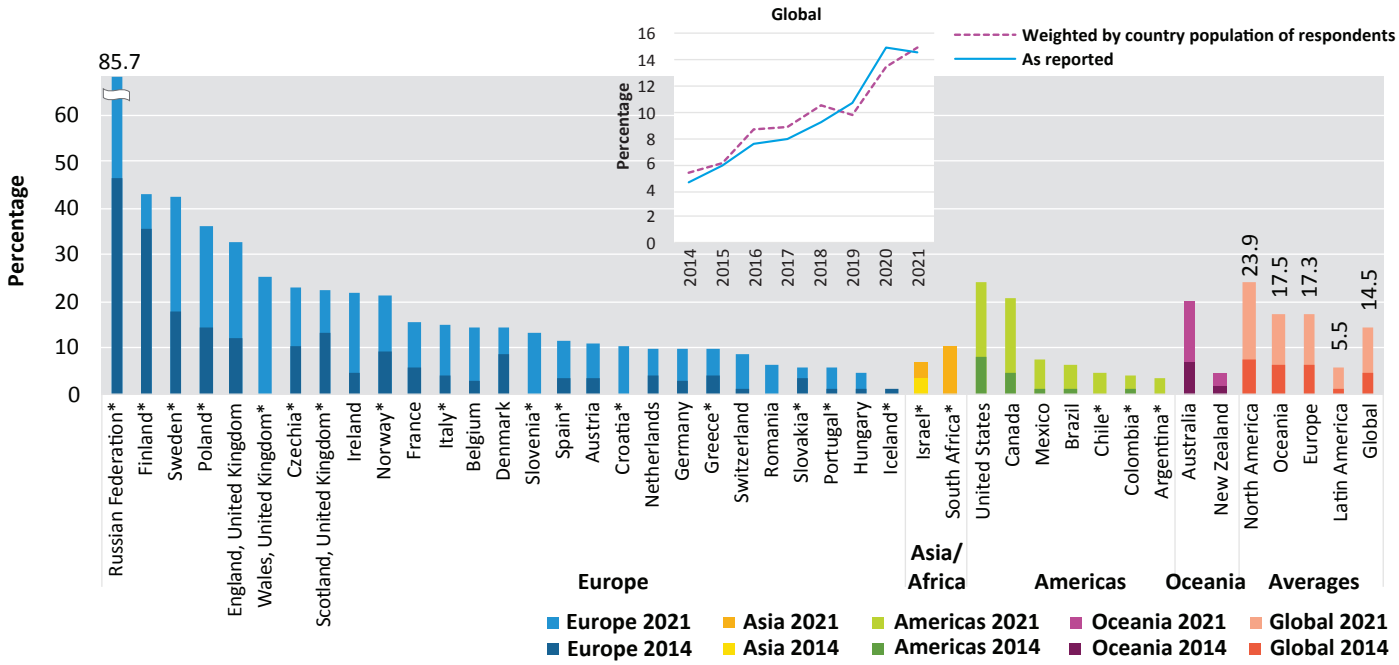
266 These nine major markets (ranked in terms of decreasing volume of (minimum) sales over this period) were: Hydra Market, Cannazon, Empire, Dream Market, Whitehouse, Wallstreet, Dark Market, Versus and Berlusconi Market.

267 *Global Drug Survey 2021* (forthcoming) and previous years.

268 UNODC calculations, based on *Global Drug Survey 2021* data (and previous years): detailed findings on drug cryptomarkets. Available at www.globaldrugsurvey.com.

269 Ibid.

FIG. 63 Proportion of people purchasing drugs over the dark web among surveyed Internet users who used drugs in the past year, global average and selected countries, January 2014 to January 2021 (or latest year available)

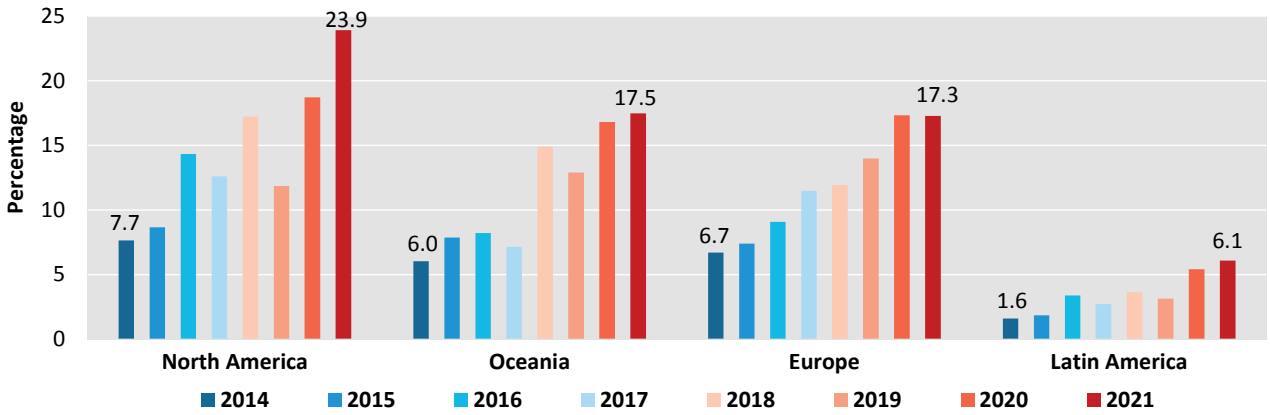


*Data for either January 2014 or January 2021 were not available; data from the most recent year available were taken as a proxy.

Source: UNODC calculations based on Global Drug Survey 2021 data (and previous years): detailed findings on drug cryptomarkets.

Note: The Global Drug Survey is based on a convenience sample of 100,000 to 500,000 people every year, of whom 20,000 to 90,000 replied to questions on drug purchases over the dark web (24,000 in January 2021). All regional averages are weighted by the population of each country. North America: averages based on information from respondents in Canada and the United States; Europe: averages based on information from respondents in 26 European countries (not included are data from the Russian Federation, which are only available for 2018 and 2020); Oceania: averages based on information from respondents in Australia and New Zealand; Latin America: averages based on information from respondents in Argentina, Brazil, Chile, Colombia and Mexico.

FIG. 64 Proportion of people purchasing drugs over the dark web among surveyed Internet users who used drugs in the past year, selected regions and subregions, 2014-2021



Source: UNODC calculations based on Global Drug Survey 2021 data and previous years: detailed findings on drug cryptomarkets.

Notes: The Global Drug Survey is based on a convenience sample of 100,000 to 500,000 people every year, of whom 20,000 to 90,000 replied to questions on drug purchases over the dark web. Values shown have been weighted by the population of reporting countries; North America: averages based on information from respondents in Canada and the United States; Europe: averages based on information from respondents in 23 European countries (not included are data from the Russian Federation, which are only available for 2018 and 2020); Oceania: averages based on information from respondents in Australia and New Zealand; Latin America: averages based on information from respondents in Argentina, Brazil, Chile Colombia and Mexico.

ANNEX

TABLE 1 Annual prevalence of the use of cannabis, opioids and opiates, by region and globally, 2019

Region or subregion	Cannabis						Opioids (opiates and prescription opioids)						Opiates					
	Number (thousands)			Prevalence (percentage)			Number (thousands)			Prevalence (percentage)			Number (thousands)			Prevalence (percentage)		
	Best estimate	Lower	Upper	Best estimate	Lower	Upper	Best estimate	Lower	Upper	Best estimate	Lower	Upper	Best estimate	Lower	Upper	Best estimate	Lower	Upper
Africa	**46,950**	**28,150**	**64,080**	**6.41**	**3.85**	**8.75**	**9,050**	**6,360**	**12,140**	**1.24**	**0.87**	**1.66**	**3,580**	**1,430**	**7,910**	**0.49**	**0.20**	**1.08**
East Africa	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
North Africa	7,850	6,900	9,170	5.26	4.63	6.15	1,580	1,060	2,100	1.06	0.71	1.41	1,580	1,060	2,100	1.06	0.71	1.41
Southern Africa	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
West and Central Africa	26,790	14,610	30,360	9.40	5.12	10.65	-	-	-	-	-	-	520	140	980	0.18	0.05	0.34
Americas	**59,130**	**57,510**	**62,220**	**8.77**	**8.53**	**9.23**	**12,580**	**11,310**	**13,730**	**1.86**	**1.68**	**2.04**	**2,550**	**1,850**	**3,270**	**0.38**	**0.27**	**0.49**
Caribbean	970	500	2,650	3.41	1.77	9.35	-	-	-	-	-	-	-	-	-	-	-	-
Central America	1,000	340	1,750	3.12	1.08	5.48	-	-	-	-	-	-	-	-	-	-	-	-
North America	47,120	46,950	47,290	14.53	14.47	14.58	11,790	10,690	12,630	3.63	3.30	3.89	2,280	1,690	2,800	0.70	0.52	0.86
South America	10,050	9,720	10,530	3.47	3.35	3.63	600	540	680	0.21	0.19	0.23	220	130	310	0.08	0.05	0.11
Asia	**61,460**	**24,340**	**95,170**	**2.01**	**0.80**	**3.11**	**35,750**	**15,250**	**47,850**	**1.17**	**0.50**	**1.56**	**21,540**	**9,170**	**29,550**	**0.70**	**0.30**	**0.97**
Central Asia and Transcaucasia	1,520	450	2,500	2.58	0.77	4.25	570	500	660	0.97	0.85	1.12	570	490	660	0.97	0.83	1.11
East and South-East Asia	19,330	8,710	24,010	1.19	0.54	1.48	3,290	2,420	4,020	0.20	0.15	0.25	3,290	2,420	4,020	0.20	0.15	0.25
South-West Asia/ Near and Middle East	10,780	7,740	12,830	3.34	2.40	3.98	10,310	8,480	12,840	3.19	2.63	3.98	5,690	4,090	8,050	1.76	1.27	2.49
South Asia	29,830	7,440	55,830	2.82	0.70	5.27	21,590	3,850	30,340	2.04	0.36	2.86	11,990	2,170	16,830	1.13	0.21	1.59
Europe	**29,610**	**28,260**	**31,590**	**5.45**	**5.20**	**5.82**	**3,610**	**3,430**	**3,800**	**0.66**	**0.63**	**0.70**	**3,080**	**2,900**	**3,270**	**0.57**	**0.53**	**0.60**
Eastern and South-Eastern Europe	4,630	3,350	6,540	2.07	1.49	2.92	1,730	1,640	1,810	0.77	0.73	0.81	1,490	1,410	1,570	0.67	0.63	0.70
Western and Central Europe	24,980	24,910	25,050	7.83	7.81	7.85	1,880	1,790	1,990	0.59	0.56	0.62	1,590	1,490	1,700	0.50	0.47	0.53
Oceania	**3,220**	**3,170**	**3,340**	**12.00**	**11.78**	**12.42**	**660**	**580**	**740**	**2.47**	**2.17**	**2.76**	**30**	**20**	**30**	**0.11**	**0.08**	**0.12**
Australia and New Zealand	2,360	2,360	2,360	12.14	12.14	12.14	-	-	-	-	-	-	-	-	-	-	-	-
Melanesia	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Micronesia	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Polynesia	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
GLOBAL ESTIMATE	**200,380**	**141,430**	**256,400**	**3.98**	**2.81**	**5.09**	**61,650**	**36,940**	**78,260**	**1.22**	**0.73**	**1.55**	**30,780**	**15,370**	**44,040**	**0.61**	**0.31**	**0.87**

TABLE 2 Annual prevalence of the use of cocaine, amphetamine-type stimulants and "ecstasy", by region and globally, 2019

Region or subregion	Cocaine[a]						Amphetamines[b] and prescription stimulants						"Ecstasy"					
	Number (thousands)			Prevalence (percentage)			Number (thousands)			Prevalence (percentage)			Number (thousands)			Prevalence (percentage)		
	Best estimate	Lower	Upper	Best estimate	Lower	Upper	Best estimate	Lower	Upper	Best estimate	Lower	Upper	Best estimate	Lower	Upper	Best estimate	Lower	Upper
Africa	**1,950**	**520**	**4,260**	**0.27**	**0.07**	**0.58**	**2,720**	**690**	**5,810**	**0.38**	**0.10**	**0.82**	**1,890**	**100**	**8,270**	**0.26**	**0.01**	**1.13**
East Africa	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
North Africa	407	311	483	0.27	0.21	0.32	-	-	-	-	-	-	-	-	-	-	-	-
Southern Africa	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
West and Central Africa	431	71	967	0.15	0.02	0.34	780	50	1,810	0.28	0.02	0.66	-	-	-	-	-	-
Americas	**10,360**	**9,180**	**11,470**	**1.54**	**1.36**	**1.70**	**8,710**	**8,190**	**9,460**	**1.30**	**1.22**	**1.41**	**3,620**	**3,460**	**3,790**	**0.54**	**0.51**	**0.56**
Caribbean	180	80	320	0.63	0.29	1.14	-	-	-	-	-	-	60	30	100	0.23	0.10	0.36
Central America	310	140	520	0.96	0.44	1.62	310	190	440	0.98	0.61	1.41	60	20	110	0.17	0.07	0.33
North America	6,880	6,740	7,030	2.12	2.08	2.17	7,380	7,330	7,420	2.29	2.27	2.30	2,890	2,880	2,890	0.89	0.89	0.89
South America	2,990	2,220	3,610	1.03	0.77	1.24	770	650	900	0.27	0.23	0.31	610	520	690	0.21	0.18	0.24
Asia	**2,030**	**1,620**	**2,600**	**0.07**	**0.05**	**0.08**	**12,670**	**11,920**	**13,500**	**0.42**	**0.39**	**0.44**	**9,930**	**1,880**	**17,980**	**0.32**	**0.06**	**0.59**
Central Asia and Transcaucasia	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
East and South-East Asia	780	530	1,030	0.05	0.03	0.06	9,860	9,510	10,280	0.61	0.59	0.64	3,670	1,220	6,120	0.23	0.08	0.38
South-West Asia/ Near and Middle East	160	30	440	0.05	0.01	0.14	640	350	920	0.17	0.11	0.29	2,180	410	3,940	0.67	0.13	1.22
South Asia	1,060	1,060	1,060	0.10	0.10	0.10	1,970	1,960	1,970	0.19	0.19	0.19	-	-	-	-	-	-
Europe	**5,000**	**4,630**	**5,520**	**0.92**	**0.85**	**1.02**	**2,510**	**2,050**	**3,070**	**0.46**	**0.38**	**0.56**	**3,550**	**3,000**	**4,600**	**0.65**	**0.55**	**0.85**
Eastern and South-Eastern Europe	580	220	1,070	0.26	0.10	0.48	-	-	-	-	-	-	780	280	1,780	0.35	0.12	0.79
Western and Central Europe	4,430	4,410	4,450	1.39	1.38	1.39	1,950	1,700	2,300	0.61	0.53	0.72	2,770	2,720	2,820	0.87	0.85	0.89
Oceania	**730**	**700**	**730**	**2.70**	**2.60**	**2.73**	**340**	**310**	**350**	**1.27**	**1.16**	**1.33**	**590**	**550**	**600**	**2.18**	**2.05**	**2.22**
Australia and New Zealand	-	-	-	-	-	-	240	240	250	1.26	1.22	1.30	550	540	560	2.84	2.79	2.90
Melanesia	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Micronesia	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Polynesia	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
GLOBAL ESTIMATE	**20,060**	**16,650**	**24,580**	**0.40**	**0.33**	**0.49**	**26,950**	**23,160**	**32,190**	**0.54**	**0.46**	**0.65**	**19,570**	**8,990**	**35,240**	**0.39**	**0.18**	**0.70**

Sources: UNODC estimates based on annual report questionnaire data and other official sources.

TABLE 3 Estimated number and prevalence (percentage) of people who inject drugs and those living with HIV among this group, by region, 2019

Region or subregion	People who inject drugs							HIV among people who inject drugs				
	Estimated number			Prevalence (%)			Data coverage of population aged 15-64	Estimated number			Prevalence (%) Best estimate	Data coverage of estimated number of people who inject drugs
	Low	Best	High	Low	Best	High		Low	Best	High		
Africa	**590,000**	**950,000**	**1,760,000**	**0.08**	**0.13**	**0.24**	**67.9%**	**52,000**	**103,000**	**300,000**	**10.9**	**82.9%**
East Africa	90,000	260,000	680,000	0.05	0.13	0.35	58.8%	11,000	43,000	124,000	16.3	87.6%
West and Central Africa	280,000	360,000	520,000	0.10	0.13	0.18	77.2%	14,000	17,000	27,000	4.6	88.5%
Southern Africa	100,000	150,000	180,000	0.10	0.14	0.17	62.9%	21,000	32,000	63,000	21.8	59.2%
North Africa	110,000	180,000	390,000	0.08	0.12	0.26	65.6%	6,000	12,000	86,000	6.7	83.8%
America	**1,880,000**	**2,350,000**	**2,920,000**	**0.28**	**0.35**	**0.43**	**87.3%**	**112,000**	**176,000**	**269,000**	**7.5**	**93.6%**
North America	1,590,000	1,800,000	2,020,000	0.49	0.56	0.62	100%	96,000	125,000	158,000	6.9	100%
Caribbean	40,000	90,000	210,000	0.14	0.33	0.76	31.3%	4,000	13,000	26,000	14.0	31.8%
South America	240,000	440,000	660,000	0.08	0.15	0.23	81.9%	12,000	37,000	83,000	8.5	82.9%
Central America	10,000	20,000	30,000	0.04	0.06	0.09	57.7%	300	600	1,400	3.4	32.9%
Asia	**3,920,000**	**5,210,000**	**6,530,000**	**0.13**	**0.17**	**0.21**	**95.1%**	**382,000**	**588,000**	**821,000**	**11.3**	**98%**
Central Asia and Transcaucasia	350,000	370,000	400,000	0.59	0.63	0.68	93.5%	23,000	26,000	31,000	7.0	93.5%
East and South-East Asia	1,970,000	3,030,000	4,000,000	0.12	0.19	0.25	95.1%	135,000	277,000	434,000	9.1	98.7%
South-West Asia	620,000	760,000	910,000	0.30	0.36	0.43	100%	163,000	218,000	275,000	28.6	100%
Near and Middle East	40,000	90,000	260,000	0.03	0.08	0.23	42%	1,800	3,300	10,600	3.8	55.4%
South Asia	950,000	950,000	960,000	0.09	0.09	0.09	100%	59,000	64,000	70,000	6.7	100%
Europe	**2,370,000**	**2,570,000**	**2,830,000**	**0.44**	**0.47**	**0.52**	**90%**	**514,000**	**537,000**	**573,000**	**20.9**	**100%**
Eastern Europe	1,690,000	1,710,000	1,740,000	1.24	1.26	1.27	100%	437,000	447,000	457,000	26.1	100%
South-Eastern Europe	80,000	90,000	130,000	0.09	0.11	0.15	100%	4,900	5,800	7,700	6.2	100%
Western and Central Europe	600,000	770,000	960,000	0.19	0.24	0.30	83%	73,000	84,000	108,000	11.0	99.9%
Oceania	**100,000**	**100,000**	**110,000**	**0.37**	**0.38**	**0.41**	**72.3%**	**1,400**	**1,800**	**2,000**	**1.8**	**72.3%**
Global	**8,860,000**	**11,180,000**	**14,150,000**	**0.18**	**0.22**	**0.28**	**89.4%**	**1,060,000**	**1,410,000**	**1,970,000**	**12.6**	**96%**

Sources: Responses to the annual report questionnaire; progress reports of the Joint United Nations Programme on HIV/AIDS (UNAIDS) on the global AIDS response (various years); the former Reference Group to the United Nations on HIV and Injecting Drug Use; published peer-reviewed articles; and government reports.

Note: Prevalence of people who inject drugs is the percentage of the population aged 15–64 years.

TABLE 4 Illicit cultivation of opium poppy, 2009–2020 (hectares)

	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
SOUTH-WEST ASIA												
Afghanistan (best estimate)	123,000	123,000	131,000	154,000	209,000	224,000	183,000	201,000	328,000	263,000	163,000	224,000
lower bound [a]	102,000	104,000	109,000	125,000	173,000	196,000	163,000	182,000	301,000	242,000	149,000	202000
upper bound [a]	137,000	145,000	155,000	189,000	238,000	247,000	202,000	221,000	355,000	283,000	178,000	246000
SOUTH-EAST ASIA												
Lao People's Democratic Republic (best estimate) [b, g]	1,900	3,000	4,100	6,800	3,900	6,200	5,700	5,395	5,327	4,925	4,624	..
lower bound [a]	1,100	1,900	2,500	3,100	1,900	3,500	3,900					
upper bound [a]	2,700	4,000	6,000	11,500	5,800	9,000	7,600					
Myanmar (best estimate) [b, c]	31,700	38,100	43,600	51,000	57,800	57,600	55,500	..	41,000	37,300	33,100	29,500
lower bound [a]	20,500	17,300	29,700	38,249	45,710	41,400	42,800		30,200	29,700	25,800	21,000
upper bound [a]	42,800	58,100	59,600	64,357	69,918	87,300	69,600		51,900	47,200	42,800	50,400
SOUTH AND CENTRAL AMERICA												
Colombia (best estimate)	356	341	338	313	298	387	595	462	282	663	..	..
Mexico (best estimate) [d, e, f]	19,500	14,000	12,000	10,500	11,000	17,000	26,100	25,200	30,600	28,000	21,500	..
lower bound [a]							21,800	20,400	22,800	21,200	15,500	
upper bound [a]							30,400	30,000	38,400	34,800	27,500	
OTHER												
Other countries [e]	**9,479**	**12,221**	**16,390**	**12,282**	**13,293**	**11,585**	**8,549**	**54,641**	**8,792**	**11,815**	**14,656**	**40,855**
TOTAL (best estimate)	**185,935**	**190,662**	**207,428**	**234,895**	**295,291**	**316,772**	**279,444**	**286,698**	**414,001**	**345,703**	**236,880**	**294,355**
lower bound	152,935	149,762	169,928	189,444	245,201	269,872	240,644	257,996	368,401	310,021	211,619	259,894
upper bound	211,835	233,662	249,328	287,952	338,309	372,272	318,744	333,396	459,701	382,121	247,587	323,187
TOTAL (best estimate, rounded)	**185,930**	**190,660**	**207,430**	**234,900**	**295,290**	**316,770**	**279,440**	**286,700**	**414,000**	**345,700**	**236,880**	**294,350**

Sources: Afghanistan: Until 2018, Afghanistan Opium Surveys were conducted by the Ministry of Counter-Narcotics (MCN) of Afghanistan and the United Nations Office on Drugs and Crime (UNODC). Data for 2019-2020 was obtained from the UNODC Illicit Crop Monitoring Programme.
Lao People's Democratic Republic: Up till 2015, national illicit crop monitoring system supported by the United Nations Office on Drugs and Crime (UNODC). Data from 2016 onwards from Lao National Commission for Drug Control and Supervision.
Myanmar: national illicit crop monitoring system supported by the United Nations Office on Drugs and Crime (UNODC).
Colombia: Government of Colombia.
Mexico: up to 2014, estimates derived from surveys by the Government of the United States of America (international narcotics control strategy reports); for 2015 onwards, joint Mexico/UNODC project entitled "Monitoring of the illicit cultivation on Mexican territory".

Note: Two dots indicate that data were unavailable. Information on estimation methodologies and definitions can be found in the online methodology section of the World Drug Report 2021.

a) Bound of the statistically derived confidence interval.

b) May include areas that were eradicated after the date of the area survey.

c) In 2020, the opium poppy cultivation survey covered Shan and Kachin States. 46 sample locations were available in Shan and Kachin States (compared to 84 locations in 2019), which increased uncertainty around area and production estimates. Estimates for 2014, 2015, 2018 included area estimates for Kayah and Chin states. In the absence of information on Kayah and Chin, the 2019, 2020 national area estimate uses latest available cultivation estimates (2018) for Chin and Kayah states. National estimates for 2014, 2015, 2018, 2019, 2020 are therefore not directly comparable with other years.

d) Up to 2014, the estimates for Mexico are sourced from the Department of State of the United States. The Government of Mexico does not validate the estimates provided by the United States as they are not part of its official figures and it does not have information on the methodology used to calculate them.

e) The figures for 2015, as published in the World Drug Report 2016 (United Nations publication, Sales No. E.16.XI.7), have been revised owing to a statistical adjustment processed by UNODC. The 2015 figures refer to the period July 2014–June 2015 and are not comparable with subsequent years, due to the updates in the methodology implemented from the 2015–2016 period onwards.

f) The figures for 2016, 2017, 2018 and 2019 are based on the estimation periods July 2015–June 2016, July 2016–June 2017 and July 2017–June 2018, July 2018–June 2019 respectively.

g) Data from 2016 onwards are not comparable to prior years.

h) Data for 2018 from U.S. State Department, International Narcotics Control Strategy Report 2020.

TABLE 5 Potential production of oven–dry opium, 2009–2020 (tons)

	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
SOUTH-WEST ASIA												
Afghanistan (best estimate) [j]	4,000	3,600	5,800	3,700	5,500	6,400	3,300	4,800	9,000	6,400	6,400	6,300
lower bound [a]		3,000	4,800	2,800	4,500	5,100	2,700	4,000	8,000	5,600	5,600	5,400
upper bound [a]		4,200	6,800	4,200	6,500	7,800	3,900	5,600	10,000	7,200	7,100	7,200
SOUTH-EAST ASIA												
Lao People's Democratic Republic (best estimate) [b, f]	11	18	25	41	23	92	..	48	48	44	41	..
lower bound [g]	7	11	15	18	11	51	84					
upper bound [g]	16	24	36	69	35	133	176					
Myanmar (best estimate) [b, h]	330	580	610	690	870	670	647[h]	..	550	520	508	405
lower bound	213	350	420	520	630	481	500		395	410	380	289
upper bound	445	820	830	870	1,100	916	820		706	664	672	685
SOUTH AND CENTRAL AMERICA												
Colombia (best estimate) [k]	9	8	8	8	11	12	17	13	7	18	..	..
Mexico (best estimate) [c, e, i]	425	300	250	220	225	360	419	404	492	450	440	..
lower bound [a]							265	251	288	267	286	
upper bound [a]							572	557	695	633	595	
Other countries (best estimate) [d]	**178**	**224**	**290**	**172**	**182**	**201**	**147**	**711**	**143**	**168**	**227**	**708**
TOTAL (best estimate)	**4,953**	**4,730**	**6,983**	**4,831**	**6,810**	**7,735**	**4,659**	**5,976**	**10,239**	**7,600**	**7,616**	**7,413**
lower bound (published)		3,894	5,783	3,738	5,558	6,205	3,713	4,927	8,881	6,507	6,670	6,467
upper bound		5,576	8,214	5,539	8,052	9,423	5,632	7,153	11,599	8,727	8,462	8,259
TOTAL best estimate (rounded)	**4,950**	**4,730**	**6,980**	**4,830**	**6,810**	**7,740**	**4,660**	**5,980**	**10,240**	**7,600**	**7,620**	**7,410**

Sources: Afghanistan: Until 2018, Afghanistan Opium Surveys were conducted by the Ministry of Counter-Narcotics (MCN) of Afghanistan and the United Nations Office on Drugs and Crime (UNODC). Data for 2019 was obtained from the UNODC Illicit Crop Monitoring Programme.
Lao People's Democratic Republic and Myanmar: national illicit crop monitoring system supported by the United Nations Office on Drugs and Crime (UNODC).
Colombia: National illicit crop monitoring system supported by UNODC. Since 2008, production was calculated based on updated regional yield figures and conversion ratios from the Department of State and the Drug Enforcement Administration of the United States of America.
Mexico: Up till 2014, estimates derived from surveys by the United States Government; from 2015 onwards national illicit crop monitoring system supported by UNODC.

Note: Two dots indicate that data were unavailable. Information on estimation methodologies and definitions can be found in the online methodology section of the World Drug Report 2021.

a) Bound of the statistically derived confidence interval.

b) Based on cultivation figures which may include areas eradicated after the date of the area survey.

c) Up to 2014, the estimates are sourced from the Department of State of the United States. The Government of Mexico does not validate the estimates provided by the United States as they are not part of its official figures and it does not have information on the methodology used to calculate them.

e) The figures from 2015 on have been updated with newly available data. The joint Mexico/UNODC project "Monitoring of the illicit cultivation on Mexican territory" collected yield data for the first time in the 2017/2018 period. The production figures presented are based on: (1) annual estimates of area under cultivation, established by the joint project of the Government of Mexico and UNODC; (2) yield data collected in an initial survey in the 2017/2018 period. UNODC and Mexico are jointly working on continuously expanding the scope and quality of yield data collected. For methodological reasons, the figures shown for 2015-2018 are not comparable with the figures over the period 1998-2014.

f) Production estimates for the period 2016–2019 are based on cultivation estimates for the period 2016–2019 and average yields per ha reported over the 2012–2014 period.

g) Bound of the statistically derived confidence interval, with the exception of 2015. The figures for 2015 represent independently derived upper and lower estimates; the midpoint was used for the calculation of the global total.

h) Estimates for 2014, 2015, 2018 include estimates for Kayah and Chin states. In the absence of information on Kayah and Chin, the 2019 national potential production estimate uses latest available (2018) cultivation estimates for Kayah and Chin states and the 2019 weighted national average yield (15.4 kg/ha). National estimates for 2014, 2015, 2018 and 2019 are therefore not directly comparable with other years.

i) The figures for 2015, 2016, 2017, 2018, and 2019 are based on the estimation periods July 2014–June 2015, July 2015–June 2016, July 2016–June 2017, July 2017–June 2018, and July 2018–June 2019 respectively.

j) Data on the potential opium production for 2019 and 2020 was obtained brom the UNODC Illicit Crop Monitoring Programme. The same methodology was used as in previous years for yield measurement and estimation of potential opium production. The results for the year 2019 were not validated by the Government of Afghanistan and are not recognized by the Government as its official estimate.

k) Production estimates for 2018 based on cultivation estimates by the U.S. State Department International Narcotics Control Strategy Report 2020 and average yields reported for the years 2015–2017.

TABLE 6 Global manufacture of heroin from global illicit opium production, 2009–2020 (tons)

	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Total potential opium production	**4,953**	**4,730**	**6,983**	**4,831**	**6,810**	**7,735**	**4,659**	**5,976**	**10,270**	**7,618**	***7,616***	***7,413***
Potential opium not processed into heroin	1,680	1,728	3,400	1,850	2,600	2,450	1,360	2,510	1,100–1,400	1,225–1,525	1,180–1,480	1,177–1,477
Potential opium processed into heroin	3,273	3,002	3,583	2,981	4,210	5,285	3,299	3,466	8,870–9,170	6,093–6,393	*6,136–6,436*	*5,936–6,236*
Total potential heroin manufacture	**427**	**383**	**467**	**377**	**555**	**544**	**319**	**368**	**677–1,027**	**468–718**	***474–724***	***454–694***

Notes: The calculation shows the potential amount of heroin that could have been manufactured out of the opium produced in a given year; it does not take into account changes in opium inventories, which may add to or reduce the amount of heroin entering the market in that year. Afghanistan and Myanmar are the only countries for which the proportion of potential opium production not converted into heroin within the country is estimated. For Myanmar, these estimates were available only for 2018 and 2019. For all other countries, for the purposes of this table, it is assumed that all opium produced is converted into heroin.

The amount of heroin produced from Afghan opium is calculated using two parameters that may change: (a) the amounts of opium consumed as raw opium in the region; and (b) the conversion ratio into heroin. The first parameter's estimate is based on consumption data in Afghanistan and neighbouring countries. For the second parameter, from 2005 to 2013, a conversion ratio of opium to morphine/heroin of 7:1 was used, based on interviews conducted with Afghan morphine/heroin "cooks", on an actual heroin production exercise conducted by two (illiterate) Afghan heroin "cooks", documented by the German Bundeskriminalamt in Afghanistan in 2003 (published in Bulletin on Narcotics, vol. LVII, Nos. 1 and 2, 2005, pp. 11–31), and United Nations Office on Drugs and Crime (UNODC) studies on the morphine content of Afghan opium (12.3 per cent over the period 2010–2012, down from 15 per cent over the period 2000–2003). Starting from 2014, a different approach to the conversion was adopted, reflecting updated information on morphine content and a different method for taking purity into account. The revised approach uses a ratio of 18.5 (range: 17.5–19.6) kg of opium for 1 kg of 100 per cent pure heroin base (see Afghanistan Opium Survey 2014, UNODC, November 2014). In addition, the conversion into export-quality heroin assumes purity to be between 50 and 70 per cent. For more details, see "Afghanistan Opium Survey 2017 – Challenges to sustainable development, peace and security" (UNODC, May 2018).

The amount of heroin produced in Myanmar in 2018 , 2019 and 2020 was calculated by subtracting the estimated unprocessed opium for consumption from the total opium production and using a conversion factor of 10:1. The unprocessed opium in Myanmar was based on the total unprocessed opium in East Asia and the relative cultivation levels of Lao PDR and Myanmar (see Transnational Organized Crime in East Asia and the Pacific – A Threat Assessment, UNODC, 2013 and Transnational Organized Crime in Southeast Asia: Evolution, Growth and Impact 2019, UNODC, 2019). For further information, please refer to the Methodology chapter (section 4.3) of the Myanmar Opium Survey 2018 (UNODC, January 2019) and the Myanmar Opium Survey 2019 (UNODC, February 2020).

For countries other than Afghanistan, a "traditional" conversion ratio of opium to heroin of 10:1 is used. The ratios will be adjusted when improved information becomes available. Figures in italics are preliminary and may be revised when updated information becomes available.

TABLE 7 Global illicit cultivation of coca bush, 2009–2019 (hectares)

	2009	2010	2011	2012	2013	1905	2015	2016	2017	2018	2019
Bolivia (Plurinational State of)	30,900	31,000	27,200	25,300	23,000	20,400	20,200	23,100	24,500	23,100	25,500
Colombia [a]	73,000	62,000	64,000	48,000	48,000	69,000	96,000	146,000	171,000	169,000	154,000
Peru [b]	59,900	61,200	64,400								
Peru [c]			62,500	60,400	49,800	42,900	40,300	43,900	49,900	54,100	54,700
Total	**163,800**	**154,200**	**155,600[d]**	**133,700**	**120,800**	**132,300**	**156,500**	**213,000**	**245,400**	**246,200**	**234,200**

Sources: Plurinational State of Bolivia: national illicit crop monitoring system supported by the United Nations Office on Drugs and Crime (UNODC). Colombia: national illicit crop monitoring system supported by UNODC. Peru: national illicit crop monitoring system supported by UNODC.

Note: Different area concepts and their effect on comparability were presented in the World Drug Report 2012 (United Nations publication, Sales No. E.12.XI.1) (p. 41–42). Efforts to improve the comparability of estimates between countries continue; since 2011 the net area under coca bush cultivation on the reference date of 31 December was estimated for Peru, in addition to Colombia. The estimate presented for the Plurinational State of Bolivia represents the area under coca cultivation as interpreted on satellite imagery.

a) Net area on 31 December.

b) Figures represent the area under coca cultivation as interpreted on satellite imagery (without deductions for subsequent eradication).

c) Net area on 31 December, deducting fields eradicated after satellite imagery was taken.

d) The global coca cultivation figure was calculated with the "area as interpreted on satellite imagery" for Peru in 2011.

TABLE 8 Reported eradication of coca bush, 2009–2019

	Method of eradication	Unit	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
Bolivia (Plurinational State of)	manual	hectare	6,341	8,200	10,509	11,044	11,407	11,144	11,020	6,577	7,237	11,174	9,205
Colombia	manual	hectare	60,565	43,804	35,201	30,456	22,121	11,703	13,473	17,642	52,001	59,978	94,606
	spraying	hectare	104,772	101,940	103,302	100,549	47,052	55,532	37,199	0	0	0	0
Peru	manual	hectare	10,025	12,033	10,290	14,171	23,785	31,205	35,868	30,150	23,025	25,107	25,526
Ecuador	manual	hectare	6	3	14	..	..	..	..	..	..	..	..
	manual	plants	57,765	3,870	55,030	122,656	41,996	15,874	45,266	20,896	10,100	3,818	..

Source: United Nations Office on Drugs and Crime annual report questionnaire and government reports.

Note: The totals for Bolivia (Plurinational State of) and Peru include voluntary and forced eradication. Reported eradication refers to the sum of all areas eradicated in a year, including repeated eradication of the same fields. Two dots indicate that data are not available.

TABLE 9 Potential manufacture of 100 per cent pure cocaine, 2009–2019 (tons)

	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
Bolivia (Plurinational State of) [a]	..	..	..	..	..	..	..	..	..	..	..
Colombia [b, c, d]	488	424	384	333	290	368	499	810	1,058	1,120	1,137
Peru [a]	..	..	..	..	..	..	..	..	..	..	..
Total [b, c, d]	***1,188***	***1,134***	***1,090***	***997***	***902***	***869***	***977***	***1,335***	***1,647***	***1,723***	***1,784***

Sources: Plurinational State of Bolivia: calculations based on coca leaf yield surveys by the United Nations Office on Drugs and Crime (UNODC) (Yungas de La Paz) and scientific studies by the Drug Enforcement Administration of the United States of America (Chapare). Colombia: UNODC/Government of Colombia. Peru: calculations based on coca leaf to cocaine conversion ratio from scientific studies by the Drug Enforcement Administration.

Notes: Figures in italics are subject to revision. Two dots indicate that data are not available. Information on estimation methodologies and definitions can be found in the online methodology section of the World Drug Report 2021.

a) Owing to a lack of updated conversion factors in Bolivia (Plurinational State of) and Peru, no final estimates of the level of cocaine production can be provided. Detailed information on the ongoing revision of conversion ratios and cocaine laboratory efficiency is available in the World Drug Report 2010 (United Nations publication, Sales No. E.10.XI.13), p. 249.

b) Values for Colombia for 2014–17 have been revised, using an improved methodology, to take into account the participation of new actors in the processing chain from coca leaf to cocaine. The same methodology was used for 2018. Thus, the values for 2014-18, and hence the global total for the same years, may not be directly comparable to earlier years.

c) Conversion of areas under coca cultivation into coca leaf and then into cocaine hydrochloride, taking yields, amounts of coca leaf used for licit purposes and cocaine laboratory efficiency into account. Current global aggregates are based on "new" conversion ratios representing the most recent data available to UNODC. See World Drug Report 2010 (United Nations publication, Sales No. E.10.XI.13, p. 249) for a discussion of "new" and "old" conversion factors and detailed information on the ongoing revision of conversion ratios and cocaine laboratory efficiency.

d) With respect to data published in the World Drug Report 2016 (United Nations publication, Sales No. E.16.XI.7), the following amendments have been made:

(i) totals for 2009–2012 have been revised to rectify minor inaccuracies in data processing.

TABLE 10 Cannabis cultivation, production and eradication, latest year available from the period 2013–2019

Year	Country / Territory	Product	Outdoors/ indoors	Area cultivated (ha)	Area eradicated (ha)	Harvestable area (ha)	Production (tons)	Plants eradicated	Sites eradicated
2012	Afghanistan	resin	outdoors	10,000			1,400		
2016	Albania	herb	outdoors					2,536,288	5,205
2017	Albania	herb	Indoors					7,766	
2017	Albania	herb	outdoors					66,927	500
2017	Albania	herb	outdoors					33,177	379
2018	Albania	herb	Indoors					2,716	
2014	Algeria	resin	outdoors					2,522	
2016	Armenia	herb	outdoors	0.50[a]	0.50	0.00		757	20
2017	Armenia	herb	outdoors	0.50[a]	0.50	0.00		2,547	21
2018	Armenia	herb	Indoors					1,025	36
2016	Australia	herb	indoors					31,266	408
2016	Australia	herb	outdoors					22,257	1,021
2017	Australia	herb	indoors					78,310	433
2017	Australia	herb	outdoors	1.00[a]	1.00	0.00		31,431	948
2018	Australia	herb	indoors					38,492	542
2018	Australia	herb	outdoors	0.80[a]	0.80	0.00		19,981	1,120
2015	Austria	herb	outdoors	3.00[a]	3.00	0.00			
2013	Azerbaijan	herb	outdoors	23.95[a]	23.95	0.00	263.96	8,469	151
2014	Azerbaijan	herb	outdoors	17.50[a]	17.50	0.00		14,889	195
2017	Azerbaijan	herb	outdoors	0.25[a]		0.25		336,791	
2015	Bahamas	herb	outdoors					17,270	
2012	Bangladesh	herb	outdoors					39,848	
2013	Bangladesh	herb	outdoors					35,012	
2014	Bangladesh	herb	outdoors					35,988	
2015	Bangladesh	herb	outdoors					39,967	
2016	Bangladesh	herb	outdoors					47,104	
2017	Bangladesh	herb	outdoors					69,989	
2016	Belarus	herb	indoors						28
2016	Belarus	herb	oudoors		123.80				1,945
2017	Belarus	herb	indoors						32
2017	Belarus	herb	oudoors		125.90				2,283
2018	Belarus	herb	indoors						42
2018	Belarus	herb	oudoors		106.30				2,469
2015	Belgium	herb	indoors					345,518	1,164
2015	Belgium	herb	outdoors					4,885	93
2017	Belgium	herb	indoors					415,728	1,175
2017	Belgium	herb	outdoors					848	59
2018	Belgium	herb	indoors					421,326	944
2018	Belgium	herb	outdoors					935	62
2015	Belize	herb	outdoors					50,897	
2017	Bhutan	herb	outdoors	1.00[a]	1.00	0.00		100,000	12
2016	Bolivia (Plurinational State of)	herb	outdoors		14.60				35
2017	Bolivia (Plurinational State of)	herb	outdoors		14.00				52
2018	Bolivia (Plurinational State of)	herb	outdoors		13.36				52
2016	Bosnia and Herzegovina	herb	indoors		39.00				
2016	Bosnia and Herzegovina	herb	outdoors		1,680.00				
2017	Bosnia and Herzegovina	herb	indoors					1	1
2017	Bosnia and Herzegovina	herb	outdoors	0.02[a]	0.02	0.00		539	53
2018	Bosnia and Herzegovina	herb	indoors	0.02[a]	0.02	0.00			6

Year	Country / Territory	Product	Outdoors/ indoors	Area cultivated (ha)	Area eradicated (ha)	Harvestable area (ha)	Production (tons)	Plants eradicated	Sites eradicated
2018	Bosnia and Herzegovina	herb	outdoors	0.02 [a]	0.02	0.00		1,580	12
2014	Brazil	herb	outdoors		44.01			1,364,316	
2017	Brazil	herb	outdoors		117.51			1,910,451	604
2018	Brazil	herb	outdoors		68.31			968,145	
2015	Bulgaria	herb	indoors					323	
2015	Bulgaria	herb	outdoors				37.77	9,488	
2017	Central African Republic	herb	outdoors	130.00	60.00	55	10.00	250,000	22
2016	Chile	herb	indoors					26,988	2,740
2016	Chile	herb	outdoors					58,950	264
2017	Chile	herb	indoors					50,414	2,408
2017	Chile	herb	outdoors					194,694	202
2018	Chile	herb	indoors					66,007	2,357
2018	Chile	herb	outdoors					183,185	318
2016	China	herb	outdoors		9.80			1,390,000	
2018	China	herb	outdoors					710	
2016	Colombia	herb	outdoors		135.00				
2017	Colombia	herb	outdoors		173.71				
2018	Colombia	herb	outdoors		59.66				
2016	Costa Rica	herb	indoors					678.00	5
2016	Costa Rica	herb	outdoors		17.59			2,122,244	201
2017	Costa Rica	herb	indoors						2
2017	Costa Rica	herb	outdoors			14.30			215
2018	Costa Rica	herb	indoors						4
2018	Costa Rica	herb	outdoors	11.41	11.41			1,346,273	208
2016	Côte d'Ivoire	herb	outdoors					5	
2017	Côte d'Ivoire	herb	outdoors		0.25				1
2018	Côte d'Ivoire	herb	outdoors					104	1
2016	Czechia	herb	indoors					53,549	229
2016	Czechia	herb	outdoors					4,111	
2017	Czechia	herb	indoors					50,925	305
2017	Czechia	herb	outdoors					3,467	
2018	Czechia	herb	outdoors					6,581	
2015	Denmark	herb	indoors/outdoors					14,560	97
2016	Denmark	herb	indoors/outdoors					13,217	105
2017	Denmark	herb	indoors/outdoors					34,801	65
2014	Dominican Republic	herb	outdoors	6.00 [a]	6.00	0.00	0.21	111	8
2016	Ecuador	herb	outdoors					224	34
2017	Ecuador	herb	outdoors					397	10
2018	Ecuador	herb	indoors					127	30
2018	Ecuador	herb	outdoors					13,891	4
2015	Egypt	herb/resin	outdoors		140.00				
2017	Egypt	herb/resin	outdoors		126.00				
2018	Eswatini	herb	outdoors	1,500.00	1,069.50	430.50		3,000,000	210
2017	Georgia	herb	indoors		0.01			186	91
2017	Georgia	herb	outdoors	0.02 [a]	0.02	0.00		93	19
2016	El Salvador	herb	outdoors			1.00		227	25
2014	France	herb	outdoors					158,592	837
2018	France	herb	outdoors					138,561	
2017	Georgia	herb	indoors		0.01			186	91
2017	Georgia	herb	outdoors	0.02	0.02	0.00		93	19
2018	Georgia	herb	indoors		0.05			927	443

Year	Country / Territory	Product	Outdoors/ indoors	Area cultivated (ha)	Area eradicated (ha)	Harvestable area (ha)	Production (tons)	Plants eradicated	Sites eradicated
2018	Georgia	herb	outdoors	0.10	0.10	0.00		406	98
2015	Germany	herb	indoors					135,925	786
2015	Germany	herb	outdoors					9,136	127
2017	Germany	herb	indoors					85,226	573
2017	Germany	herb	outdoors						95
2016	Greece	herb	indoors					16,554	
2016	Greece	herb	oudoors					39,151	
2017	Greece	herb	indoors					19,498	
2017	Greece	herb	oudoors					27,409	
2018	Greece	herb	indoors					6,913	
2018	Greece	herb	oudoors					43,684	
2016	Guatemala	herb	outdoors		9.00			3,138,298	427
2017	Guatemala	herb	outdoors	3.50[a]	3.81		1.61	6,033,345	150
2018	Guatemala	herb	outdoors	129.00[a]	129.00	0.00		5,189,422	368
2015	Guyana	herb	outdoors	20.00	9.40	10.60	1,000.00	419,700	19
2016	Honduras	herb	indoors					7	2
2016	Honduras	herb	oudoors					24,253	19
2017	Honduras	herb	oudoors	59.58[a]	59.59	0.00			
2018	Honduras	herb	oudoors					720,426	67
2016	China, Hong Kong SAR	herb	indoors					329	1
2016	Hungary	herb	indoors					5,000	3
2016	Hungary	herb	outdoors					2,000	20
2013	Iceland	herb	indoors					6,652	323
2016	India	herb	outdoors		3,414.74				
2017	India	herb	outdoors		3,445.90			6,687,376	
2018	India	herb	outdoors		3,430.12				
2016	Indonesia	herb	outdoors	482.00[a]	482.00	0.00			
2017	Indonesia	herb	outdoors	89.00[a]	89.00	0.00		738,020	14
2018	Indonesia	herb	outdoors	76.23[a]	76.23	0.00		1,455,390	13
2018	Iran (Islamic Republic of)	herb	indoors		0.04				
2016	Ireland	herb	indoors					7,273	
2017	Ireland	herb	indoors					9,046	50
2018	Ireland	herb	indoors					7,186	
2014	Italy	herb	indoors					51,534	639
2014	Italy	herb	outdoors					70,125	1,134
2017	Italy	herb	indoors					56,125	1,161
2017	Italy	herb	outdoors					209,510	401
2012	Jamaica	herb	outdoors					456	382
2016	Kazakhstan	herb	outdoors	18.00[a]	18.00	0.00		170,000	202
2017	Kazakhstan	herb	outdoors	12.30[a]	12.30	0.00		930,774	91
2016	Kenya	herb	outdoors	12.00				8,747	46
2017	Kenya	herb	outdoors		0.10			4,662	
2018	Kenya	herb	outdoors		0.10			517	
2015	Kyrgyzstan	herb	outdoors	5,014.00		5,014.00			
2018	Kyrgyzstan	herb	outdoors	1,276.37	457.69	818.68		49,942	12.00
2016	Latvia	herb	indoors					557	35
2016	Latvia	herb	outdoors					78	6
2017	Latvia	herb	indoors					798	34
2017	Latvia	herb	outdoors					66	15
2018	Latvia	herb	indoors					152	17
2018	Latvia	herb	outdoors					1,152	34

Year	Country / Territory	Product	Outdoors/ indoors	Area cultivated (ha)	Area eradicated (ha)	Harvestable area (ha)	Production (tons)	Plants eradicated	Sites eradicated
2015	Lebanon	herb	outdoors	3,500.00		3,500.00			
2017	Lebanon	Kif	outdoors	40,772.00					
2018	Lebanon	herb	outdoors	4,205.70		4,205.70			
2016	Lithuania	herb	indoors						4
2017	Lithuania	herb	indoors						8
2017	Lithuania	herb	outdoors						7
2018	Lithuania	herb	indoors						3
2015	Madagascar	herb	outdoors		11.00			21,325	
2017	Madagascar	herb	outdoors		9.00			57,708	
2013	Malta	herb	indoors					27	
2016	Mexico	herb	outdoors		5,478.42		6,574.1		38,432
2017	Mexico	herb	outdoors		4,193.34		5,032.0		34,523
2018	Mexico	herb	outdoors		2,263.71		2,716.47		28,873
2013	Mongolia	herb	outdoors	15,000.00	4,000.00	11,000.00		4,000	4,000
2018	Mongolia	herb	outdoors	15,000.00	173.00	14,827.00			33
2016	Morocco	herb	outdoors				35,652.83		
2016	Morocco	plant	outdoors	47,000.00	395.00	46,605.00			
2016	Morocco	resin	outdoors				713.00		
2017	Morocco	herb	outdoors				35,702.90		
2017	Morocco	plant	outdoors	47,500.00	523.00	46,977.00			
2017	Morocco	resin	outdoors				714.06		
2018	Morocco	herb	outdoors				23,699.80		
2018	Morocco	plant	outdoors	47,500.00		47,500.00			
2018	Morocco	resin	outdoors				423.58		
2014	Myanmar	herb	outdoors	15.00	10.00	5.00			3
2018	Nepal	herb	outdoors	235.87	235.87	0.00	5,000.00	2,358,700	335
2016	Netherlands	herb	indoors					994,068	5,856
2017	Netherlands	herb	indoors					883,163	5,538
2018	Netherlands	herb	indoors					516,418	3,482
2018	Netherlands	herb	outdoors						431
2016	New Zealand	herb	indoors					18,903	607
2016	New Zealand	herb	outdoors					104,725	
2017	New Zealand	herb	indoors					19,992	
2017	New Zealand	herb	outdoors					19,559	
2018	New Zealand	herb	indoors					19,313	
2018	New Zealand	herb	outdoors					22,660	
2014	Nicaragua	herb	outdoors		0.30		1,507.00	3,014	30
2016	Nicaragua	herb	outdoors					275,000	
2017	Nicaragua	herb	outdoors					994,787	
2016	Nigeria	herb	outdoors		718.78				65
2017	Nigeria	herb	outdoors		317.12				
2018	Nigeria	herb	outdoors		3,660.64				
2015	Norway	herb	indoors		0.04			4,000	30
2017	North Macedonia	herb	indoors					168	
2017	North Macedonia	herb	outdoors					220	
2018	North Macedonia	herb	outdoors	2.51			4.04	2,264	4,527
2016	Oman	herb	outdoors	0.50[a]	0.50	0.00		5	3
2013	Panama	herb	indoors	0.50[a]	0.50	0.00		37	2
2013	Panama	herb	outdoors	10.50[a]	10.50	0.00		78,633	2
2016	Paraguay	herb	outdoors				1,298.50		
2016	Paraguay	plant	outdoors	1,298.50[a]	1,298.50	0.00		5,656,266	4

Year	Country / Territory	Product	Outdoors/ indoors	Area cultivated (ha)	Area eradicated (ha)	Harvestable area (ha)	Production (tons)	Plants eradicated	Sites eradicated
2016	Paraguay	resin	outdoors				1.15		
2017	Paraguay	plant	outdoors		1,462.00			36,550,000	
2016	Peru	herb	outdoors		87.83			1,429,749	
2017	Peru	herb	outdoors		61.30			4,671,387	47
2018	Peru	herb	outdoors		91.80			1,716,751	46
2016	Philippines	herb	outdoors		8.67			24,635,153	337
2017	Philippines	herb	outdoors		4.82			221,035	27
2018	Philippines	herb	outdoors		12.39			869,682	186
2016	Poland	herb	indoors					146,755	1,403
2016	Poland	herb	indoors/outdoors					4,585	219
2017	Poland	herb	indoors					448	10
2017	Poland	herb	indoors/outdoors						54
2018	Poland	herb	indoors/outdoors					118,382	1,274
2017	Portugal	herb	indoors/outdoors					22,910	158
2018	Portugal	herb	indoors/outdoors					8,706	139
2013	Republic of Korea	herb	outdoors					8,072	
2014	Republic of Moldova	herb	outdoors	100.00	59.00	41.00	10,000.00	200,548	
2017	Republic of Moldova	herb	outdoors	0.15	2.57			257,236	
2018	Republic of Moldova	herb	outdoors		0.71			86,926	61
2014	Republic of Moldova	herb	indoors		41.00				
2016	Romania	herb	indoors					1,433	41
2016	Romania	herb	outdoors		6.99				42
2017	Romania	herb	indoors					1,875	46
2017	Romania	herb	outdoors		1.90			4,905	32
2018	Romania	herb	indoors					3,903	39
2018	Romania	herb	outdoors		0.11			1,882	98
2016	Russian Federation	herb	indoors		0.66				788
2016	Russian Federation	herb	outdoors	7.61[a]	7.61	0.00	68.64		1,143
2016	Albania	herb	outdoors					2,536,288	5,205
2017	Albania	herb	Indoors					7,766	
2017	Albania	herb	outdoors					66,927	500
2017	Albania	herb	outdoors					33,177	379
2018	Albania	herb	Indoors					2,716	
2014	Algeria	resin	outdoors					2,522	
2016	Armenia	herb	outdoors	0.50[a]	0.50	0.00		757	20
2017	Armenia	herb	outdoors	0.50[a]	0.50	0.00		2,547	21
2018	Armenia	herb	Indoors					1,025	36
2016	Australia	herb	indoors					31,266	408
2016	Australia	herb	outdoors					22,257	1,021
2017	Australia	herb	indoors					78,310	433
2017	Australia	herb	outdoors	1.00[a]	1.00	0.00		31,431	948
2018	Australia	herb	indoors					38,492	542
2018	Australia	herb	outdoors	0.80[a]	0.80	0.00		19,981	1,120
2019	Australia	herb	indoors		1.72			50,837	86
2019	Australia	herb	outdoors	0.04[a]	0.04	0.00		4,755	1
2015	Austria	herb	outdoors	3.00[a]	3.00	0.00			
2013	Azerbaijan	herb	outdoors	23.95[a]	23.95	0.00	263.96	8,469	151
2014	Azerbaijan	herb	outdoors	17.50[a]	17.50	0.00		14,889	195
2017	Azerbaijan	herb	outdoors	0.25[a]		0.25		336,791	
2015	Bahamas	herb	outdoors					17,270	
2013	Bangladesh	herb	outdoors					35,012	

Year	Country / Territory	Product	Outdoors/ indoors	Area cultivated (ha)	Area eradicated (ha)	Harvestable area (ha)	Production (tons)	Plants eradicated	Sites eradicated
2014	Bangladesh	herb	outdoors					35,988	
2015	Bangladesh	herb	outdoors					39,967	
2016	Bangladesh	herb	outdoors					47,104	
2017	Bangladesh	herb	outdoors					69,989	
2016	Belarus	herb	indoors						28
2016	Belarus	herb	oudoors		123.80				1,945
2017	Belarus	herb	indoors						32
2017	Belarus	herb	oudoors		125.90				2,283
2018	Belarus	herb	indoors						42
2018	Belarus	herb	oudoors		106.30				2,469
2019	Belarus	herb	indoors						28
2019	Belarus	herb	oudoors		117.60				2,182
2015	Belgium	herb	indoors					345,518	1,164
2015	Belgium	herb	outdoors					4,885	93
2016	Belgium	herb	indoors					327,216	1,012
2016	Belgium	herb	outdoors					1,395	34
2017	Belgium	herb	indoors					415,728	1,175
2017	Belgium	herb	outdoors					848	59
2018	Belgium	herb	indoors					421,326	944
2018	Belgium	herb	outdoors					935	62
2015	Belize	herb	outdoors					50,897	
2017	Bhutan	herb	outdoors	1.00[a]	1.00	0.00		100,000	12
2016	Bolivia (Plurinational State of)	herb	outdoors		14.60				35
2017	Bolivia (Plurinational State of)	herb	outdoors		14.00				52
2018	Bolivia (Plurinational State of)	herb	outdoors		13.36				52
2019	Bolivia (Plurinational State of)	herb	outdoors		22.50				50
2016	Bosnia and Herzegovina	herb	indoors		39.00				
2016	Bosnia and Herzegovina	herb	outdoors		1,680.00				
2017	Bosnia and Herzegovina	herb	indoors					1	1
2017	Bosnia and Herzegovina	herb	outdoors	0.02[a]	0.02	0.00		539	53
2018	Bosnia and Herzegovina	herb	indoors	0.02[a]	0.02	0.00			6
2018	Bosnia and Herzegovina	herb	outdoors	0.02[a]	0.02	0.00		1,580	12
2019	Bosnia and Herzegovina	herb	outdoors	30.00[a]					
2014	Brazil	herb	outdoors		44.01			1,364,316	
2017	Brazil	herb	outdoors		117.51			1,910,451	604
2018	Brazil	herb	outdoors		68.31			968,145	
2019	Brazil	herb	outdoors		74.53		475.70	1,585,759	651
2015	Bulgaria	herb	indoors					323	
2015	Bulgaria	herb	outdoors				37.77	9,488	
2017	Central African Republic	herb	outdoors	130.00	60.00	55	10.00	250,000	22
2016	Chile	herb	indoors					26,988	2,740
2016	Chile	herb	outdoors					58,950	264
2017	Chile	herb	indoors					50,414	2,408
2017	Chile	herb	outdoors					194,694	202
2018	Chile	herb	indoors					66,007	2,357
2018	Chile	herb	outdoors					183,185	318
2019	Chile	herb	indoors					31,711	1,856
2019	Chile	herb	outdoors					199,523	212
2016	China	herb	outdoors		9.80			1,390,000	
2018	China	herb	outdoors					710	
2016	China, Hong Kong SAR	herb	indoors					329	1

Year	Country / Territory	Product	Outdoors/ indoors	Area cultivated (ha)	Area eradicated (ha)	Harvestable area (ha)	Production (tons)	Plants eradicated	Sites eradicated
2019	China, Hong Kong SAR	herb	indoors					1,693	
2016	Colombia	herb	outdoors		135.00				
2017	Colombia	herb	outdoors		173.71				
2018	Colombia	herb	outdoors		59.66				
2019	Colombia	herb	outdoors		39.34				
2016	Costa Rica	herb	indoors					678.00	5
2016	Costa Rica	herb	outdoors		17.59			2,122,244	201
2017	Costa Rica	herb	indoors						2
2017	Costa Rica	herb	outdoors			14.30			215
2018	Costa Rica	herb	indoors						4
2018	Costa Rica	herb	outdoors	11.41	11.41			1,346,273	208
2019	Costa Rica	herb	indoors						2
2019	Costa Rica	herb	outdoors	11.56	11.56			1,419,495	224
2016	Côte d'Ivoire	herb	outdoors					5	
2017	Côte d'Ivoire	herb	outdoors		0.25				1
2018	Côte d'Ivoire	herb	outdoors					104	1
2019	Côte d'Ivoire	herb	outdoors					4,848	
2016	Czechia	herb	indoors					53,549	229
2016	Czechia	herb	outdoors					4,111	
2017	Czechia	herb	indoors					50,925	305
2017	Czechia	herb	outdoors					3,467	
2018	Czechia	herb	outdoors					6,581	
2019	Czechia	herb	indoors					26,925	258
2019	Czechia	herb	outdoors					5,526	
2015	Denmark	herb	indoors/outdoors					14,560	97
2016	Denmark	herb	indoors/outdoors					13,217	105
2018	Denmark	herb	indoors/outdoors					14,171	99
2019	Denmark	herb	indoors/outdoors					14,338	79
2014	Dominican Republic	herb	outdoors	6.00[a]	6.00	0.00	0.21	111	8
2017	Denmark	herb	indoors/outdoors					34,801	65
2016	Ecuador	herb	outdoors					224	34
2017	Ecuador	herb	outdoors					397	10
2018	Ecuador	herb	indoors					127	30
2018	Ecuador	herb	outdoors					13,891	4
2015	Egypt	herb/resin	outdoors		140.00				
2017	Egypt	herb/resin	outdoors		126.00				
2016	El Salvador	herb	outdoors			1.00		227	25
2019	Estonia	herb	indoors					979	27
2019	Estonia	herb	outdoors					66	2
2018	Eswatini	herb	outdoors	1,500.00	1,069.50	430.50		3,000,000	210
2018	France	herb	outdoors					138,561	
2014	France	herb	outdoors					158,592	837
2017	Georgia	herb	indoors		0.01			186	91
2017	Georgia	herb	outdoors	0.02[a]	0.02	0.00		93	19
2017	Georgia	herb	indoors		0.01			186	91
2017	Georgia	herb	outdoors	0.02	0.02	0.00		93	19
2018	Georgia	herb	indoors		0.05			927	443
2018	Georgia	herb	outdoors	0.10	0.10	0.00		406	98
2015	Germany	herb	indoors					135,925	786
2015	Germany	herb	outdoors					9,136	127
2016	Germany	herb	indoors					79,599	712

Year	Country / Territory	Product	Outdoors/ indoors	Area cultivated (ha)	Area eradicated (ha)	Harvestable area (ha)	Production (tons)	Plants eradicated	Sites eradicated
2016	Germany	herb	outdoors					18,414	108
2017	Germany	herb	indoors					85,226	573
2017	Germany	herb	outdoors						95
2016	Greece	herb	indoors					16,554	
2016	Greece	herb	oudoors					39,151	
2017	Greece	herb	indoors					19,498	
2017	Greece	herb	oudoors					27,409	
2018	Greece	herb	indoors					6,913	
2018	Greece	herb	oudoors					43,684	
2016	Guatemala	herb	outdoors		9.00			3,138,298	427
2017	Guatemala	herb	outdoors	3.50[a]	3.81		1.61	6,033,345	150
2018	Guatemala	herb	outdoors	129.00[a]	129.00	0.00		5,189,422	368
2019	Guatemala	herb	outdoors	150.00[a]	84.26	65.74		3,447,979	127
2015	Guyana	herb	outdoors	20.00	9.40	10.60	1,000.00	419,700	19
2016	Honduras	herb	indoors					7	2
2016	Honduras	herb	oudoors					24,253	19
2017	Honduras	herb	oudoors	59.58[a]	59.59	0.00			
2018	Honduras	herb	oudoors					720,426	67
2019	Honduras	herb	oudoors					228,542	46
2016	Hungary	herb	indoors					5,000	3
2016	Hungary	herb	outdoors					2,000	20
2013	Iceland	herb	indoors					6,652	323
2016	India	herb	outdoors		3,414.74				
2017	India	herb	outdoors		3,445.90			6,687,376	
2018	India	herb	outdoors		3,430.12				
2019	India	herb	outdoors		9,023.27				
2016	Indonesia	herb	outdoors	482.00[a]	482.00	0.00			
2017	Indonesia	herb	outdoors	89.00[a]	89.00	0.00		738,020	14
2018	Indonesia	herb	outdoors	76.23[a]	76.23	0.00		1,455,390	13
2019	Indonesia	herb	outdoors	103.20[a]	84.50	18.70	169.00	845,000	25
2018	Iran (Islamic Republic of)	herb	indoors		0.04				
2016	Ireland	herb	indoors					7,273	
2017	Ireland	herb	indoors					9,046	50
2018	Ireland	herb	indoors					7,186	
2019	Ireland	herb	indoors					8,576	
2014	Italy	herb	indoors					51,534	639
2014	Italy	herb	outdoors					70,125	1,134
2017	Italy	herb	indoors					56,125	1,161
2017	Italy	herb	outdoors					209,510	401
2019	Italy	herb	indoors					68,266	
2019	Italy	herb	outdoors					155,275	
2016	Kazakhstan	herb	outdoors	18.00[a]	18.00	0.00		170,000	202
2017	Kazakhstan	herb	outdoors	12.30[a]	12.30	0.00		930,774	91
2016	Kenya	herb	outdoors	12.00				8,747	46
2017	Kenya	herb	outdoors		0.10			4,662	
2018	Kenya	herb	outdoors		0.10			517	
2019	Kenya	herb	outdoors	0.25[a]	0.25	0.00		130	1
2015	Kyrgyzstan	herb	outdoors	5,014.00		5,014.00			
2018	Kyrgyzstan	herb	outdoors	1,276.37	457.69	818.68		49,942	12.00
2016	Latvia	herb	indoors					557	35
2016	Latvia	herb	outdoors					78	6

Year	Country / Territory	Product	Outdoors/ indoors	Area cultivated (ha)	Area eradicated (ha)	Harvestable area (ha)	Production (tons)	Plants eradicated	Sites eradicated
2017	Latvia	herb	indoors					798	34
2017	Latvia	herb	outdoors					66	15
2018	Latvia	herb	indoors					152	17
2018	Latvia	herb	outdoors					1,152	34
2019	Latvia	herb	indoors					932	34
2019	Latvia	herb	outdoors					61	12
2015	Lebanon	herb	outdoors	3,500.00		3,500.00			
2017	Lebanon	Kif	outdoors	40,772.00					
2018	Lebanon	herb	outdoors	4,205.70		4,205.70			
2016	Lithuania	herb	indoors						4
2017	Lithuania	herb	indoors						8
2017	Lithuania	herb	outdoors						7
2018	Lithuania	herb	indoors						3
2015	Madagascar	herb	outdoors		11.00			21,325	
2017	Madagascar	herb	outdoors		9.00			57,708	
2013	Malta	herb	indoors					27	
2016	Mexico	herb	outdoors		5,478.42		6,574.1		38,432
2017	Mexico	herb	outdoors		4,193.34		5,032.0		34,523
2018	Mexico	herb	outdoors		2,263.71		2,726.47		28,873
2013	Mongolia	herb	outdoors	15,000.00	4,000.00	11,000.00		4,000	4,000
2018	Mongolia	herb	outdoors	15,000.00	173.00	14,827.00			33
2016	Morocco	herb	outdoors				35,652.83		
2016	Morocco	plant	outdoors	47,000.00	395.00	46,605.00			
2016	Morocco	resin	outdoors				713.00		
2017	Morocco	herb	outdoors				35,702.90		
2017	Morocco	plant	outdoors	47,500.00	523.00	46,977.00			
2017	Morocco	resin	outdoors				714.06		
2018	Morocco	herb	outdoors				23,699.80		
2018	Morocco	plant	outdoors	47,500.00		47,500.00			
2018	Morocco	resin	outdoors				423.58		
2019	Morocco	plant	outdoors	21,048.71	135.50	20,913.21			
2019	Morocco	resin	outdoors				596.03		
2014	Myanmar	herb	outdoors	15.00	10.00	5.00			3
2018	Nepal	herb	outdoors	235.87	235.87	0.00	5,000.00	2,358,700	335
2016	Netherlands	herb	indoors					994,068	5,856
2017	Netherlands	herb	indoors					883,163	5,538
2018	Netherlands	herb	indoors					516,418	3,482
2018	Netherlands	herb	outdoors						431
2019	Netherlands	herb	indoors					556,802	3,285
2019	Netherlands	herb	outdoors						350
2016	New Zealand	herb	indoors					18,903	607
2016	New Zealand	herb	outdoors					104,725	
2017	New Zealand	herb	indoors					19,992	
2017	New Zealand	herb	outdoors					19,559	
2018	New Zealand	herb	indoors					19,313	
2018	New Zealand	herb	outdoors					22,660	
2019	New Zealand	herb	indoors					18,052	
2019	New Zealand	herb	outdoors					15,269	
2014	Nicaragua	herb	outdoors		0.30		1,507.00	3,014	30
2016	Nicaragua	herb	outdoors					275,000	
2017	Nicaragua	herb	outdoors					994,787	

Year	Country / Territory	Product	Outdoors/ indoors	Area cultivated (ha)	Area eradicated (ha)	Harvestable area (ha)	Production (tons)	Plants eradicated	Sites eradicated
2016	Nigeria	herb	outdoors		718.78				65
2017	Nigeria	herb	outdoors		317.12				
2018	Nigeria	herb	outdoors		3,660.64				
2017	North Macedonia	herb	indoors					168	
2017	North Macedonia	herb	outdoors					220	
2018	North Macedonia	herb	outdoors	2.51			0.00404	2,264	4,527
2015	Norway	herb	indoors		0.04			4,000	30
2016	Oman	herb	outdoors	0.50[a]	0.50	0.00		5	3
2013	Panama	herb	indoors	0.50[a]	0.50	0.00		37	2
2013	Panama	herb	outdoors	10.50[a]	10.50	0.00		78,633	2
2016	Paraguay	herb	outdoors				1,298.50		
2016	Paraguay	plant	outdoors	1,298.50[a]	1,298.50	0.00		5,656,266	4
2016	Paraguay	resin	outdoors				1.15		
2017	Paraguay	plant	outdoors		1,462.00			36,550,000	
2016	Peru	herb	outdoors		87.83			1,429,749	
2017	Peru	herb	outdoors		61.30			4,671,387	47
2018	Peru	herb	outdoors		91.80			1,716,751	46
2016	Philippines	herb	outdoors		8.67			24,635,153	337
2017	Philippines	herb	outdoors		4.82			221,035	27
2018	Philippines	herb	outdoors		12.39			869,682	186
2019	Philippines	herb	outdoors		149.35			2,345,650	137
2016	Poland	herb	indoors					146,755	1,403
2016	Poland	herb	indoors/outdoors					4,585	219
2017	Poland	herb	indoors					448	10
2017	Poland	herb	indoors/outdoors						54
2018	Poland	herb	indoors/outdoors					118,382	1,274.00
2019	Poland	herb	indoors					2,840	2
2019	Poland	herb	indoors/outdoors					5,124	17
2017	Portugal	herb	indoors/outdoors					22,910	158
2018	Portugal	herb	indoors/outdoors					8,706	139
2019	Portugal	herb	indoors/outdoors					12,077	131
2013	Republic of Korea	herb	outdoors					8,072	
2014	Republic of Moldova	herb	indoors		41.00				
2014	Republic of Moldova	herb	outdoors	100.00	59.00	41.00	10,000.00	200,548	
2017	Republic of Moldova	herb	outdoors	0.15	2.57			257,236	
2018	Republic of Moldova	herb	outdoors		0.71			86,926	61
2019	Republic of Moldova	herb	outdoors					143,537	
2016	Romania	herb	indoors					1,433	41
2016	Romania	herb	outdoors		6.99				42
2017	Romania	herb	indoors					1,875	46
2017	Romania	herb	outdoors		1.90			4,905	32
2018	Romania	herb	indoors					3,903	39
2018	Romania	herb	outdoors		0.11			1,882	98
2019	Romania	herb	indoors		0.49			2,096	39
2019	Romania	herb	outdoors					787	44
2016	Russian Federation	herb	indoors		0.66				788
2016	Russian Federation	herb	outdoors	7.61[a]	7.61	0.00	68.64		1,143
2017	Russian Federation	herb	indoors		0.87				1,990
2017	Russian Federation	herb	outdoors	159.00[a]	159.00	0.00	30.07		5,379
2018	Russian Federation	herb	indoors		1.87				
2018	Russian Federation	herb	outdoors	9.34[a]	7.47	1.87			16,212

Year	Country / Territory	Product	Outdoors/ indoors	Area cultivated (ha)	Area eradicated (ha)	Harvestable area (ha)	Production (tons)	Plants eradicated	Sites eradicated
2019	Russian Federation	herb	indoors		0.72				2,112
2019	Russian Federation	herb	outdoors		161.10				3,571
2015	Serbia	herb	outdoors				0.05		
2013	Sierra Leone	herb	outdoors	190.00		190.00		190	3
2016	Slovakia	herb	indoors					385	
2017	Slovakia	herb	outdoors	2.00[a]	2.00	0.00		2,299	31
2019	Slovakia	herb	indoors					1,611	41
2014	Slovenia	herb	indoors					9,223	118
2014	Slovenia	herb	outdoors					1,844	
2017	Slovenia	herb	indoors					10,259	78
2015	Spain	herb	indoors					244,772	108
2015	Spain	herb	outdoors					135,074	44
2014	Sudan	herb	outdoors	8.00[a]	8.00	0.00	345.00		
2017	Sudan	herb	outdoors	1,250.00[a]	1,250.00	0.00	205.00		100
2018	Sudan	herb	outdoors	7,744.00[a]	1,452.00	6,292.00	774,400.00	1,500,000	3
2014	Sweden	herb	indoors					10,000	56
2015	Sweden	herb	outdoors				182.00		
2017	Sweden	herb	indoors					5,100	44
2018	Sweden	herb	indoors					1,642	
2016	Switzerland	herb	indoors					11,386	83
2017	Switzerland	herb	indoors					71,750	
2016	Thailand	herb	outdoors	1.00[a]	1.00	0.00	7.50		1
2019	Thailand	herb	outdoors	1.50[a]	1.50	0.00	45.00	4,790	53
2019	Togo	herb	outdoors		0.06				1
2015	Trinidad and Tobago	herb	outdoors		0.31			375,925	58
2016	Ukraine	herb	outdoors	91.00[a]	91.00	0.00			
2017	Ukraine	herb	outdoors		166.90			483,000	
2019	Ukraine	herb	outdoors		47.00			1,800,000	2,135
2016	United States of America	herb	indoors					406,125	1,865
2016	United States of America	herb	outdoors					4,940,596	5,513
2017	United States of America	herb	indoors					303,654	1,399
2017	United States of America	herb	outdoors					3,078,418	4,062
2018	United States of America	herb	indoors					596,149	1,618
2018	United States of America	herb	outdoors					2,221,837	3,847
2019	United States of America	herb	indoors					770,472	1,437
2019	United States of America	herb	outdoors					3,232,722	3,850
2016	Uruguay	herb	indoors					661	
2017	Uruguay	herb	indoors					1,926	
2019	Uruguay	herb	indoors					1,654	
2016	Uzbekistan	herb	outdoors	0.20[a]	0.20	0.00			586
2017	Uzbekistan	herb	outdoors	0.20[a]	0.20	0.00			618
2018	Uzbekistan	herb	indoors	0.13[a]	0.13	0.00			519
2019	Uzbekistan	herb	outdoors	0.11[a]	0.11	0.00			417
2018	Venezuela	herb	oudoors					13,891	4
2015	Viet Nam	herb	oudoors		1.00				

Sources: United Nations Office on Drugs and Crime annual report questionnaire, government reports and and international narcotics control strategy reports of the United States of America.

a) Estimate of total area under cannabis cultivation.

GLOSSARY

amphetamine-type stimulants — a group of substances composed of synthetic stimulants controlled under the Convention on Psychotropic Substances of 1971 and from the group of substances called amphetamines, which includes amphetamine, methamphetamine, methcathinone and the "ecstasy"-group substances (3,4-methylenedioxymethamphetamine (MDMA) and its analogues).

amphetamines — a group of amphetamine-type stimulants that includes amphetamine and methamphetamine.

annual prevalence — the total number of people of a given age range who have used a given drug at least once in the past year, divided by the number of people of the given age range, and expressed as a percentage.

coca paste (or coca base) — an extract of the leaves of the coca bush. Purification of coca paste yields cocaine (base and hydrochloride).

"crack" cocaine — cocaine base obtained from cocaine hydrochloride through conversion processes to make it suitable for smoking.

cocaine salt — cocaine hydrochloride.

drug use — use of controlled psychoactive substances for non-medical and non-scientific purposes, unless otherwise specified.

fentanyls — fentanyl and its analogues.

new psychoactive substances — substances of abuse, either in a pure form or a preparation, that are not controlled under the Single Convention on Narcotic Drugs of 1961 or the 1971 Convention, but that may pose a public health threat. In this context, the term "new" does not necessarily refer to new inventions but to substances that have recently become available.

opiates — a subset of opioids comprising the various products derived from the opium poppy plant, including opium, morphine and heroin.

opioids — a generic term that refers both to opiates and their synthetic analogues (mainly prescription or pharmaceutical opioids) and compounds synthesized in the body.

problem drug users — people who engage in the high-risk consumption of drugs. For example, people who inject drugs, people who use drugs on a daily basis and/or people diagnosed with drug use disorders (harmful use or drug dependence), based on clinical criteria as contained in the *Diagnostic and Statistical Manual of Mental Disorders* (fifth edition) of the American Psychiatric Association, or the *International Classification of Diseases and Related Health Problems* (tenth revision) of WHO.

people who suffer from drug use disorders/people with drug use disorders — a subset of people who use drugs. Harmful use of substances and dependence are features of drug use disorders. People with drug use disorders need treatment, health and social care and rehabilitation.

harmful use of substances — defined in the *International Statistical Classification of Diseases and Related Health Problems* (tenth revision) as a pattern of use that causes damage to physical or mental health.

dependence — defined in the *International Statistical Classification of Diseases and Related Health Problems* (tenth revision) as a cluster of physiological, behavioural and cognitive phenomena that develop after repeated substance use and that typically include a strong desire to take the drug, difficulties in controlling its use, persisting in its use despite harmful consequences, a higher priority given to drug use than to other activities and obligations, increased tolerance, and sometimes a physical withdrawal state.

substance or drug use disorders — referred to in the *Diagnostic and Statistical Manual of Mental Disorders* (fifth edition) as patterns of symptoms resulting from the repeated use of a substance despite experiencing problems or impairment in daily life as a result of using substances. Depending on the number of symptoms identified, substance use disorder may be mild, moderate or severe.

prevention of drug use and treatment of drug use disorders — the aim of "prevention of drug use" is to prevent or delay the initiation of drug use, as well as the transition to drug use disorders. Once a person develops a drug use disorder, treatment, care and rehabilitation are needed.

REGIONAL GROUPINGS

The *World Drug Report* uses a number of regional and subregional designations. These are not official designations, and are defined as follows:

AFRICA

- East Africa: Burundi, Comoros, Djibouti, Eritrea, Ethiopia, Kenya, Madagascar, Mauritius, Rwanda, Seychelles, Somalia, South Sudan, Uganda, United Republic of Tanzania and Mayotte
- North Africa: Algeria, Egypt, Libya, Morocco, Sudan and Tunisia
- Southern Africa: Angola, Botswana, Eswatini, Lesotho, Malawi, Mozambique, Namibia, South Africa, Zambia, Zimbabwe and Reunion
- West and Central Africa: Benin, Burkina Faso, Cabo Verde, Cameroon, Central African Republic, Chad, Congo, Côte d'Ivoire, Democratic Republic of the Congo, Equatorial Guinea, Gabon, Gambia, Ghana, Guinea, Guinea-Bissau, Liberia, Mali, Mauritania, Niger, Nigeria, Sao Tome and Principe, Senegal, Sierra Leone, Togo and Saint Helena

AMERICAS

- Caribbean: Antigua and Barbuda, Bahamas, Barbados, Cuba, Dominica, Dominican Republic, Grenada, Haiti, Jamaica, Saint Kitts and Nevis, Saint Lucia, Saint Vincent and the Grenadines, Trinidad and Tobago, Anguilla, Aruba, Bonaire, Netherlands, British Virgin Islands, Cayman Islands, Curaçao, Guadeloupe, Martinique, Montserrat, Puerto Rico, Saba, Netherlands, Sint Eustatius, Netherlands, Sint Maarten, Turks and Caicos Islands and United States Virgin Islands
- Central America: Belize, Costa Rica, El Salvador, Guatemala, Honduras, Nicaragua and Panama
- North America: Canada, Mexico, United States of America, Bermuda, Greenland and Saint-Pierre and Miquelon
- South America: Argentina, Bolivia (Plurinational State of), Brazil, Chile, Colombia, Ecuador, Guyana, Paraguay, Peru, Suriname, Uruguay, Venezuela (Bolivarian Republic of) and Falkland Islands (Malvinas)

ASIA

- Central Asia and Transcaucasia: Armenia, Azerbaijan, Georgia, Kazakhstan, Kyrgyzstan, Tajikistan, Turkmenistan and Uzbekistan
- East and South-East Asia: Brunei Darussalam, Cambodia, China, Democratic People's Republic of Korea, Indonesia, Japan, Lao People's Democratic Republic, Malaysia, Mongolia, Myanmar, Philippines, Republic of Korea, Singapore, Thailand, Timor-Leste, Viet Nam, Hong Kong, China, Macao, China, and Taiwan Province of China
- South-West Asia: Afghanistan, Iran (Islamic Republic of) and Pakistan
- Near and Middle East: Bahrain, Iraq, Israel, Jordan, Kuwait, Lebanon, Oman, Qatar, Saudi Arabia, Syrian Arab Republic, United Arab Emirates, Yemen and State of Palestine
- South Asia: Bangladesh, Bhutan, India, Maldives, Nepal and Sri Lanka

EUROPE

- Eastern Europe: Belarus, Republic of Moldova, Russian Federation and Ukraine
- South-Eastern Europe: Albania, Bosnia and Herzegovina, Bulgaria, Croatia, Montenegro, North Macedonia, Romania, Serbia, Turkey and Kosovo[1]

1 References to Kosovo shall be understood to be in the context of Security Council resolution 1244 (1999).

- Western and Central Europe: Andorra, Austria, Belgium, Cyprus, Czechia, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Liechtenstein, Lithuania, Luxembourg, Malta, Monaco, Netherlands, Norway, Poland, Portugal, San Marino, Slovakia, Slovenia, Spain, Sweden, Switzerland, United Kingdom of Great Britain and Northern Ireland, Holy See, Faroe Islands and Gibraltar

OCEANIA

- Australia and New Zealand: Australia and New Zealand
- Polynesia: Cook Islands, Niue, Samoa, Tonga, Tuvalu, French Polynesia, Tokelau and Wallis and Futuna Islands
- Melanesia: Fiji, Papua New Guinea, Solomon Islands, Vanuatu and New Caledonia
- Micronesia: Kiribati, Marshall Islands, Micronesia (Federated States of), Nauru, Palau, Guam and Northern Mariana Islands

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UNODC Research

Consisting of five separate booklets, the *World Drug Report 2021* provides an in-depth analysis of the global drug markets and paints a comprehensive picture of the measurable effects and potential impact of the COVID-19 crisis on the world drug problem.

Booklet 1 summarizes the four subsequent booklets by reviewing their key findings and highlighting their policy implications. Booklet 2 offers a projection of the impact of population growth on drug use by 2030 and gives a global overview of the supply of and demand for drugs, including their health impact and the trafficking of substances over the Internet. Booklet 3 provides an analysis of the global markets for cannabis and opioids, both in terms of supply and use, and includes an overview of the latest developments in countries with measures regulating the non-medical use of cannabis; it also discusses the overlaps between the various opioids and looks at access to pharmaceutical opioids for medical use. Booklet 4 contains the latest trends in and estimates of the markets for stimulants – cocaine, methamphetamine, amphetamine and "ecstasy" – both at the global level and in the most affected subregions. Booklet 5 presents an early assessment of the impact of the COVID-19 pandemic on drug markets by looking at how it has affected drug supply and demand dynamics, including in terms of health consequences and how drug service provision has adapted to the new situation in many countries; the booklet closes with a look at how the pandemic may influence long-term changes in the drug markets.

The *World Drug Report 2021* is aimed not only at fostering greater international cooperation to counter the impact of the world drug problem on health, governance and security, but also, with its special focus on the impact of the COVID-19 pandemic, at assisting Member States in anticipating and addressing challenges that may arise in the near future.

The accompanying statistical annex is published on the UNODC website:
www.unodc.org/unodc/en/data-and-analysis/wdr2021.html