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**DRUG MARKET  
TRENDS:  
CANNABIS  
OPIOIDS**

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ISBN: 9789211483611

eISBN: 9789210058032

United Nations publication, Sales No. E.21.XI.8

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Suggested citation:

*World Drug Report 2021* (United Nations publication, Sales No. E.21.XI.8).

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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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## Acknowledgements

The *World Drug Report 2021* was prepared by the Research and Trend Analysis Branch, Division for Policy Analysis and Public Affairs, United Nations Office on Drugs and Crime (UNODC), under the supervision of Jean-Luc Lemahieu, Director of the Division, and Angela Me, Chief of the Research and Trend Analysis Branch, and the coordination of Chloé Carpentier, Chief of the Drug Research Section.

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The Research and Trend Analysis Branch acknowledges the invaluable contributions and advice provided by the *World Drug Report* Scientific Advisory Committee:

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The analysis on access to pharmaceutical opioids in Booklet 3 is based on original data graciously shared by the INCB Secretariat.

# 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:

- alpha-PVP** *alpha*-pyrrolidinovalerophenone
- CBD** cannabidiol
- COVID-19** coronavirus disease
- DALYs** disability-adjusted life years
- Δ-9-THC** *delta*-9-tetrahydrocannabinol
- ECOWAS** Economic Community of West African States
- EMCDDA** European Monitoring Centre for Drugs and Drug Addiction
- Europol** European Union Agency for Law Enforcement Cooperation
- ha** hectares
- INCB** International Narcotics Control Board
- NPS** new psychoactive substances
- S-DDD** defined daily doses for statistical purposes
- UNODC** United Nations Office on Drugs and Crime
- WHO** World Health Organization





## SCOPE OF THE BOOKLET

3

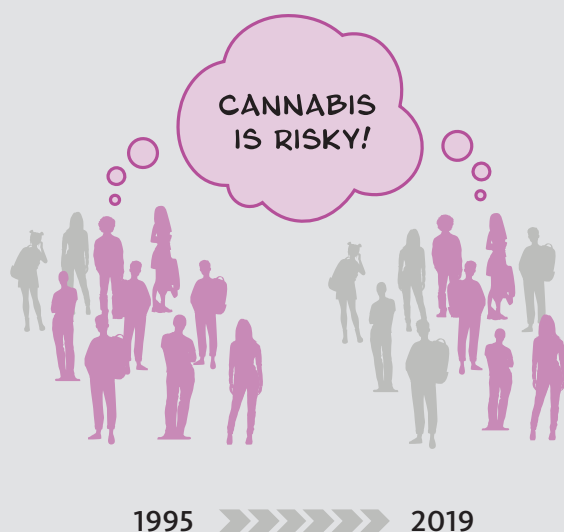
SCOPE OF THE BOOKLET

Constituting the third part of the *World Drug Report 2021*, the present booklet contains an analysis of the global market for cannabis, starting with a review of cannabis supply, including trends in the cultivation of and trafficking in cannabis herb and cannabis resin at the global level and in the various regions. It contains the latest estimates of and trends in cannabis use, including an analysis of changes over time in cannabis use and risk perceptions. The booklet also includes an overview of the latest developments in measures regulating the non-medical use of cannabis in Canada, Uruguay and some jurisdictions in the United States of America.

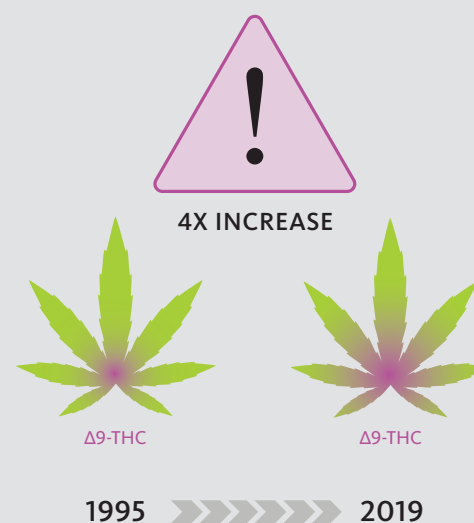
With respect to opioids, the booklet discusses the overlaps between the various opioids, mostly in terms of demand dynamics. It also contains the latest estimates of and trends in opioid use at the global and regional levels, including an update on the availability of pharmaceutical opioids for medical consumption. That is followed by an overview of the latest estimates of and trends in the supply of opiates, from the cultivation of opium poppy and production of opium to trafficking trends and routes, on the basis of seizures made in the subregions in which opiates are produced and along the routes to the main opiate markets. The booklet concludes with a review of the supply of other opioids, in particular the trafficking trends and routes for fentanyl and tramadol both at the global level and in the subregions most affected.

### CANNABIS IS MORE POTENT BUT FEWER YOUNG PEOPLE SEE IT AS HARMFUL

#### PERCEPTION AMONG ADOLESCENTS

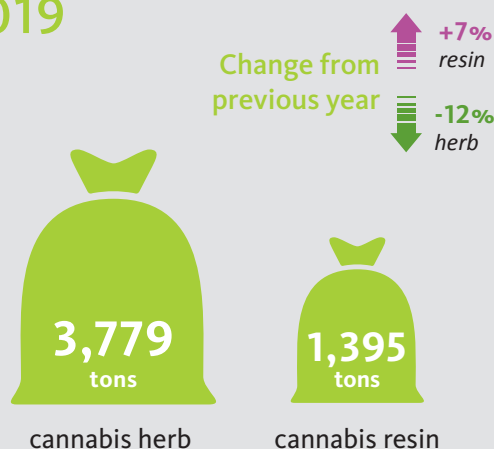


#### CANNABIS HERB POTENCY

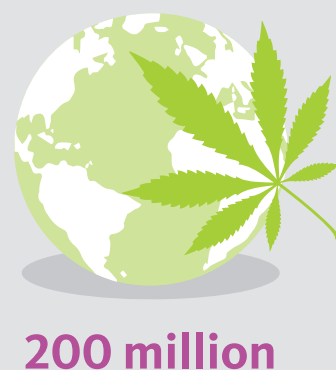




## GLOBAL SEIZURES 2019



## GLOBAL NUMBER OF USERS 2019



## Cannabis supply

### Cannabis cultivation and production affects all regions

Unlike other plant-based drugs, for which cultivation and production are concentrated in only a few countries, cannabis is produced in almost all countries worldwide. In the period 2010–2019, the cultivation of cannabis plant was reported to UNODC either through direct indicators (such as the cultivation or eradication of cannabis plants and the dismantlement of cannabis-producing sites) or indirect indicators (such as the seizure of cannabis plants and the origin of cannabis seizures as reported by other Member States) by 151 countries, covering 97 per cent of the global population.

Qualitative information on trends reported by Member States suggests that there was an expansion in global cannabis cultivation over the period 2010–2017, followed by a decline in 2018 and then a moderate increase in 2019.

### Outdoor cultivation of cannabis continues to be more widespread than indoor cultivation, but the increase in indoor cultivation is larger

Available data suggest that outdoor cannabis cultivation continues to be more widespread at the global level than indoor cannabis cultivation, a situation that did not change between the periods 2010–2014 and 2015–2019. Overall, 89 countries reported outdoor cannabis cultivation and/or law enforcement activities linked to outdoor cannabis cultivation (such as eradication, seizures of cannabis plants and seizures of cannabis-producing sites) in the period 2010–2019, while 65 countries reported data in relation to indoor cultivation. Some countries reported both indoor and outdoor cannabis cultivation.

Whereas outdoor cannabis production is found around the globe, most reported indoor cultivation of cannabis continues to be concentrated in countries of Europe and North America (most notably the United States, followed by Canada) and, to a lesser extent, in countries of Central

## Source countries for cannabis

As most countries do not have systems in place to systematically monitor the area under cannabis cultivation, estimating the global area under cannabis cultivation is challenging. On the one hand, some countries report the total area under cannabis cultivation, but such estimates have severe limitations; on the other hand, existing indicators on seizures and eradication are widely available. Any indicator as it relates to a single country is insufficient to provide insight into the extent of cannabis cultivation and production, but when the indicators for various countries are analysed together, they can point to those countries where the most significant cannabis cultivation is likely to exist.<sup>a</sup> Analysis of the various indicators over the period 2010–2019 suggests that the following countries are likely to have a significant area under cannabis cultivation in comparison with other countries in the same region or subregion (given in order of importance, for each subregion):

### > Americas

North America: Mexico, the United States of America and Canada

South America: Paraguay, Brazil and Colombia

Central America: Guatemala, Costa Rica and Honduras

Caribbean: Jamaica and Trinidad and Tobago

### > Africa

Morocco, Egypt, South Africa, Nigeria, Eswatini and Ghana

### > Europe

Western and Central Europe: the Netherlands, Spain, Czechia and Switzerland

South-Eastern Europe: Albania, Turkey and Romania

Eastern Europe: the Russian Federation and Ukraine

### > Asia

Near and Middle East/South-West Asia: Afghanistan, Lebanon and Pakistan

Central Asia: Kyrgyzstan and Kazakhstan

Transcaucasia: Azerbaijan and Armenia

South Asia: India and Nepal

South-East Asia: the Philippines, the Lao People's Democratic Republic, Thailand and Indonesia

### > Oceania

Australia and New Zealand

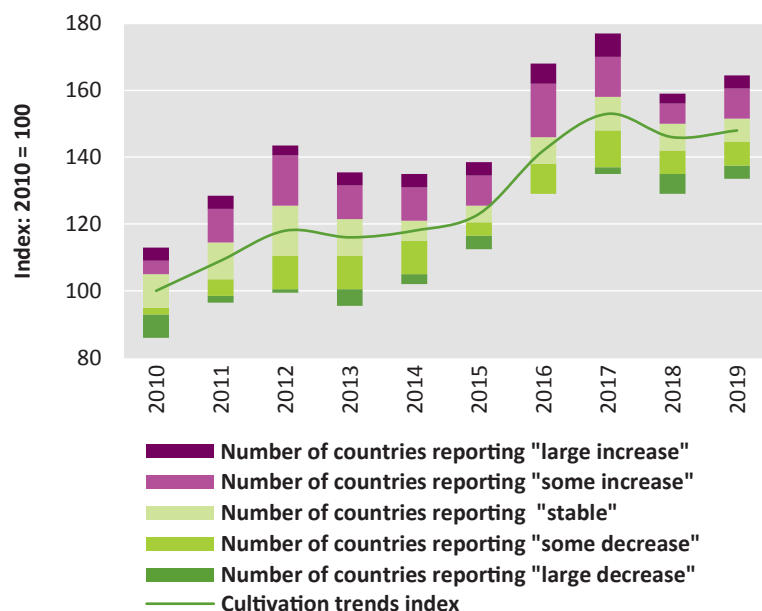
<sup>a</sup> Data for a number of direct indicators (e.g., "area under cannabis cultivation") and for indirect indicators (e.g., "hectares of cannabis eradicated", "number of cannabis plants eradicated", "number of cannabis sites eradicated", "number of cannabis plants seized", "origin of cannabis seized" and "seizures of cannabis herb and resin") are available and have been combined to identify those countries likely to have a significant area under cannabis cultivation.

and South America (including Chile, Colombia, Ecuador and Uruguay). Beyond those regions, indoor cannabis cultivation is found in Oceania (Australia and New Zealand) as well as in a number of countries and territories in Asia, including in the Near and Middle East/South-West Asia (Iran (Islamic Republic of), Israel and the State of Palestine), in East and South-East Asia (China, including Hong Kong, China, Japan and Mongolia), in Central Asia (Kyrgyzstan and Uzbekistan) and Transcaucasia (Armenia and Georgia). To date, no indoor cannabis cultivation has been reported to UNODC by countries in Africa.

Qualitative information on trends reported by Member States also suggests that over the period 2012–2019, the

increase in indoor cannabis cultivation was larger than the increase in outdoor cultivation. In that period, 49 countries (43 per cent of the countries that reported trends in indoor cultivation) reported an increase in indoor cultivation, while 23 countries (20 per cent) reported a decrease, resulting in overall "net growth" of 23 per cent among all countries that reported indoor cannabis cultivation trends. That is more than three times the corresponding "net growth" in the proportion of countries that reported outdoor cannabis cultivation trends (7 per cent). Most of the increases in indoor cannabis cultivation were reported by countries in Europe and, to a lesser extent, by countries in the Americas.

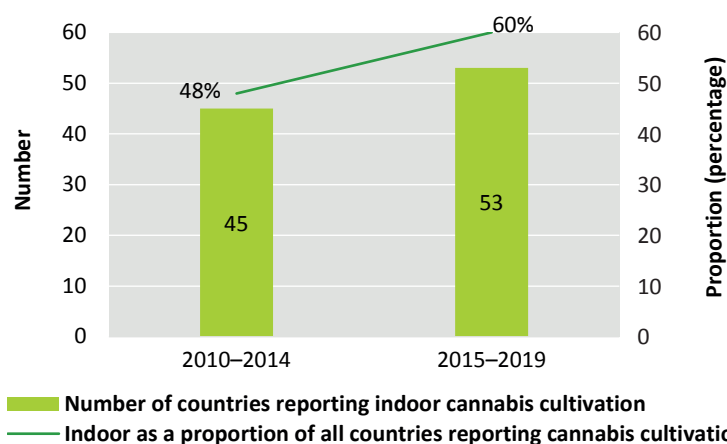
**FIG. 1** Qualitative information on trends in cannabis cultivation as reported by national experts, 2010–2019



Source: UNODC, responses to the annual report questionnaire.

Note: The cultivation trends index is based on qualitative information on trends in cannabis cultivation reported by Member States. Calculations are based on the reports of 112 countries – on average, 34 countries per year over the period 2010–2019. The trend line is calculated on the basis of the number of countries reporting increases minus the number of countries reporting decreases (2 points for "large increase", 1 point for "some increase", 0 points for "stable", -1 point for "some decrease", -2 points for "large decrease").

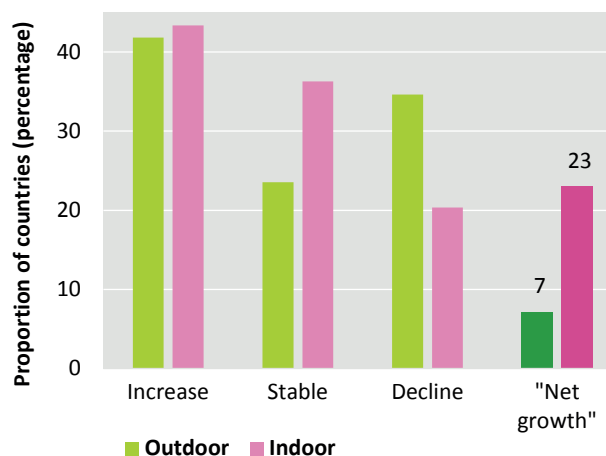
**FIG. 2** Number of countries reporting indoor cannabis cultivation and their share among all countries with cannabis cultivation, 2010–2014 and 2015–2019



Source: UNODC, responses to the annual report questionnaire.

Note: Figures are based on estimates reported by countries of the area under cannabis cultivation and/or area of cannabis eradicated and/or number of cannabis plants eradicated and/or number of cannabis sites eradicated and/or area available for cannabis cultivation after eradication.

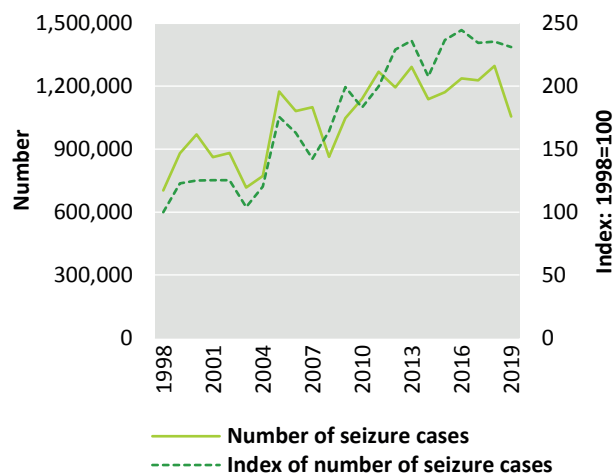
**FIG. 3** Reported trends in outdoor and indoor cannabis cultivation, 2012–2019



Source: UNODC, responses to the annual report questionnaire.

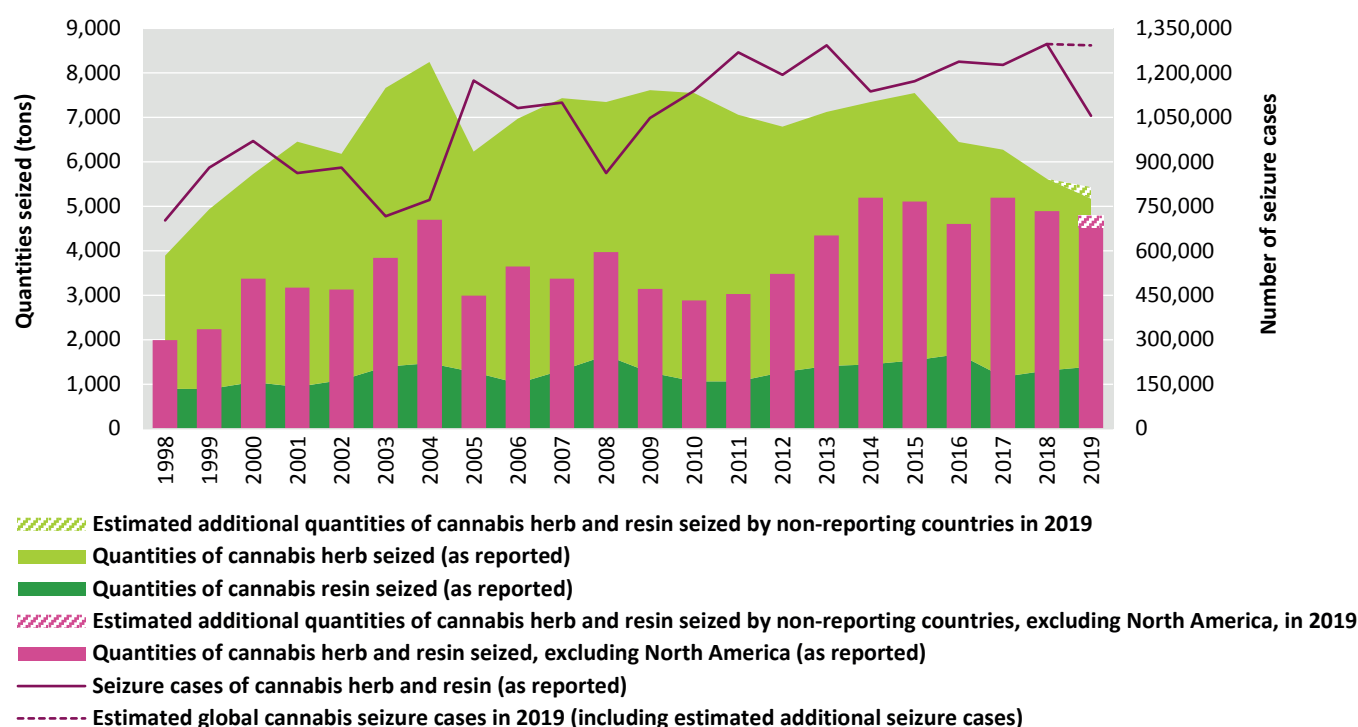
Note: The figure is based on qualitative information on trends in indoor and outdoor cannabis cultivation reported by Member States. "Net growth" is defined here as the number of countries reporting increases minus the number of countries reporting decreases in cannabis cultivation over the period 2012–2019, presented as a proportion of the total number of countries providing trends on outdoor cannabis cultivation and on indoor cannabis cultivation, respectively.

**FIG. 4** Global number of cannabis herb and resin seizure cases, 1998–2019



Source: UNODC calculations based on responses to the annual report questionnaire.

Note: The number of seizure cases is based on cannabis herb and resin seizure cases reported by an average of 75 countries per year over the period 1998–2019 (57 countries in 2019). The index is a chained index of the number of cannabis herb and resin seizure cases reported by countries in at least two subsequent years; it is based on the reporting of an average of 61 countries per year (52 countries in 2018–2019).

**FIG. 5** Global cannabis seizures: quantities and seizure cases, 1998–2019

Source: UNODC, responses to the annual report questionnaire.

*Note: A total of 121 countries reported seizure cases of cannabis herb or resin in the period 2009–2019, with an average of 62 countries per year (57 in 2019). This compares with a total of 166 countries reporting quantities of cannabis herb or resin seized in the period 2009–2019, with an average of 127 countries per year (120 in 2019). The estimates for 2019 are based on the assumption that the quantities of cannabis (herb and resin) seized and the number of cannabis (herb and resin) seizure cases remained unchanged in non-reporting countries in 2019 as compared with the previous year.*

### Quantities of cannabis seized continue to decline, although probably not due to reduced supply

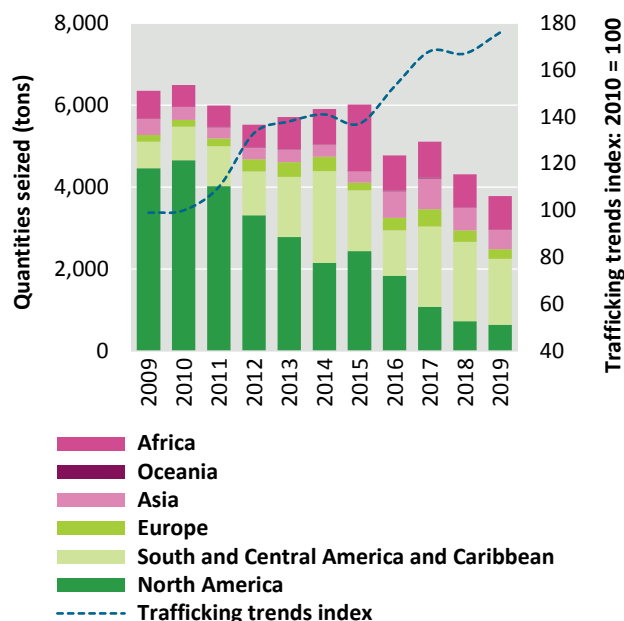
The reported numbers of seizures of cannabis (herb and resin) showed an upward trend over the first decade of the new millennium, albeit with annual fluctuations, followed in recent years by a more stable trend. By contrast, the quantities of cannabis (herb and resin) seized at the global level, fell by 8 per cent in 2019 to 5,174 tons, the fifth consecutive yearly decline. The quantities seized declined in all regions except Africa, and in all sub-regions except West and Central Africa, North Africa, the Caribbean, Central America and Eastern Europe; however, some of this decline may have been partially due to the non-reporting of some countries in 2019.

The overall decrease in the quantities of cannabis (herb and resin) seized in the last decade reflects a 56 per cent

decline in the Americas over the period 2009–2019 (and more than 40 per cent since 2015). The global quantities of cannabis (herb and resin) seized, excluding those reported in North America, were 44 per cent larger in 2019 than in 2009.

In contrast to the decline in the quantities of cannabis (herb and resin) seized, qualitative information on trends reported by Member States (38 countries on average per year) suggests an upward trend in cannabis trafficking over the past decade, most notably after 2015, and the upward trend continued in 2019. This discrepancy could be the result of the set of countries reporting seizures being to some degree different from the set of countries reporting trends by means of qualitative information. It may also be an indication that the overall decline in the quantities of cannabis seized may be a result of the interdiction of cannabis possibly becoming less of a priority for law enforcement agencies in a number of jurisdictions

**FIG. 6** Quantities of cannabis herb seized and reported trends in cannabis herb trafficking, 2009–2019



Source: UNODC, responses to the annual report questionnaire.

*Note: The trafficking trends index is based on qualitative information on trends in cannabis herb trafficking reported by Member States. The trend line is calculated on the basis of the number of countries reporting increases minus the number of countries reporting decreases (2 points for “large increase”, 1 point for “some increase”, 0 points for “stable”, -1 point for “some decrease”, -2 points for “large decrease”).*

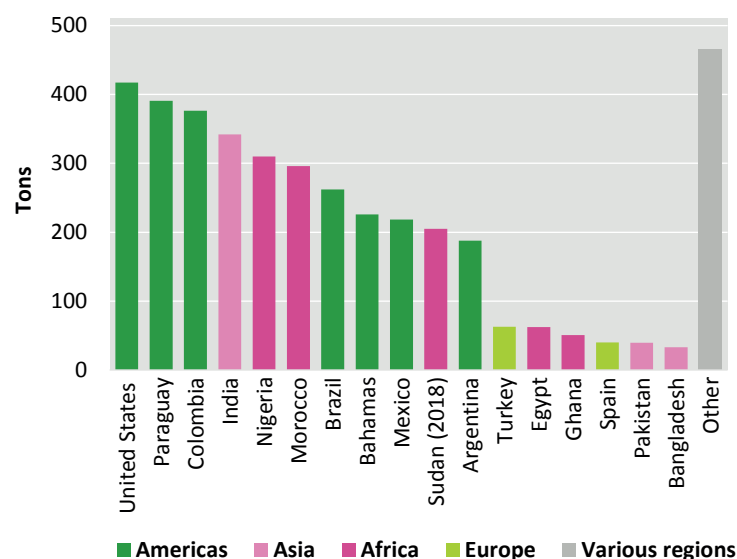
in the Americas because of the decriminalization and legalization of cannabis for non-medical use in these jurisdictions,<sup>1</sup> rather than an indication of a decline in the supply of cannabis at the global level.

### Decline in quantities of cannabis herb seized in North America may be partly linked to the legalization of some cannabis markets in that subregion

The total global quantity of cannabis herb seized in 2019 declined by 12 per cent compared with the previous year, falling to 3,779 tons, the lowest figure since 1998. The largest proportion of that amount was seized in the

<sup>1</sup> United States Government Accountability Office, “State marijuana legalization: DOJ should document its approach to monitoring the effects of legalization”, Report to Congressional Requesters, GAO-16-1 (December 2015).

**FIG. 7** Quantities of cannabis herb seized, by country, 2019



Source: UNODC, responses to the annual report questionnaire.

*Note: No seizure data provided for 2019 by Sudan; data refer to 2018.*

Americas (60 per cent of the global total), with South America accounting for 34 per cent of the global total and North America for 17 per cent. In previous years, the largest proportion of cannabis herb seized was reported by countries in North America, which accounted for an average of 50 per cent of the global total in the period 2008–2018. The next largest proportions of global quantities seized in 2019 were those of Africa (21 per cent) and Asia (13 per cent), followed by Europe (6 per cent).

The total quantity of cannabis herb seized worldwide in 2019 was 40 per cent less than in 2009. That decline was mainly driven by the decreases in the reported seizure quantities in North America (decrease of 86 per cent), as there were marked declines reported by the United States (decrease of 82 per cent), Mexico (decrease of 90 per cent) and Canada (decrease of 91 per cent). As mentioned above, the decline in reported quantities seized most likely reflects the changing legal framework concerning cannabis, as Canada legalized cannabis for non-medical purposes in 2018 and some jurisdictions in the United States have done so since 2014.<sup>2</sup>

<sup>2</sup> See the below chapter of the present booklet, “Developments in measures regulating the non-medical use of cannabis”.



## Origin, departure and transit of cannabis herb, 2015–2019

The countries that were most frequently mentioned in the annual report questionnaire as the main countries of origin, departure and transit for cannabis herb in the period 2015–2019 were as follows (given in order of importance, for each subregion):

### > Americas

North America: United States, Mexico and Canada

South America: Colombia and Paraguay

Central America: Guatemala and Honduras

Caribbean: Jamaica

### > Africa

West and Central Africa: Ghana and Nigeria

Southern Africa: Mozambique, South Africa, Malawi and Eswatini

East Africa: United Republic of Tanzania, Uganda and Kenya

North Africa: Morocco

### > Europe

Western and Central Europe: the Netherlands, Spain and Albania

South-Eastern Europe: Albania and Serbia

Eastern Europe: the Russian Federation, Ukraine and Kazakhstan

### > Asia

South-East Asia: Myanmar, Malaysia and Thailand

South Asia: India, Bangladesh and Nepal

Near and Middle East/South-West Asia: Afghanistan and Lebanon

Central Asia and Transcaucasia: Kyrgyzstan and Kazakhstan

## Most cannabis herb continues to be seized in the Americas

Despite the marked declines, the country that reported seizing the largest quantities of cannabis herb in 2019 was the United States, followed by Paraguay, a major supplier of the markets in Brazil and other countries in the region,<sup>3</sup> and Colombia. Of the 10 countries worldwide reporting the seizure of the largest quantities of cannabis herb, 7 were located in the Americas. The countries reporting the seizure of the largest quantities of cannabis herb in 2019 in regions other than the Americas were India and Nigeria.

When considering a larger timespan, the period 2009–2019, the countries seizing the largest total amounts of cannabis herb worldwide were, in order of the amounts seized, the United States, Mexico, Paraguay, Colombia, Nigeria, Morocco, Brazil, India and Egypt.

## Trafficking in cannabis herb continues to be mostly intraregional

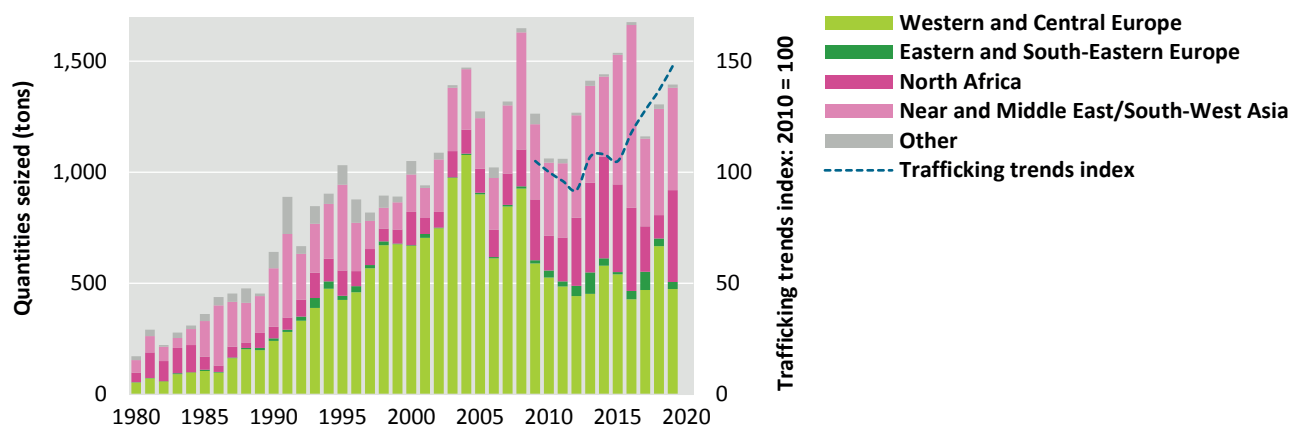
Most trafficking in cannabis herb continues to be intraregional. In Africa, the Americas and Europe, countries report that seized cannabis herb primarily comes from or is destined for countries of the same region. By contrast, the most frequently mentioned countries of origin, departure and transit for cannabis herb seized in Oceania in the period 2015–2019 were countries in other regions (primarily the United States, followed by the Netherlands and Canada). Similarly, in Asia, two countries from North America (Canada and the United States) were among the six most frequently mentioned countries of origin, departure and transit of cannabis herb; those two countries were mostly mentioned by countries or territories in East and South-East Asia, most notably by Hong Kong, China, followed by the Republic of Korea, Japan, China, Malaysia and Indonesia, as well as by Kuwait in the Near and Middle East.

## Reported increase in cannabis resin trafficking

In contrast to the decrease in the quantity of cannabis herb seized, the global quantity of cannabis resin seized has shown a long-term upward trend, and qualitative information from Member States points to an increase in cannabis resin trafficking, especially since 2015.

3 UNODC, responses to the annual report questionnaire.



**FIG. 8** Quantities of cannabis resin seized and reported trends in cannabis trafficking, 2009–2019

Source: UNODC, responses to the annual report questionnaire.

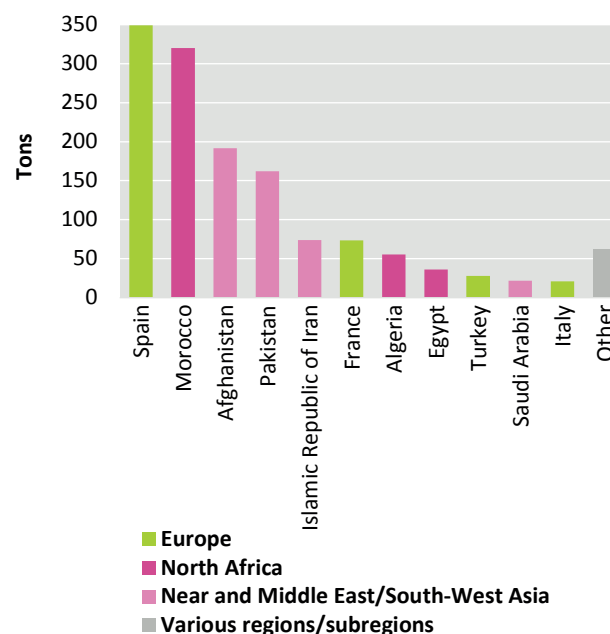
Note: The trafficking trends index is based on qualitative information on trends in cannabis resin trafficking reported by Member States. The trend line is calculated on the basis of the number of countries reporting increases minus the number of countries reporting decreases (2 points for “large increase”, 1 point for “some increase”, 0 points for stable, -1 point for “some decrease”, -2 points for “large decrease”).

### Trafficking in cannabis resin continues to be more geographically concentrated than trafficking in cannabis herb

More than a third of the global quantity of cannabis resin seized was intercepted in Western and Central Europe (34 per cent) in 2019, followed by the Near and Middle East/South-West Asia (33 per cent) and North Africa (30 per cent). These subregions accounted for close to 97 per cent of all cannabis resin seized worldwide in 2019. The largest quantities of cannabis resin were seized by Spain, followed by Morocco, Afghanistan, Pakistan and the Islamic Republic of Iran.

### Cannabis resin trafficked worldwide originates mainly in Morocco and Afghanistan

Morocco, which accounted for more than a fifth of all mentions of the main “country of origin” in responses to the annual report questionnaire worldwide in the period 2015–2019, continues to be the most frequently mentioned source country of cannabis resin intercepted worldwide. Authorities reported some 21,000 ha under cannabis cultivation in 2019 (mostly grown in the Rif area), down from 25,000 ha in 2018.<sup>4</sup>

**FIG. 9** Quantities of cannabis resin seized in countries reporting the largest total seizures, 2019

Source: UNODC, responses to the annual report questionnaire.

<sup>4</sup> Response submitted by Morocco to the annual report questionnaire for 2019.

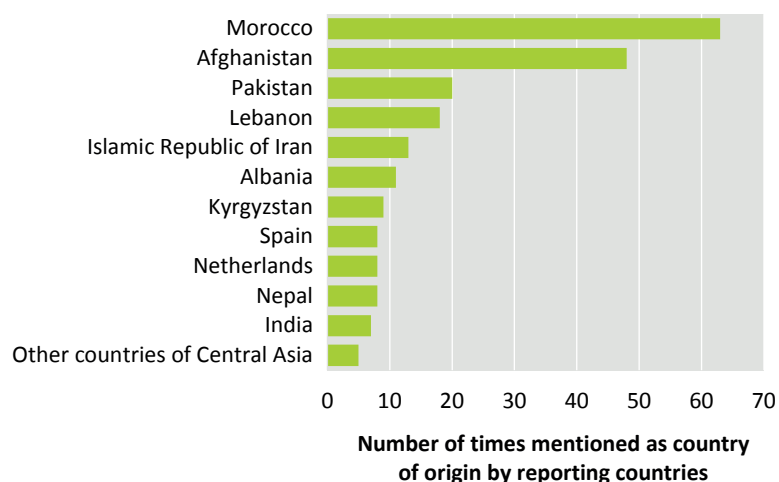
On the basis of global patterns of seizures and reports by Member States, it appears that Moroccan cannabis resin mainly supplies other markets in North Africa and Western and Central Europe. Some of it is also trafficked to Eastern Europe and South-Eastern Europe. Most of the Moroccan cannabis resin destined for countries in Europe is shipped to Spain and then on to France, the Netherlands and other countries in the region. For years, including over the period 2015–2019, Spain has been identified by other European countries as the principal country of departure and transit of cannabis resin, followed by the Netherlands and France.

Afghanistan appears to be the second most important source country of cannabis resin worldwide, accounting for 18 per cent of all mentions of the main “country of origin” in responses to the annual report questionnaire in the period 2015–2019. The two other most frequently mentioned countries of origin of cannabis resin seized were Pakistan and Lebanon. Those three countries have been reported as source or transit countries of cannabis resin intercepted in other countries in the Near and Middle East/South-West Asia, most notably countries of the Arabian peninsula. Cannabis resin originating in Afghanistan has also been identified by countries in Central Asia, Eastern Europe and, to a lesser extent, Western and Central Europe.

The Islamic Republic of Iran reported that the cannabis resin seized on its territory in the period 2015–2019 originated mainly in Afghanistan and was trafficked either via Pakistan or directly from Afghanistan. In 2018, roughly 65 per cent of the cannabis resin seized in the Islamic Republic of Iran was destined for countries of the Arabian peninsula, 15 per cent for the Caucasus and 20 per cent for domestic consumption; in 2019, however, most cannabis resin seized in the Islamic Republic of Iran was destined for the country’s domestic market, the Caucasus countries, Turkey and, to a lesser extent, the European Union.

Cannabis resin seized in the Near and Middle East in the period 2015–2019 was reported to have originated mainly in Lebanon, as reported by Israel, Jordan, Lebanon, Oman, the State of Palestine and the Syrian Arab Republic. Some of the cannabis resin seized in Lebanon was also destined for markets outside the subregion, most notably Italy and, to a lesser extent, Brazil in 2018; also, most of the cannabis resin seized in Cyprus in the period 2015–2019, including some 60 per cent of all cannabis resin seized in 2019, which was mostly destined for the local market in Cyprus, originated in Lebanon.

**FIG. 10** Main countries of origin of cannabis resin, as reported by Member States, 2015–2019



Source: UNODC, responses to the annual report questionnaire.

*Note: Figures are based on data from 71 countries providing such information to UNODC in the period 2015–2019. The category of “Other countries in Central Asia” refers mainly to Kazakhstan and Tajikistan. Not all countries identified as “countries of origin” by other countries have been necessarily source countries of cannabis resin; some of these countries may have been significant transit countries from where the cannabis resin departed. Not all countries identified “as countries of origin” by other countries have been necessarily source countries of cannabis resin; some of these countries may have been significant transit countries from where the cannabis resin departed.*

Notwithstanding the ongoing debate as to whether the genus cannabis comprises one or more species, the cannabis plant is currently considered to be monospecific (*Cannabis sativa* L.) by the scientific community.<sup>5,6</sup> There are two subspecies of the plant (*sativa* and *indica*) and four varieties. To date, 120 phytocannabinoids have been recorded for *Cannabis sativa*, the main species of the cannabis plant.<sup>7</sup> The main intoxicating or psychoactive constituent is  $\Delta$ 9-THC, while CBD is the principal cannabinoid, for which there is no substantive evidence that it is likely to cause THC-like psychoactive effects.<sup>8,9,10</sup>

Produced in almost every country, cannabis herb consists of the dried and crumbled leaves and flowering tops of the cannabis plant, which are generally smoked. By contrast, cannabis resin, which is the concentrated extract of cannabis flower and plant, is produced mainly in a few countries in North Africa, the Middle East and South-West Asia. Hash oil is a cannabis product that can be extracted from any part of the plant. An increasing variety of other extract-based cannabis products is also used, including edibles, vapes and dabs.

In the past two decades, there have been rapid advances in cannabis plant cultivation techniques, in particular in Europe and North America, which are mainly focused on achieving a high  $\Delta$ 9-THC content.

In addition to the major transformation of cannabis cultivation in recent years, the cannabis market has diversified to the extent that it now comprises a broad range of products with varying means of ingestion, potency and effects.

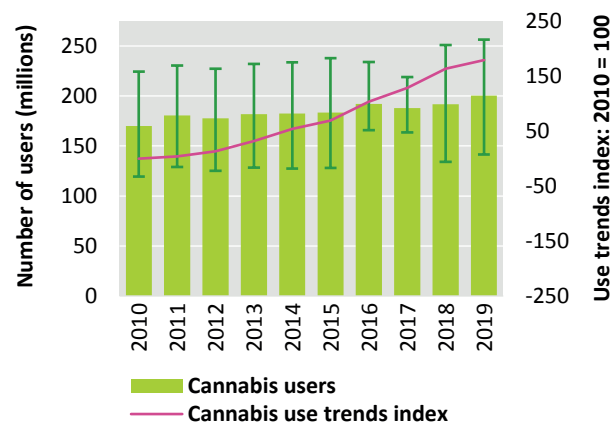
## Cannabis use

### Global prevalence of cannabis use has increased modestly while the number of cannabis users continues to rise

Cannabis continues to be the most widely used drug worldwide. UNODC estimates that almost 4 per cent (range: 2.8–5.1 per cent) of the global population aged 15–64 years used cannabis at least once in 2019, the equivalent of some 200 million people (range: 141 million–256 million).

The overall number of people who used cannabis in the past year is estimated to have increased by nearly 18 per cent over the past 10 years (2010–2019), reflecting in part an increase in the global population of 10 per cent over the same period. Since 2010, the past-year prevalence

**FIG. 11** Trends in the global number of people who use cannabis and reported trends in cannabis use, 2010–2019



Source: UNODC, responses to the annual report questionnaire.

Notes: Estimated number of people aged 15–64 who used cannabis in the past year. The cannabis use trends index is based on qualitative information on trends in cannabis use reported by Member States (on average, 67 countries per year over the period 2010–2019). The trend line is calculated on the basis of the number of countries reporting increases minus the number of countries reporting decreases (2 points for “large increase”; 1 point for “some increase”; 0 points for “stable”; -1 point for “some decrease”; -2 points for “large decrease”).

- 5 WHO Expert Committee on Drug Dependence, *Critical Review: Cannabis Plant and Cannabis Resin* (Geneva, 2018), sect. 1.
- 6 The letter “L” denotes Carl Linnaeus, who, in 1753, gave the botanical name to the plant.
- 7 WHO, *Critical Review: Cannabis Plant and Cannabis Resin*.
- 8 Ibid.
- 9 WHO Expert Committee on Drug Dependence, “Critical review report: Cannabidiol (CBD)” (Geneva, 2018).
- 10 WHO, *Critical Review: Cannabis Plant and Cannabis Resin*.

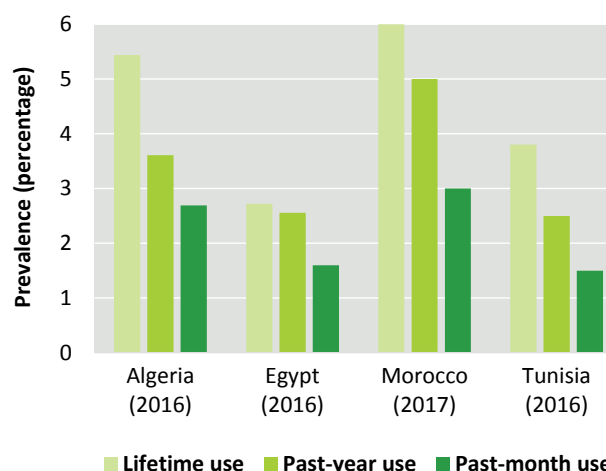
of cannabis use has thus increased by nearly 5 per cent. This increase in the number of people who use cannabis and the prevalence of cannabis use should be interpreted with caution, however, because of the wide margins of error with respect to the estimates. Notwithstanding these limitations, qualitative information on trends in cannabis use, as reported by an average of 67 Member States per year, confirm the increase in cannabis use over the period 2010–2019.

### Cannabis use in Africa and Asia

In Africa, the annual prevalence of cannabis use in 2019 is estimated at 6.4 per cent of the population aged 15–64 (range 3.8–8.8 per cent), corresponding to 47 million past-year users (range 28 million–64 million). Within the region, the subregion constituted by West and Central Africa has the highest prevalence of use, at 9.4 per cent, or an estimated 27 million past-year users, largely reflecting past-year use of cannabis in Nigeria, where people who use cannabis were estimated to comprise 10.6 per cent of the adult population, or 10.6 million people in 2018.<sup>11</sup> Recent estimates of cannabis use are not available for any other country in the region.

People in treatment for cannabis use disorders are commonly reported in Africa, where half of those in drug treatment in 2019 were reported as being treated for cannabis use. On the basis of drug treatment data from West Africa covering the period 2014–2017, the majority of people (73 per cent) who were treated for drug use disorders in the subregion were treated for cannabis as the primary drug, which corresponds to a rate of almost 2 per 100,000 adult population being treated for cannabis use disorders in each reporting year.<sup>12</sup> Similarly, among people in South Africa who attended specialist drug treatment services in 2019, cannabis was reported as the primary or secondary drug for the majority of people who were treated for drug use disorders, in particular among those aged 20 or less.<sup>13</sup> Among students aged 15–17 in countries in North Africa, the past-year prevalence of cannabis use

**FIG. 12** Cannabis use among students aged 15–17, North Africa



Sources: UNODC, responses to the annual report questionnaire; and reports of the Mediterranean School Survey Project on Alcohol and Other Drugs for Algeria (2016), Egypt (2016), Morocco (2017) and Tunisia (2016).

ranged between 5 per cent in Morocco (2017) and 2.5 per cent in Tunisia (2016) and Egypt (2016).<sup>14, 15</sup>

The estimated annual prevalence of cannabis use in Asia is much lower than in other regions, at almost 2 per cent, but owing to the size of the population, nearly one third (61.5 million) of the estimated global number of cannabis users reside in the region. In India, in 2018, more than 3 per cent of the population aged 18 and older, and less than 1 per cent of adolescents (aged 10–17) – nearly 31 million people in total – had used a cannabis product in the past year.<sup>16</sup> In Thailand, an estimated 1.3 per cent of the adult population were past-year cannabis users in 2019; in Indonesia, the figure was 1.4 per cent.<sup>17, 18</sup> Although up-to-date surveys among the general population have not yet been conducted in the region, surveys of young people were conducted in both Afghanistan and Kazakhstan in 2018. In Afghanistan, 5.5 per cent (range 4.5–6.7 per cent) of students aged 13–18 had used cannabis in the past year.

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

12 UNODC and ECOWAS, *West African Epidemiology Network on Drug Use (WENDU) Report: Statistics and Trends on Illicit Drug Use and Supply 2014–2017* (2019).

13 Siphokazi Dada and others, "Monitoring tobacco and other drug abuse treatment admission in South Africa: July–December 2019, phase 47", South African Community Epidemiology Network on Drug Use (SACENDU) updates (Cape Town, South Africa, Alcohol, Tobacco and other Drug Research Unit, South African Medical Research Council, 2020).

14 UNODC, responses submitted by Algeria, Egypt, Morocco and Tunisia to the annual report questionnaires.

15 Mediterranean School Survey Project on Alcohol and Other Drugs surveys (MEDSPAD) for the period 2016–2017 for the same countries.

16 Atul Ambekar and others, *Magnitude of Substance Use in India* (New Delhi, Ministry of Social Justice and Empowerment, 2019).

17 Thailand, Office of the Narcotics Control Board and Administrative Committee for Substance Abuse Academic Network, "National survey on substance use in Thailand, 2019" (2019).

18 UNODC, responses to annual reports questionnaire.

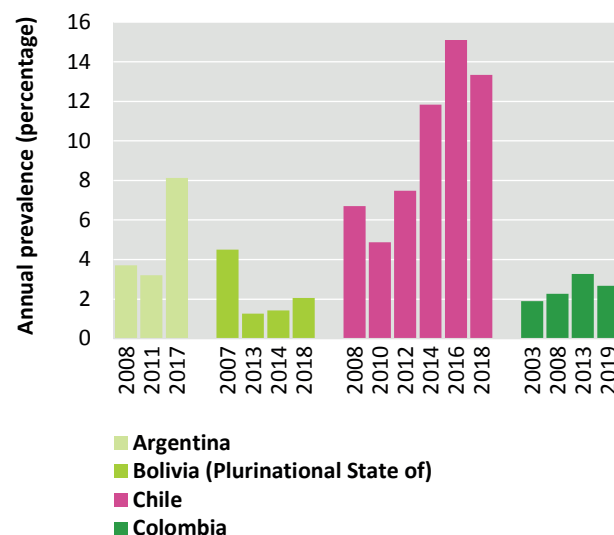
Among young people out of school, mainly in Kabul, 7.3 per cent (range 5.5–9.0 per cent) reported past-year use of cannabis,<sup>19</sup> whereas in Kazakhstan, between 1.2 and 2.3 per cent of students aged 13–18 reported past-year use of cannabis.<sup>20</sup>

In the absence of survey data, the cannabis use perception index indicates that cannabis use increased in Africa and Asia over the period 2010–2019. More recently, an increase in cannabis use was reported, as based on expert perceptions, by more than half of the countries in Africa and Asia that submitted responses to the annual report questionnaire in 2018 and 2019.

### Cannabis use in Central and South America and the Caribbean

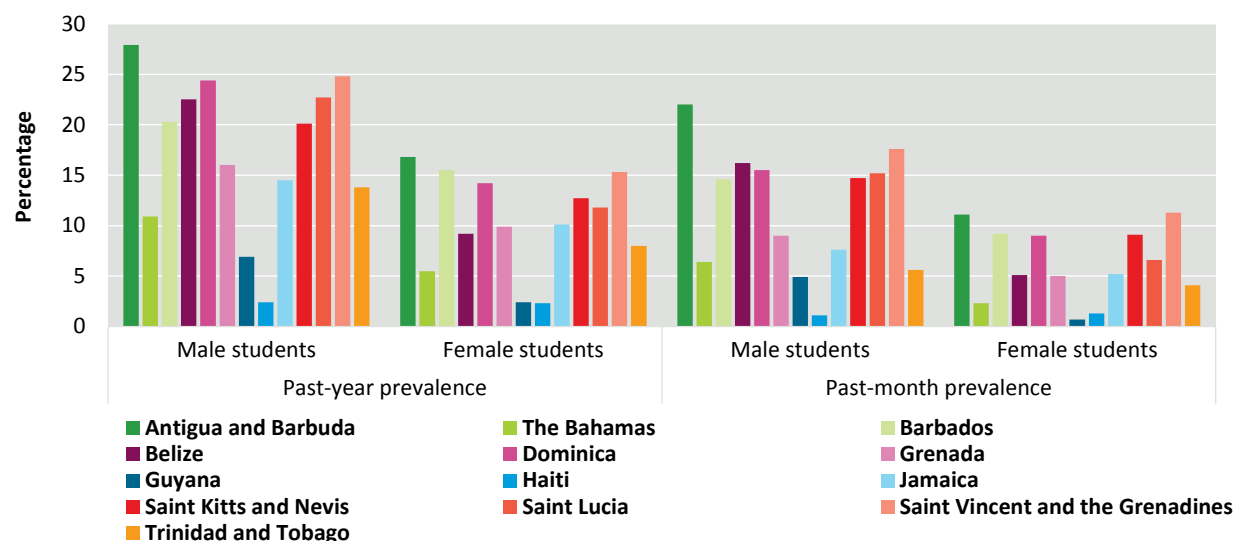
The past-year prevalence of cannabis use in the Caribbean, Central America and South America is lower than the global average, at 3.4 per cent, 3.1 per cent and 3.5 per cent, respectively, of the adult population, corresponding to over 12 million people who used cannabis in the past year in those subregions. Among the four countries

**FIG. 13** Trends in cannabis use among the adult population, selected countries with recent data, South America



Source: UNODC, responses to the annual report questionnaire, multiple years.

**FIG. 14** Cannabis use among students aged 14–17 in the Caribbean, 2016



Source: Organization of American States, Inter-American Drug Abuse Control Commission, *A Report on Students' Drug Use in 13 Caribbean Countries* (OEA/Ser.L/XIV.6.46).

<sup>19</sup> UNODC and Afghanistan, "Youth study on substance use and health in Afghanistan, 2018" (forthcoming).

<sup>20</sup> UNODC and Kazakhstan, Scientific and Practical Centre of Mental Health, "Youth survey on drug use and health in Kazakhstan, 2018" (forthcoming).

in South America with data for multiple years, cannabis use in Argentina and Chile nearly doubled from 2008 to 2017/18, while the trend in cannabis use remained generally stable in Bolivia (Plurinational State of) and Colombia. In Central America, recent information on the extent of drug use among secondary school students showed that the past-year prevalence of cannabis use in Costa Rica was 5.1 per cent (2018) and in El Salvador was 6.6 per cent (2018).

Cannabis use in the past year among the adult population in Caribbean countries is estimated at 3.4 per cent in 2019, whereas a survey among students aged 14–17 in 13 Caribbean countries in 2016 showed that the average past-year prevalence of cannabis use was 17.5 per cent among boys and 10.3 per cent among girls. The average past-month prevalence among boys (11.6 per cent) in the 13 countries surveyed was nearly double that of girls.<sup>21</sup>

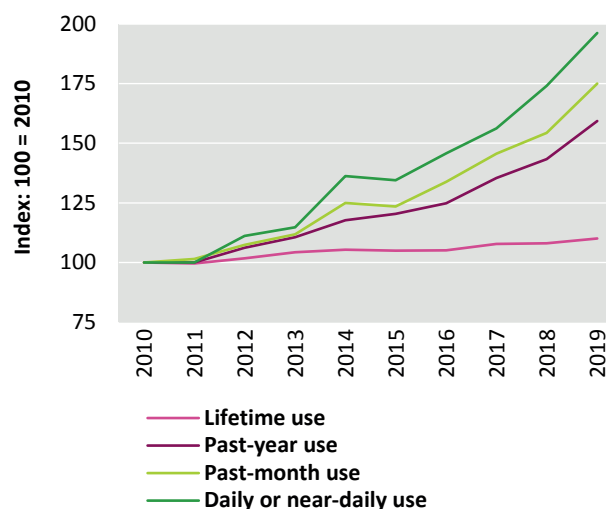
### Cannabis use is still on the increase in North America

Past-year cannabis use in the Americas increased from an estimated 6.6 per cent (40 million past-year users) in 2010 to 8.8 per cent of the adult population (59 million past-years users) in 2019. Within the Americas, cannabis use is much higher in North America (14.5 per cent, or 47 million users) than in other subregions.

### Cannabis use continues to increase in the United States

Change in the cannabis market in the United States in the past decade has resulted in a larger number of users of the drug and, more dramatically, in a higher frequency of cannabis consumption and in larger quantities of cannabis being consumed.<sup>22</sup> While the past-year and past-month prevalence of cannabis use among the adult population (aged 18 and older) in the United States have increased by 60 per cent and 75 per cent, respectively, the prevalence of daily or near-daily use increased almost

**FIG. 15** Trends in cannabis use among the population aged 18 and older, United States, 2010–2019



Source: United States, Substance Abuse and Mental Health Services Administration, *Results from the 2019 National Survey on Drug Use and Health: Detailed Tables* (Rockville, Maryland, 2020).

twofold over the period 2010–2019. Prior to that, between 2002 and 2009, the prevalence of cannabis use in the past month had increased by 10 per cent among the adult population. In 2019, over 29 million people aged 18 and older were estimated to be past-month users of cannabis, of whom 45 per cent, or 13.8 million people, were daily or near-daily<sup>23</sup> users of cannabis.<sup>24</sup>

In 2018 and 2019, in the United States, past-month cannabis use among people aged 18 and older was higher among men than among women, and more so among people who were socially disadvantaged (e.g., without completed college education, unemployed).<sup>25</sup>

Compared with cannabis use among the adult population in the United States, the levels of past-year and past-month use of cannabis among high-school students have remained stable over the past 10 years (2011–2020); in

21 Organization of American States, Inter-American Drug Abuse Control Commission, *A Report on Students' Drug Use in 13 Caribbean Countries: Antigua and Barbuda, The Bahamas, Barbados, Belize, Dominica, Grenada, Guyana, Haiti, Jamaica, St. Kitts and Nevis, St. Lucia, St. Vincent and the Grenadines, Trinidad and Tobago* (OEA/Ser.L/XIV.6.46) (2016).

22 See, for instance, Miles K. Light and others, "Market size and demand for marijuana in Colorado" (Colorado, United States, Colorado Department of Revenue, 2016), which argues that the amount of cannabis used per day is strongly correlated with the number of days of use per month, and that 80 per cent of the cannabis consumed in Colorado was consumed by daily users, who comprised 20 per cent of the past-year cannabis users in Colorado.

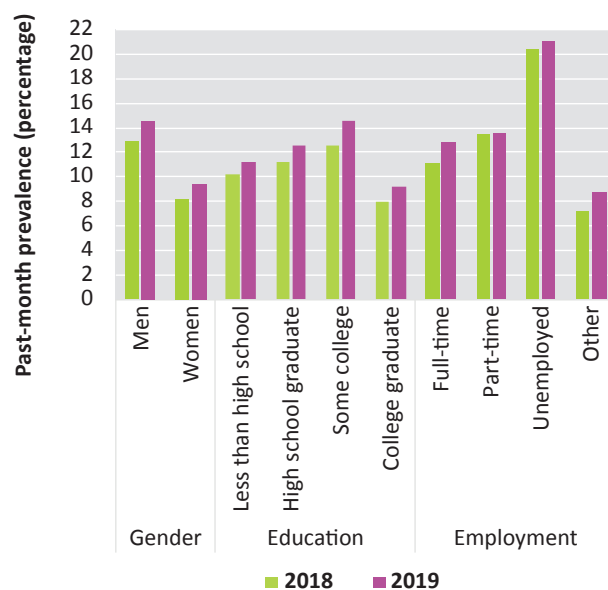
23 Daily or near-daily use is defined as use of a substance for 20 days or more in the past month.

24 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*, HHS Publication, No. SMA 18-5068, NSDUH Series H-53 (Rockville, Maryland, Center for Behavioral Health Statistics and Quality, 2020).

25 Based on data from United States, Substance Abuse and Mental Health Services Administration, *Results from the 2019 National Survey on Drug Use and Health: Detailed Tables* (Rockville, Maryland, 2020).



**FIG. 16** Recent cannabis use, by sociodemographic profile of users, United States, 2018–2019



Source: United States, Substance Abuse and Mental Health Services Administration, *Results from the 2019 National Survey on Drug Use and Health: Detailed Tables* (Rockville, Maryland, 2020).

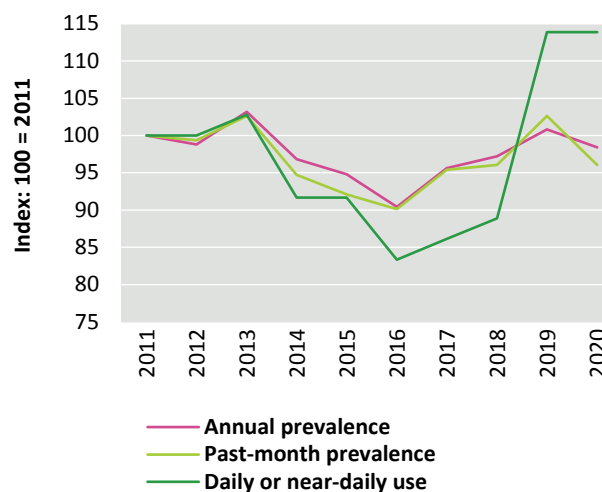
2020, 14.6 per cent of high-school students reported past-month use of cannabis.<sup>26</sup> However, there has been a significant increase in daily or near-daily use of cannabis in the past two years (2019 and 2020). In 2020, the daily or near-daily use of cannabis was estimated at 4.1 per cent among high-school students compared with nearly 1 per cent in 1991. The increase in daily or near-daily use of cannabis is more significant among 8th and 10th grade students, and in 2020 was at its highest level among all high-school students since 1991.<sup>27</sup> Cannabis use among adolescents is found to be related to impaired cognition – showing lagged effects on inhibitory control (e.g., self-control) and working memory, and concurrent effects on delayed memory recall and perceptual reasoning (ability to think and reason using pictures or visual information).<sup>28</sup>

26 United States, National Institute on Drug Abuse, Monitoring the Future, “2020 data from in-school surveys of 8th-, 10th-, and 12th-grade students” (December 2020).

27 Lloyd D. Johnston and others, “*Monitoring the Future: National Survey Results on Drug Use, 1975–2020 – Overview, Key Findings on Adolescent Drug Use* (Ann Arbor, Michigan, University of Michigan, Institute for Social Research, 2021).

28 Jean-Francois G. Morin and others, “A population-based analysis of the relationship between substance use and adolescent cognitive

**FIG. 17** Trends in cannabis use among high-school students (combined 8th, 10th and 12th grades), United States, 2011–2020



Source: United States, National Institute on Drug Abuse, Monitoring the Future, “2020 data from in-school surveys of 8th-, 10th-, and 12th-grade students” (December 2020).

However, the trends in cannabis use among high-school students are in stark contrast to the decline in tobacco and alcohol use, the two most commonly used substances by adolescents. The past-month prevalence of tobacco use among high-school students declined from nearly 12 per cent in 2011 to 5 per cent in 2020, while the past-month prevalence of alcohol use declined from 26 per cent to 21 per cent over the same period.<sup>29</sup>

### Cannabis use in Canada also continues to increase

In North America, comparatively high levels of cannabis use have also been reported in Canada. In 2020, more than a quarter of people aged 16 and older reported non-medical use of cannabis in the past year.<sup>30,31</sup> Past-year

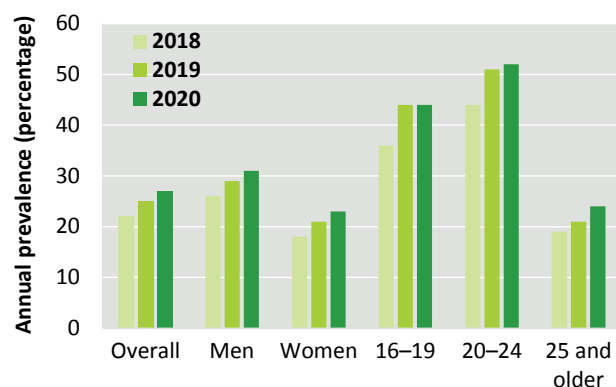
development”, *American Journal of Psychiatry*, vol. 176, No. 2 (February 2019).

29 United States, National Institute on Drug Abuse, “2020 data from in-school surveys of 8th-, 10th-, and 12th-grade students”.

30 Since 2017, the Canadian Cannabis Survey has been implemented in the country with the aim of obtaining detailed information about cannabis users and behaviours relative to its use. Since cannabis users are oversampled in the cannabis survey, its results are not comparable with the general population surveys such as the Canadian Tobacco, Alcohol and Drugs Survey, the most recent of which was conducted in 2017.

31 According to the most recent Canadian Tobacco, Alcohol and Drugs Survey in 2017, for comparison, 15 per cent of Canadians aged 15 and older (or 4.4 million) had used cannabis in the past 12 months (19 per

**FIG. 18** Cannabis use, by sex and age group, Canada, 2018–2020



Source: Health Canada, “Cannabis use for non-medical purposes among Canadians (Aged 16+)”, Data blog <https://health-infobase.canada.ca/cannabis/>.

cannabis use was higher among men than among women and higher among both sexes aged 20–24 than among other age groups. Data suggest an increase since 2018 in past year use across both sexes, and among those aged 25 and older.<sup>32</sup>

During the COVID-19 pandemic in 2020, more than half (56 per cent) of people who had used cannabis in the past 12 months reported that they had used the same amount of cannabis as they had prior to the pandemic, while those reporting using less cannabis than prior to the pandemic and those reporting using more cannabis were less than a quarter each (22 per cent). Nearly one third (31 per cent) of cannabis users aged 24 and younger reported using more cannabis, a higher proportion than among those aged 25 and older (19 per cent).<sup>33</sup>

While cannabis users reported using more than one method of cannabis consumption (non-medical use), smoking was the most common method (79 per cent) reported in Canada in 2020. However, that is a decrease from the 89 per cent of users who reported smoking cannabis in 2018. Other common methods reported in 2020 included eating edible cannabis products in food (53 per cent) and vaping (31 per cent). In 2018, 43 per cent of

cent among those aged 15–19; 33 per cent among those aged 20–24; and 13 per cent among those aged 25 and older).

<sup>32</sup> Health Canada, “Cannabis use for non-medical purposes among Canadians (Aged 16+)”, Data blog <https://health-infobase.canada.ca/cannabis/>.

<sup>33</sup> Health Canada, “Canadian cannabis survey 2020: summary”.

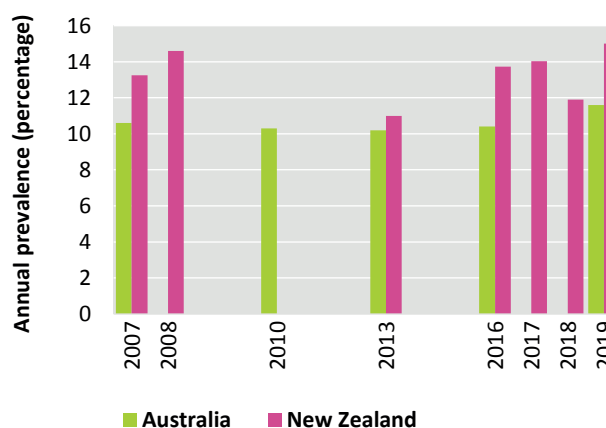
past-year cannabis users reported eating or drinking cannabis products and 33 per cent reported vaping cannabis products.<sup>34</sup>

### Cannabis use remains relatively stable in Australia and New Zealand

The annual prevalence of cannabis use in Australia and New Zealand is estimated at 12.4 per cent of the adult population. In both countries, past-year cannabis use has remained stable over the past 10 years, with some increase in 2019.

In Australia,<sup>35</sup> the highest past-year prevalence of cannabis use was reported among young people aged 20–29, although over the period 2016–2019, past-year use of cannabis increased significantly among older people (aged 50 and older), essentially indicating an ageing cohort of cannabis users in Australia. The older age group is also more likely to report regular cannabis use than other age groups, with nearly half of past-year users aged 50 and older using cannabis once a week or more. Past-year

**FIG. 19** Trends in cannabis use among the adult population, Australia and New Zealand, 2007–2019



Source: UNODC, responses to the annual report questionnaire, different years.

Note: The adult population in Australia is defined as those aged 14 and older, while in New Zealand it is those aged 15 and older.

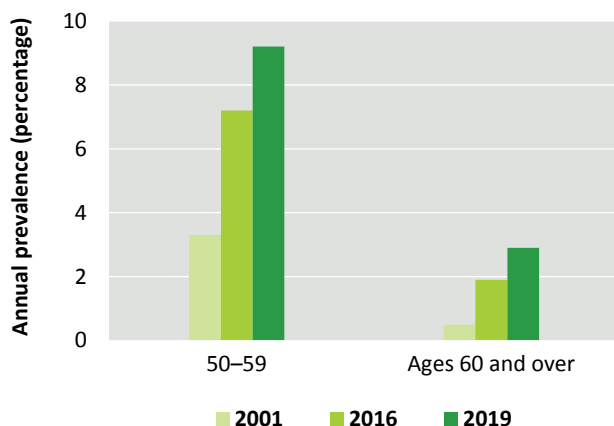
<sup>34</sup> Health Canada, “Cannabis use for non-medical purposes among Canadians (Aged 16+)”, Data blog <https://health-infobase.canada.ca/cannabis/>.

<sup>35</sup> Australian Institute of Health and Welfare, *National Drug Strategy Household Survey 2019*, Drug Statistics Series, No. 32 (Canberra, 2020).



cannabis use also increased significantly over the period 2016–2019 among those who had completed 12 years or less of education and those who were living in the most disadvantaged socioeconomic areas.

**FIG. 20** Trend in cannabis use among the population aged 50 and older, by age group, Australia, 2001–2019



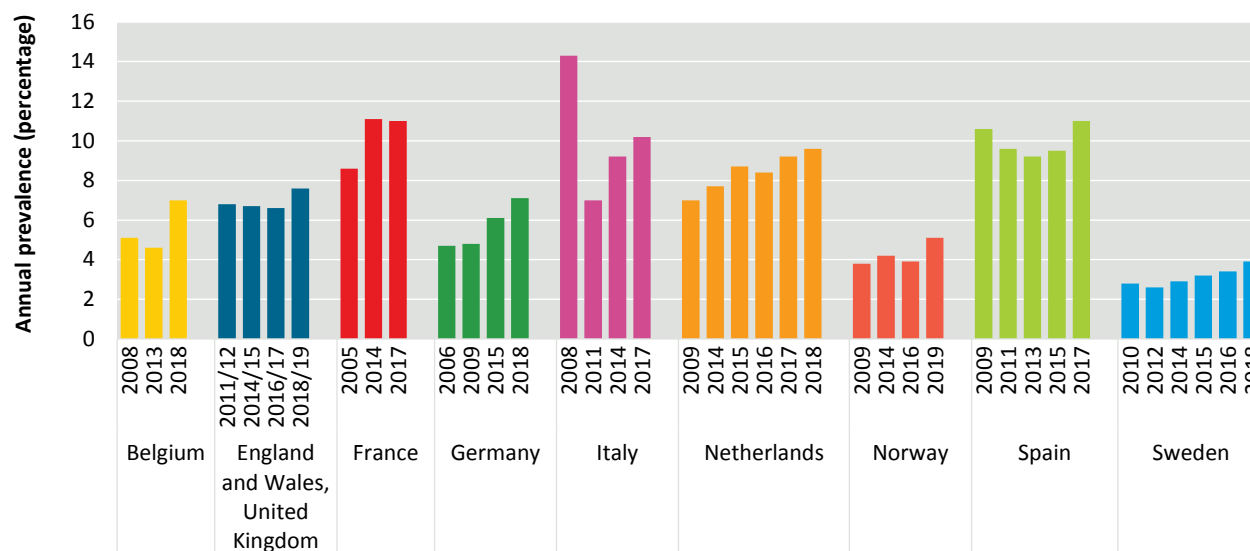
Source: Australian Institute of Health and Welfare, *National Drug Strategy Household Survey 2019*, Drug Statistics Series, No. 32 (Canberra, 2020).

### Cannabis use is increasing among the adult population but remains stable among secondary school students in Western and Central Europe

The past-year prevalence of cannabis use in Western and Central Europe has fluctuated between 6 per cent and nearly 8 per cent over the past decade (2010–2019). In 2019, 7.8 per cent of the population aged 15–64 (25 million people) had used cannabis in the past year. Cannabis use in the past year among young people aged 15–34 is particularly high, at an estimated 15 per cent (18 million people). Past-month use of cannabis in 2019 was estimated at about 3.0 per cent of the adult population. Moreover, it is estimated that about 1 per cent of adults in that subregion (mainly States members of the European Union) are daily or near-daily cannabis users. That is, they have used the drug on 20 days or more in the past month. The majority of them (60 per cent) are under 35, and around three quarters are male.<sup>36</sup>

According to the latest survey, in 2019, of secondary school students aged 15–16 in 34 countries in Europe, cannabis is the most widely used drug, with an average past-year prevalence of 13 per cent: 15 per cent among

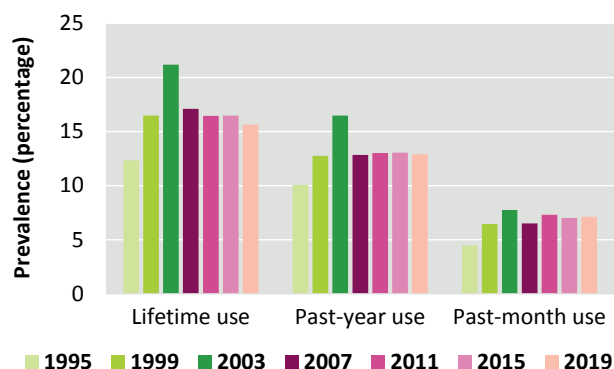
**FIG. 21** Trends in cannabis use, selected countries, Western and Central Europe



Sources: UNODC, responses to the annual report questionnaire; and EMCDDA, “Statistical Bulletin 2020: prevalence and patterns of drug use in the general population”.

<sup>36</sup> EMCDDA, *European Drug Report 2020: Trends and Developments* (Luxembourg, Publications Office of the European Union, 2020).

**FIG. 22** Trends in cannabis use among secondary school students aged 15–16, Europe, 1995–2019



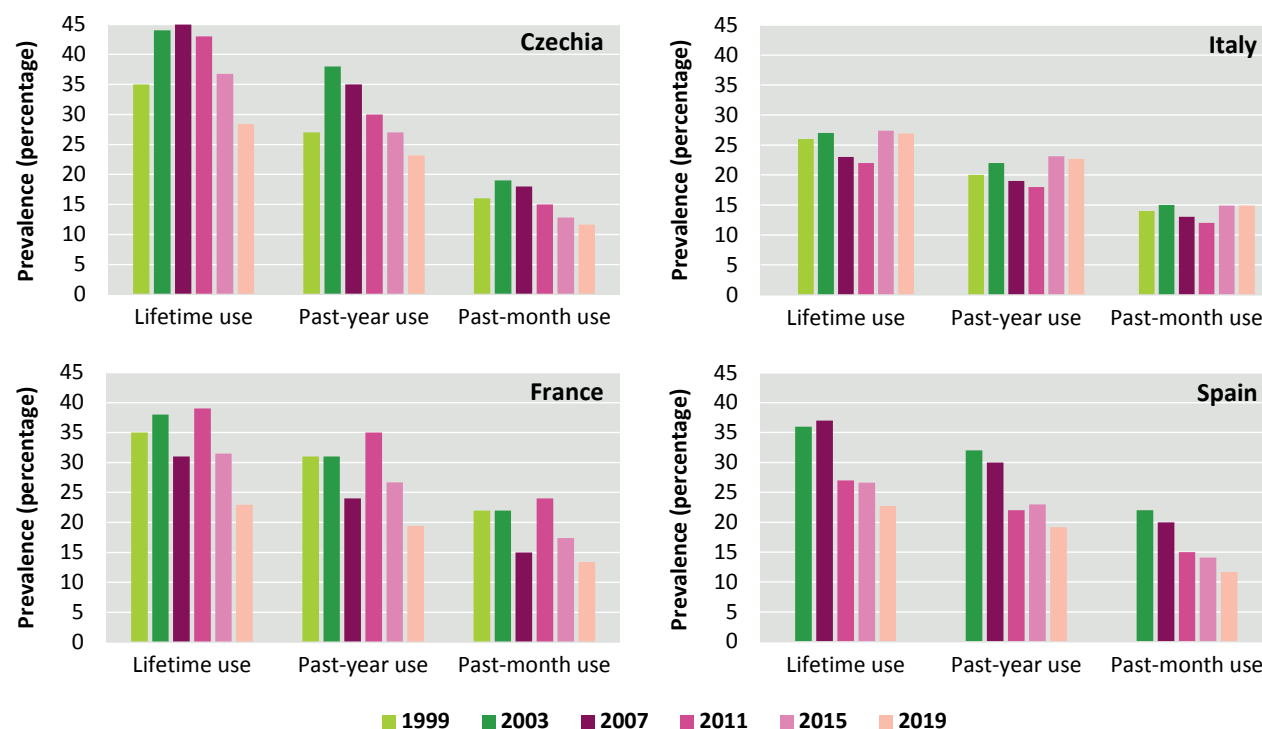
Source: EMCDDA and European School Survey Project on Alcohol and Other Drugs, *ESPAD Report 2019: Results from the European School Survey Project on Alcohol and Other Drugs*, EMCDDA Joint Publications Series (Luxembourg, Publications Office of the European Union, 2020).

boys and 11 per cent among girls. There is great variation in cannabis use among students from country to country, ranging from an annual prevalence of 4.8 per cent in North Macedonia and 5.1 per cent in Iceland to 23 per cent in Czechia and Italy. Overall, cannabis use remained quite stable among secondary school students in Europe aged 15–16 over the period 2007–2019, with an average lifetime prevalence of about 16 per cent and past-month prevalence of about 13 per cent.<sup>37</sup>

### Association between the decreasing trend in adolescents perceiving cannabis as harmful and increasing use of cannabis

There has been considerable research into risk and protective factors for substance use, especially in relation to cannabis, as it is the substance most commonly used by adolescents. Among these factors, the perceived descriptive norms, that is, the use of drugs (both prevalence and

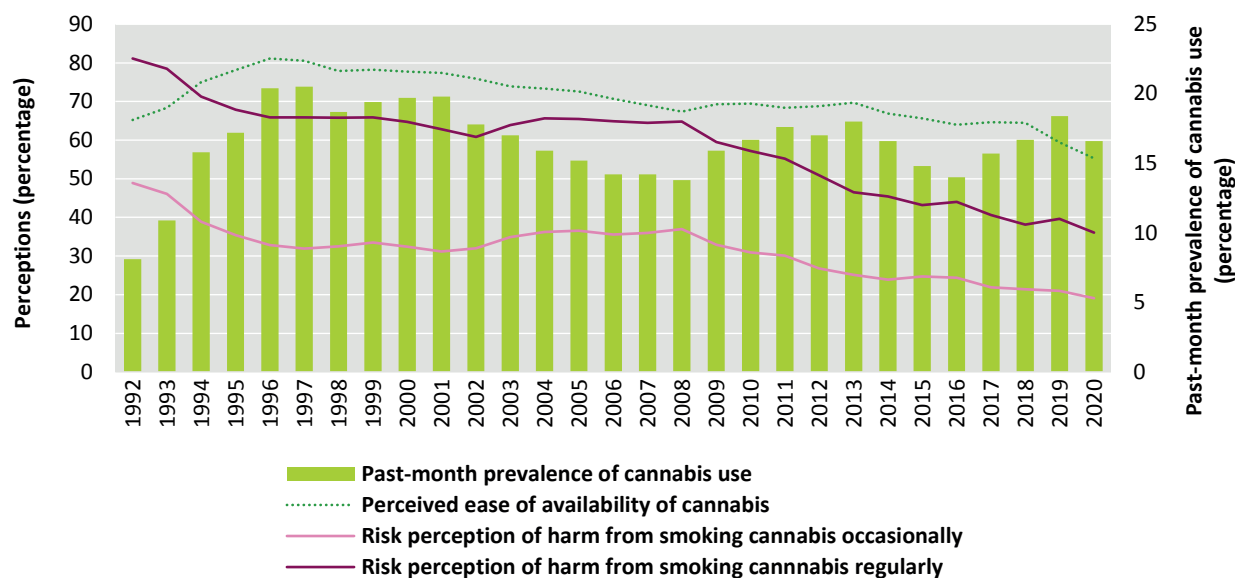
**FIG. 23** Trends in cannabis use among secondary school students aged 15–16, selected countries with a high prevalence of use, Europe, 1999–2019



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

<sup>37</sup> EMCDDA and European School Survey Project on Alcohol and Other Drugs, *ESPAD Report 2019: Results from the European School Survey Project on Alcohol and Other Drugs*, EMCDDA Joint Publications Series (Luxembourg, Publications Office of the European Union, 2020).

**FIG. 24** Trends in recent cannabis use, risk perception and perception of availability of cannabis among 10th grade students, United States, 1991–2020



Source: United States, National Institute on Drug Abuse, Monitoring the Future, “2020 data from in-school surveys of 8th-, 10th-, and 12th-grade students” (December 2020).

frequency of use among friends), as well as injunctive norms (how much others approve of use) and expectancies (expected outcomes from use, including the perception of risk of harm) have been strongly associated with cannabis use by adolescents.<sup>38, 39, 40, 41</sup>

In recent years, the debate about medical use of cannabis and measures allowing non-medical use of cannabis in the United States and elsewhere have led adolescents to perceive cannabis as less harmful than they previously had.<sup>42</sup> How much this reduced perception of harmfulness

explains the long-term increase in cannabis use among adolescents is difficult to determine. It is clear, however, that there is an association between a lower perception of risk and higher use of cannabis, as observed in the United States, Europe and Latin America and the Caribbean, although the strength of the association, at least in the case of United States, may no longer be as strong as it used to be. The strength of this association may vary but, in both the United States and Europe, it is characterized by a steady decline in the risk perception of cannabis among adolescents and a long-term increase in regular cannabis use, with some irregular annual fluctuations.

Among 10th grade students in the United States, there is a clear association between the past-month prevalence of cannabis use and the perception of risk (from either occasional or regular use of cannabis), but the strength of this association has weakened in the past 20 years. In the period 1992–2000, the lower the perception of risk or harm arising from cannabis use was, the higher the past-month cannabis use among students (Pearson correlation coefficient of -0.98).

However, over the period 2001–2020, the inverse association between risk perception and current use of cannabis

38 Julia D. Buckner, “College cannabis use: the unique roles of social norms, motives, and expectancies”, *Journal of Studies on Alcohol and Drugs*, vol. 74, No. 5, pp. 720–726 (September 2013).

39 Lyndon D. Johnston and others, *Monitoring the Future National: Survey Results on Drug Use, 1975–2015 – Overview, Key Findings on Adolescent Drug Use* (Ann Arbor, Michigan, University of Michigan, Institute for Social Research, 2016).

40 Dagmar Džúrová, Jana Spilková and Martin Vraný, “Substance misuse and its risk perception in European teenagers”, *Children's Geographies*, vol. 14, No. 2 (2016), pp. 203–216.

41 Daniela Piontek and others, “Individual and country-level effects of cannabis-related perceptions on cannabis use: a multilevel study among adolescents in 32 European countries”, *Journal of Adolescent Health*, vol. 52, No. 4 (April 2013), pp. 473–479.

42 Aaron L. Sarvet and others, “Recent rapid decrease in adolescents’ perception that marijuana is harmful, but no concurrent increase in use”, *Drug and Alcohol Dependence*, vol. 186 (2018), pp. 68–74.

was not as strong as in the previous decade – the Pearson correlation coefficient<sup>43</sup> was -29 for past-month cannabis use and perception of risk or harm from occasional cannabis use, and -16 between regular cannabis use and the perception of harm from regular cannabis use.

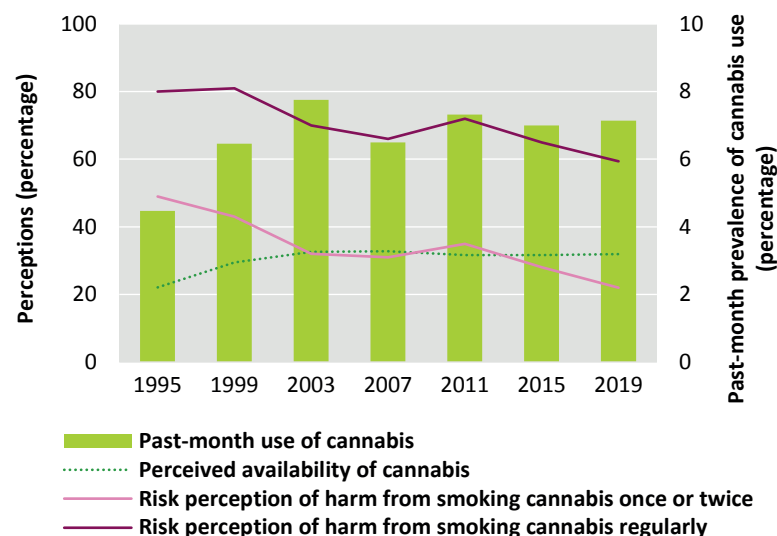
Between 1992 and 2000, past-month cannabis use more than doubled at the same time as the perception of risk or harm from occasional cannabis use declined by one third and perception of risk or harm from regular use declined by 20 per cent. From 2001 to 2020, past-month cannabis use increased by 16 per cent as the perception of risk or harm from occasional cannabis use declined by 39 per cent and the perception of risk or harm from regular cannabis use declined by 42 per cent. Similar findings were reported in another study that looked at data for 12th grade students in a national school survey and for those in the corresponding age group in the national survey among the general population.<sup>44</sup>

Similarly, in Europe the perception of risk or harm from trying cannabis once or twice among students aged 15–16 declined by nearly half, and the perception of risk or harm from smoking cannabis regularly declined by a quarter over the period 1995–2019, in parallel with an overall increase in past-month cannabis use.

Also, a study among adolescents aged 15–17 in Latin American and Caribbean countries in 2016 concluded that there was a significant association between a low perception of harm, a strong perception of the benefits of using cannabis and the use of cannabis (odds ratio of 1.61 for lifetime use, 1.62 for past-year use and 1.66 for past-month use). However, there was a much stronger association between friends' use of cannabis and self-reported past-year or past-month use of the drug (odds ratio of 8.5 and 8.9, respectively). It was also noted in this study that, despite favourable perceptions, the majority of the respondents (55 per cent) nevertheless reported no intention of using cannabis even if it were legally available.<sup>45</sup>

The different grades of association between risk perceptions and regular cannabis use could be explained by other factors that have determined the trends in use,

**FIG. 25** Trends in recent cannabis use and risk perceptions concerning the use and availability of cannabis among secondary school students aged 15–16, Europe, 1995–2019



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

such as perceived availability of cannabis, that is, how easy it is to obtain cannabis. In the United States, the perceived availability has declined by 28 per cent over the past 20 years among 10th grade students. In other words, fewer adolescents think it is easier to obtain cannabis than in the past.

In the United States, the decreasing perception of risk from occasional or regular use of cannabis is considered to be a spillover effect as debates over measures allowing the medical and non-medical use of cannabis in the states considering those measures extend to other states, and the result of an increase in regular cannabis use, which comes to be perceived as less risky among users, as well as media coverage of the medical use of various cannabis products in many states containing claims of the medical benefits of cannabis products, including those of CBD.<sup>46, 47</sup>

<sup>48</sup> Nevertheless, further research is required to determine

<sup>43</sup> The Pearson correlation coefficient is a measure of linear correlation between two sets of data.

<sup>44</sup> Sarvet and others, "Recent rapid decrease in adolescents' perception that marijuana is harmful, but no concurrent increase in use".

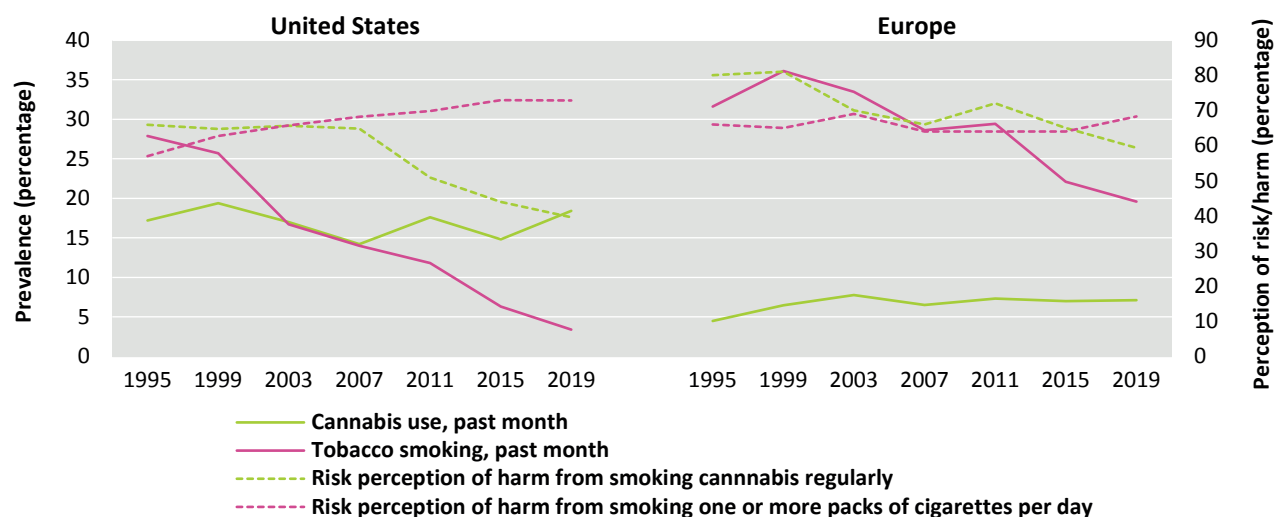
<sup>45</sup> Maria Inês Gandolfo Conceição and others, "Perception of harm and benefits of cannabis use among adolescents from Latin America and Caribe", *Texto and Contexto – Enfermagem*, vol. 28 (2019).

<sup>46</sup> UNODC, *World Drug Report* for the years 2016–2019.

<sup>47</sup> Wayne Hall and Megan Weier, "Has marijuana legalization increased marijuana use among US youth?", *JAMA Paediatrics*, vol. 171, No. 2 (February 2017), pp. 116–118.

<sup>48</sup> Sarvet and others, "Recent rapid decrease in adolescents' perception that marijuana is harmful, but no concurrent increase in use".

**FIG. 26** Trends in cigarette smoking, cannabis use and risk perceptions related to smoking cigarettes and the use of cannabis among adolescents in the United States (10th grade) and Europe (aged 15–16), 1995–2019



Sources: United States, National Institute on Drug Abuse, Monitoring the Future, “2020 data from in-school surveys of 8th-, 10th-, and 12th-grade students” (December 2020); and EMCDDA and European School Survey Project on Alcohol and Other Drugs, *ESPAD Report 2019: Results from the European School Survey Project on Alcohol and Other Drugs*, EMCDDA Joint Publications Series (Luxembourg, Publications Office of the European Union, 2020).

Note: In order to show comparable trends, the data points for the United States Monitoring the Future survey that are presented are those that correspond to the years of the survey of the European School Survey Project on Alcohol and Other Drugs.

whether the differences in a lower perception of risk or harm from cannabis use and actual use of cannabis are causally associated with policy frameworks or are simply established secular trends in wider society.<sup>49</sup>

In both Europe and the United States, the association between use and the perception of risk or harm is much more linear in the case of the smoking of cigarettes than for cannabis use, as the past two decades or more show a sharp decrease in cigarette use, which was more pronounced among adolescents in the United States than in Europe, together with an increasing perception of risk or harm from regular cigarette smoking. The trends for Europe and the United States are similar although the levels of use are quite dissimilar: more adolescents use cannabis in the United States than in Europe (the past-month prevalence of cannabis use in 2019 was 18 per cent among 10th grade students in the United States compared with 7 per cent among adolescents in Europe), but fewer adolescents use cigarettes in the United States than in Europe: nearly 4 per cent of 10th grade students in the United States in 2019 had smoked cigarettes in

the past month, compared with nearly 20 per cent of adolescents in Europe. However, the decline in cigarette smoking among adolescents in the United States is offset by the increase in vaping, which increased from a past-month prevalence of 14.2 per cent in 2015<sup>50</sup> to 23.5 per cent in 2020.<sup>51</sup> By contrast, 14 per cent of students in Europe in 2019 reported using e-cigarettes in the past month.<sup>52</sup>

### Cannabis has become more potent in the United States and Europe, but adolescents perceive cannabis as less harmful than before

There is clear discordance between the risk of harm perceived by adolescents in using cannabis and the potential risk that cannabis products of increasingly greater potency could pose to their health. The percentage of

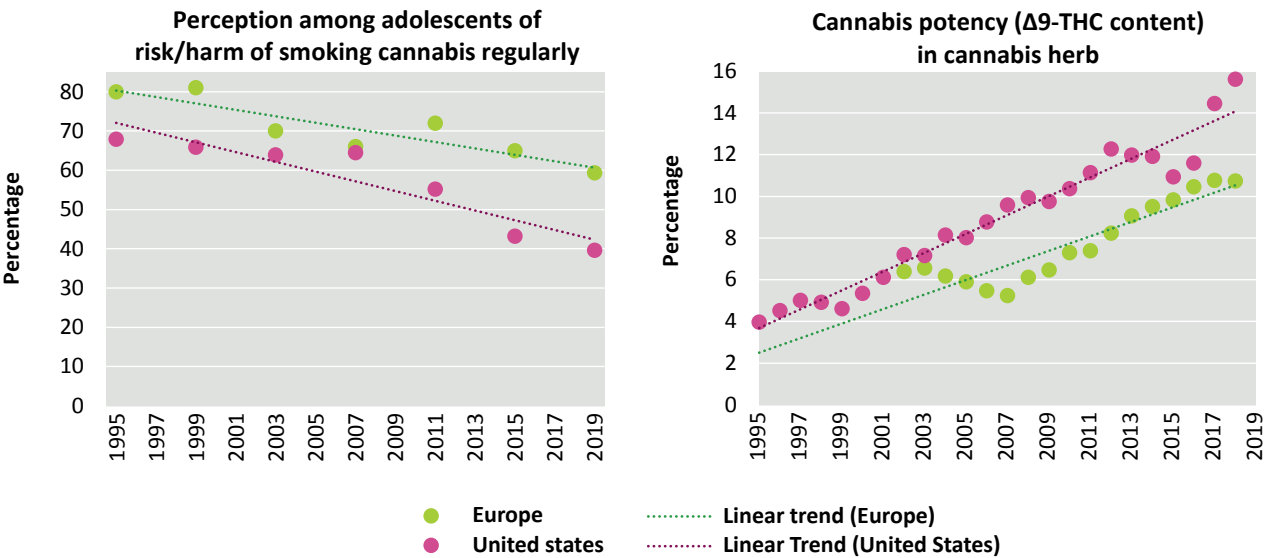
<sup>50</sup> The collection of information on the use of vaping began in 2015.

<sup>51</sup> United States, National Institute on Drug Abuse, “2020 data from in-school surveys of 8th-, 10th-, and 12th-grade students”.

<sup>52</sup> EMCDDA and European School Survey Project on Alcohol and Other Drugs, *ESPAD Report 2019*.

<sup>49</sup> Ibid.

**FIG. 27** Potency of cannabis and perception of risk from cannabis use among adolescents, Europe and United States, 1995–2019



Sources: University of Mississippi, National Center for Natural Products Research, Research Institute of Pharmaceutical Sciences, Quarterly Report No. 140, Potency Monitoring Program (June 2019); EMCDDA, Statistical Bulletin 2000; UNODC, annual report questionnaire; EMCDDA and European School Survey Project on Alcohol and Other Drugs, *ESPAD Report 2019: Results from the European School Survey Project on Alcohol and Other Drugs*, EMCDDA Joint Publications Series (Luxembourg, Publications Office of the European Union, 2020); and United States, National Institute on Drug Abuse, Monitoring the Future, “2020 data from in-school surveys of 8th-, 10th-, and 12th-grade students” (December 2020).

Note: For Europe, the Δ-9-THC potency is presented as an unweighted average of 26 European countries, including data from the countries of the European Union (excluding Denmark, Greece and Lithuania), as well as from Norway and the United Kingdom.

Δ9-THC in cannabis herb seized increased fourfold in the United States between 1995 and 2018 and almost doubled in Europe between 2002 and 2018. Moreover, in some jurisdictions in Canada and the United States, other cannabis products, such as cannabis concentrates and edibles, may have a potency of 70 per cent or more,<sup>53</sup> making the substance more potent and its users more prone to health consequences. Despite that trend, over that same period of time, the percentage of adolescents who consider regular use of cannabis to be harmful has significantly declined.

As the scientific literature suggests, daily cannabis use has been associated with a greater likelihood of psychotic disorders among users than among people who have never used cannabis, and the likelihood of such disorders is nearly five times greater among those who, on a daily basis, use cannabis with a high Δ-9-THC content (Δ-9-THC ≥ 10 per cent).<sup>54, 55</sup>

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

54 Marta Di Forti and others, “The contribution of cannabis use to variation in the incidence of psychotic disorder across Europe (EU-GEI): a multicentre case-control study”, *The Lancet Psychiatry*, vol. 6, No. 5 (May 2019).

55 Rebecca Keupper and others, “Continued cannabis use and risk of incidence and persistence of psychotic symptoms: 10 year follow-up cohort study”, *BMJ*, vol. 342 (2011).



## Developments in measures regulating the non-medical use of cannabis

As of April 2021, legal provisions allowing the non-medical use of cannabis have been approved in Canada and Uruguay, as well as in 20 jurisdictions (17 states, 2 territories and the District of Columbia) of the United States. The common feature of the legislation in Canada and most jurisdictions in the United States is that it generally allows for the production and sale by for-profit industry of cannabis products for non-medical use in the relevant jurisdictions. There are differences in the level of regulation and control between the non-medical and the medical use of cannabis,<sup>56</sup> and the regulations are being implemented in different local contexts and dynamics, which is likely to have a different impact on the development of cannabis markets in each jurisdiction, on the extent of non-medical use of cannabis and on other public health and safety and criminal justice outcomes.

## Legalization of non-medical use of cannabis in Canada

The use of cannabis for medical purposes has been permitted in Canada since 1999 through exemptions granted by the Minister of Health for medical and scientific purposes or in the public interest and according to its domestic law. In July 2018, the Canadian Parliament passed the *Cannabis Act*, which establishes a legal framework that provides regulated access for medical and non-medical cannabis, setting out a series of controls governing the production, distribution, sale and possession of cannabis. The objectives of the legislation are, among others, “to protect public health and public safety” and, in particular, to keep cannabis away from young people (minors under 18 years of age) and “to reduce illicit activities in relation to cannabis”.<sup>57</sup> The

## Permitted quantities of cannabis products for personal possession in public in Canada

Adults are allowed to possess a maximum of 30 g of dried cannabis (or equivalent) in public at any time.

30 g of dried cannabis is deemed equivalent to:

- 150 g of fresh cannabis, or
- 450 g of edible cannabis, or
- 2,100 g of liquid product, or
- 7.5 g of concentrates (solid or liquid), or
- 30 cannabis plant seeds, or
- 4 cannabis plants that are not budding or flowering

Source: Canada, Department of Justice, “Cannabis legalization and regulation”. Available at [www.justice.gc.ca/eng/cj-jp/cannabis/](http://www.justice.gc.ca/eng/cj-jp/cannabis/).

legislation permits adults (aged 18 and over) to legally access a range of cannabis products, including edibles, extracts and topicals, which regulation came into force a year after the Act, in October 2019.

The *Cannabis Act* establishes a cooperative framework for regulating cannabis between the federal, provincial and territorial governments. The federal government is responsible for regulating cannabis production and has implemented a series of measures to help ensure that the risks and harms of cannabis are appropriately addressed, including licences, permits and authorizations, security clearances, a cannabis tracking system, advertising and promotion rules, and packaging and labelling requirements. The provinces and territories regulate the distribution and retail sale of cannabis, subject to minimum federal conditions. Provinces and territories also have the ability to establish stricter rules for public possession, personal cultivation of cannabis plants, and minimum age; they are responsible for establishing local rules related to where cannabis may be consumed.

<sup>56</sup> For more information on cannabis regulations in each jurisdiction in Canada, the United States and Uruguay, see the summary table at the end of the present chapter.

<sup>57</sup> Canada, Department of Justice, “Cannabis legalization and regulation”. Available at [www.justice.gc.ca/eng/cj-jp/cannabis/](http://www.justice.gc.ca/eng/cj-jp/cannabis/).

## TRENDS IN CANNABIS USE IN CANADA

PAST-YEAR  
USE

22% 25% 27%

... daily use in the past year: ... 19% ... 18% ... 18%

PAST-MONTH  
USE

15% 17% 18%

... “stoned” or “high” on a  
typical use day for three  
or four hours (among  
past-month users): ... 27%  
... 30%  
... 36%

PAST  
THREE-MONTH  
USE

14% 17.5% 20%

... daily/near-daily use (among users  
in the past three months):  
... 5.4%  
... 6.1%  
... 7.9%

2018 Q1 2018  
2019 Q1 2019  
2020 Q4 2020

Provinces and territories have each adopted a slightly different approach to how they license and operate their distribution and retail systems, in recognition of the unique circumstances of each jurisdiction.<sup>58</sup> In most provinces, the retail licensing regime is similar to that which regulates the sale of alcohol, and cannabis is sold through licensed retailers (private sector), provincial retail stores (public sector) and online. Some provinces have established government-run monopolies at both the distribution and retail level, others have adopted a hybrid model with a mix of private and public retailers and/or distributors, while others have both private distributors and retailers.

To monitor the outcome of the *Cannabis Act* and regulations, the Government of Canada has invested in monitoring and surveillance activities; principal among those is a cannabis survey that established a baseline in 2017 and is repeated annually in order to provide objective information on knowledge, attitudes and behaviours around cannabis, and the regular collection of data on the cannabis market.

## Use of cannabis is on the increase in Canada

In 2020, 27 per cent of people (31 per cent of men and 23 per cent of women) aged 16 and older reported that they had used cannabis in the past 12 months and 18 per cent in the past month, showing increases since 2018. Those reporting having used cannabis in the last 30 days did so on an average of 14.4 days. Also, 36 per cent of past-month users reported that they would be “stoned” or “high” on a typical use day for three or four hours. Smoking was the most common method of using cannabis; dried cannabis flower and edible products, which have been allowed since 2019, were the main cannabis products used in the past 12 months.<sup>59</sup>

An analysis of changes over time – before the Act was passed, just after it was passed and one year after it was passed – shows increases in recent and regular use of cannabis. By the end of 2020, 7.9 per cent of people who had used cannabis in the past three months reported daily or near-daily use of the drug; the prevalence was similar for men and women but was higher among adults under 45 than among older ones.<sup>60</sup>

58 See <https://www.canada.ca/en/health-canada/services/drugs-medication/cannabis/laws-regulations/provinces-territories.html>.

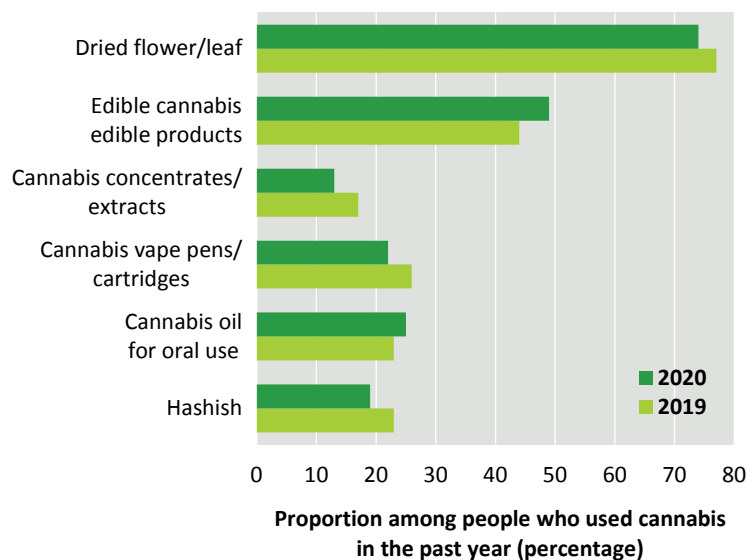
59 Health Canada, “Canadian cannabis survey 2020: summary”.

60 Michelle Rotermann, “Looking back from 2020, how cannabis use and related behaviours changed in Canada”, *Health Reports* (Statistics

Sources: Health Canada, “Canadian cannabis survey 2020: summary”, and previous years; Michelle Rotermann, “Looking back from 2020, how cannabis use and related behaviours changed in Canada”, *Health Reports* (Statistics Canada, Avril 2021).



**FIG. 28** Cannabis products used by people who reported use in the past 12 months, Canada, 2019 and 2020



Source: Health Canada, "Canadian cannabis survey 2020: summary".

Note: Respondents to the survey could choose multiple responses. Therefore, the total of percentages for all categories is more than 100 per cent.

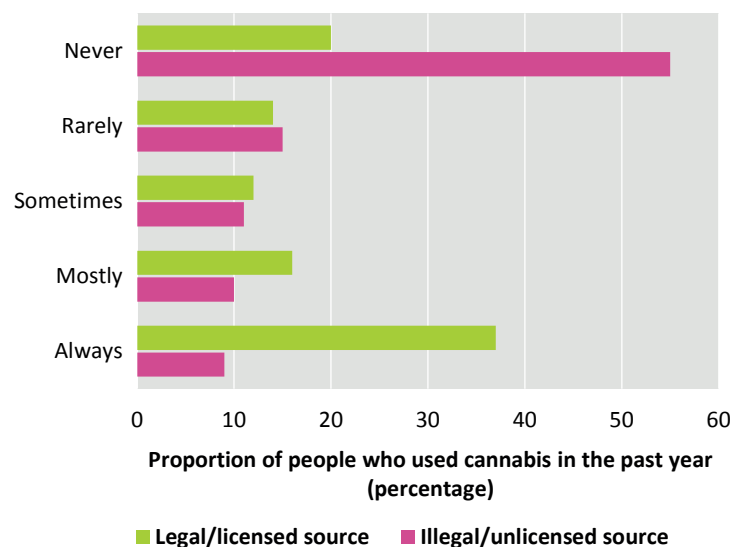
### Users of cannabis in Canada are increasingly purchasing their product from the legal market

In 2020, more than half of the people in Canada who used cannabis in the past 12 months reported that they had never obtained or purchased cannabis from an illegal or unlicensed source. Moreover, 41 per cent reported a legal storefront as their usual source of purchasing cannabis, a significantly higher proportion than in 2019 when just under a quarter of past-year cannabis users reported legal storefronts as their usual source for obtaining cannabis.

Among the 45 per cent of people who had used cannabis in the past 12 months and had obtained it from illegal or unlicensed sources, most had bought the drug from someone they knew (58 per cent). Past-year cannabis users also reported obtaining cannabis from an unregulated or unauthorized online retailer (22 per cent), a dealer (20 per cent) or an unregulated or unauthorized storefront (19 per cent). Prices, safe supply and quality of cannabis products were the three main reasons mentioned for obtaining cannabis from the respondents'

Canada, April 2021).

**FIG. 29** Frequency of obtaining cannabis from an illegal/unlicensed or legal/licensed source among people who used cannabis in the past 12 months, Canada, 2020



Source: Health Canada, "Canadian cannabis survey 2020: summary".

Note: Respondents to the survey could choose multiple responses.

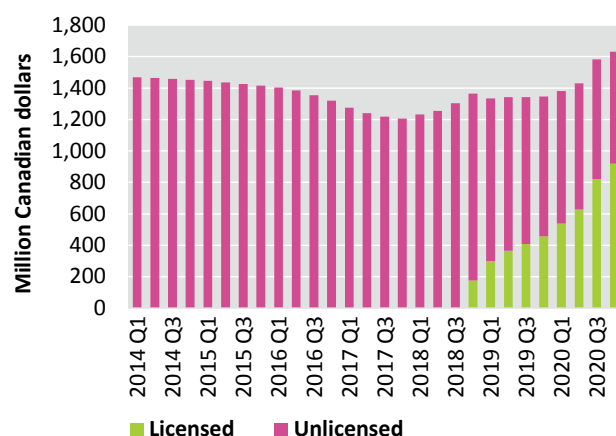
preferred source.<sup>61</sup> It would seem that the cannabis products in the legal market captured the share of the cannabis market in the first year after legalization to the extent that those products were available, accessible and low-priced for the consumers.<sup>62</sup>

In 2020, those who reported cannabis use in the past 12 months also indicated that they typically spent close to 67 Canadian dollars on cannabis products each month. On average, women reported spending less on cannabis than men. Cannabis users who reported cannabis use in the past 30 days spent more, approximately 49 Canadian dollars in the past 30 days, to obtain cannabis from legal sources in addition to a similar amount spent to obtain cannabis from illegal sources.<sup>63</sup>

61 Health Canada, "Canadian cannabis survey 2020: summary".

62 Michael J. Armstrong, "Legal cannabis market shares during Canada's first year of recreational legalisation", *International Journal of Drug Policy*, vol. 88 (2021).

63 Health Canada, "Canadian cannabis survey 2020: summary".

**FIG. 30** Household expenditure on cannabis products for non-medical use, Canada, 2014–2020

Source: Statistics Canada, Table 36-10-0124-01. Detailed household final consumption expenditure, Canada, quarterly.

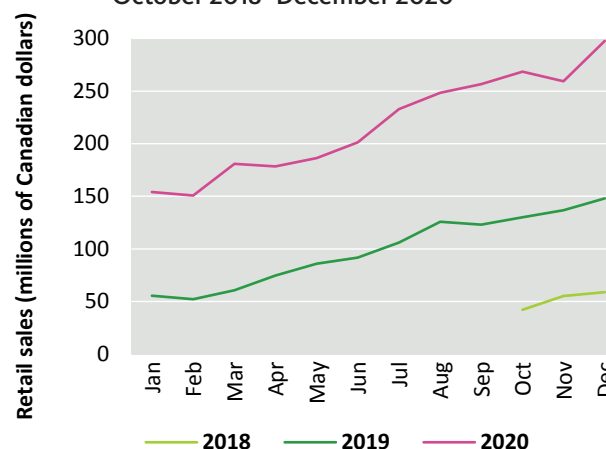
### Cannabis retail is increasing in Canada, with large corporations investing in the cannabis market

By the end of 2020, there were 1,369 cannabis retail stores in Canada, double the number of stores in existence nationally at the end of 2019.<sup>64</sup> By December 2020, the 12-month retail sale of cannabis stood at 2.6 billion Canadian dollars, more than double the previous 12-month retail sale period (1.2 billion Canadian dollars).

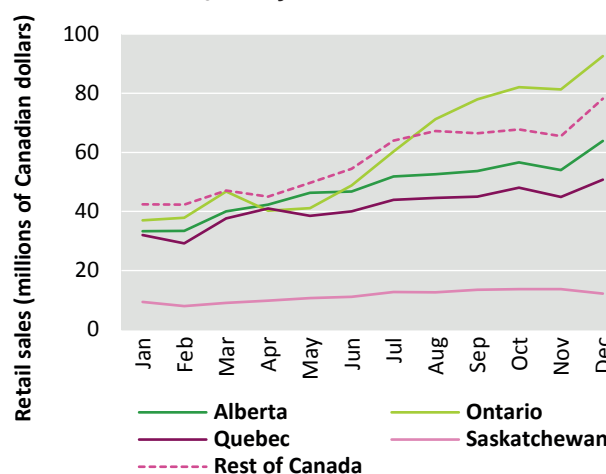
The criteria for obtaining a retail licence differs by jurisdiction. For example, Ontario, the most populous province in Canada, with a population of 14.7 million, began using a retail system in which licences were issued to operators by means of a lottery, but the province has since abandoned that approach and removed the cap on retail licences in favour of an open market for private cannabis retail in 2020. Another example is Alberta, which, by the end of 2020, accounted for 40 per cent of all retail outlets in Canada, and where, in September 2020, the provincial government amended the Gaming, Liquor and Cannabis Regulation<sup>65</sup> to remove a restriction that had previously prevented any one person or group from controlling more than 15 per cent of cannabis licences issued

<sup>64</sup> Business of Cannabis, “A look at cannabis store counts by province”, 11 January 2021.

<sup>65</sup> Province of Alberta, *Gaming, Liquor and Cannabis Act*, Alberta Regulation 143/1996 with amendments up to and including Alberta Regulation 176/202, Current as of November 1, 2020, Office Consolidation.

**FIG. 31** Monthly cannabis retail sale, Canada, October 2018–December 2020

Source: Statistics Canada: table 20-10-0008-01. Retail trade sales by province and territory.

**FIG. 32** Monthly cannabis retail sale, by province, Canada, January–December 2020

Source: Statistics Canada: table 20-10-0008-01. Retail trade sales by province and territory.

in the province.<sup>66</sup> By the end of 2020, there were 2 stores per roughly 100,000 population in Ontario, while there were nearly 13 stores per 100,000 population in Alberta.<sup>67</sup>

In the past couple of years, major multinational alcohol and tobacco companies have invested in the acquisition of a large number of shares in major cannabis production

<sup>66</sup> CBC News, “Alberta lifts cap on percentage of cannabis market retailers can own”, 13 October 2020.

<sup>67</sup> Contribution from Canada.

companies in Canada.<sup>68, 69, 70, 71</sup> As market analysts have stated, one aim of this investment is for alcohol and tobacco companies to capitalize on the developing cannabis market in order to diversify and, according to media reports, expand their product range, for example, through the production of cannabis-infused beverages or the use of vaping technology from the tobacco industry for use with cannabis extracts.<sup>72, 73, 74, 75</sup> Some have raised concerns that the largest cannabis production companies would also be owned or partly owned by alcohol and tobacco companies and that the development of cannabis markets could be dictated more by commercial considerations than by public health and safety concerns.<sup>76, 77, 78, 79, 80</sup>

Lessons learned from the tobacco, alcohol and ultra-processed food industries, as well as the pharmaceutical industry (as in the opioid crisis), have illustrated, in the context of non-communicable diseases, how corporate activities and domination of the market can be a determinant of poor health of the population.<sup>81, 82</sup> Such

commercial determinants of health<sup>83</sup> have been recognized in the scientific literature in cases where corporate interests secure a favourable policy environment or prevent public policies that could affect the sale of commodities or products, and the profit thereby generated, that collectively impact the health of the population.<sup>84, 85</sup> The *Cannabis Act* has a number of important regulatory controls, including controls to prevent corporate control or takeover, plain packaging restrictions and advertising restrictions.

The retail cannabis market in Canada is likely to continue to evolve as jurisdictions adapt their regulatory approaches, as supply chains develop and as cannabis product offerings are diversified. Overall, the implementation of laws permitting the non-medical use of cannabis in Canada is still in its nascent stages, and it may take several years of monitoring to clarify how the cannabis market has evolved and to identify its dynamics and the impact of legalization on public health and safety, among other outcome measures. Differences in the implementation of the legislation in the provinces and territories may also vary in impact and thus require contextual analysis at the provincial and territorial levels.

## Developments in cannabis regulation in Uruguay

In 2013, the Government of Uruguay approved legislation (Law No. 19.172) regulating the cultivation, production, dispensing and use of cannabis for non-medical purposes. In accordance with the legislation, cannabis can be obtained by individuals aged 18 and older for non-medical purposes through registration with the national Institute for the Regulation and Control of Cannabis and by choosing one of three options: (a) purchase in authorized pharmacies; (b) membership of a club; or (c) domestic cultivation.<sup>86</sup>

The total quantity of cannabis permitted per person, as obtained through any of the three mechanisms, cannot

- 68 Nathan Reiff, "10 biggest Canadian marijuana companies", *Investopedia*, 5 April 2021.
- 69 Constellation Brands, "Constellation Brands' \$5 billion CAD (\$4 billion USD) investment in canopy growth closes following shareholder and Canadian Government approval", 1 November 2018.
- 70 Sean Williams, "Cronos Group's \$1.8 billion investment from Altria has closed. Now what?", *The Motley Fool*, 17 March 2019.
- 71 Aurora Cannabis, "Management's discussion and analysis report (Q1 2019 MD and A)" (2019).
- 72 Jennifer Maloney and David George-Cosh, "Big brewer makes a play for marijuana beverages", *The Wall Street Journal*, 29 October 2017.
- 73 Diane Caruana, "Imperial brands to invest £75 million in Canadian cannabis brand", *Vaping Post*, 9 August 2019.
- 74 David George-Cosh, "Canopy Growth beverage head to depart amid sluggish drink sales", *BNN Bloomberg*, 9 December 2020.
- 75 Shariq Khan, "Canada dry? Cannabis-infused drinks fizzle due to production, distribution challenges", *Reuters*, 29 October 2020.
- 76 Craig Giammona, "The next big thing is weed beer", *Bloomberg Businessweek*, 10 October 2018.
- 77 Sean Williams, "Altria grossly overpaid for its equity stake in pot stock Cronos Group", *The Motley Fool*, 11 December 2018.
- 78 Wayne Hall and others, "Public health implications of legalising the production and sale of cannabis for medicinal and recreational use", *The Lancet*, vol. 394, No. 10208 (October 2019).
- 79 Beau Kilmer, "How will cannabis legalization affect health, safety, and social equity outcomes? It largely depends on the 14 Ps", *American Journal of Drug and Alcohol Abuse*, vol. 45, No. 6 (July 2019), pp. 664–672.
- 80 Rosalie Liccardo Pacula and others, "Developing public health regulations for marijuana: lessons from alcohol and tobacco", *American Journal of Public Health*, vol. 104, No. 6 (June 2014), pp. 1021–1028.
- 81 Nicholas Freudenberg, "The manufacture of lifestyle: the role of corporations in unhealthy living", *Journal of Public Health Policy*, vol. 33, No. 2 (May 2012), pp. 244–256.
- 82 Robin Ireland and others, "Commercial determinants of health: advertising of alcohol and unhealthy foods during sporting events", *Bulletin of the World Health Organization*, vol. 97, No. 4 (April 2019), pp. 290–295.

- 83 Robert West and Theresa Marteau, "Commentary on Casswell (2013): the commercial determinants of health", *Addiction*, vol. 108, No. 4 (April 2013), pp 686–7.
- 84 Illona Kickbusch, Luke Allen and Christian Franz, "The commercial determinants of health", *The Lancet*, vol. 4, No. 12 (December 2016).
- 85 Melissa Mialon, "An overview of the commercial determinants of health", *Global Health*, vol. 16, No. 74 (2020).
- 86 See also *World Drug Report 2018*, booklet 3, *Analysis of Drug Markets: Opiates, Cocaine, Cannabis, Synthetic Drugs* (United Nations publication, 2018).

exceed 480 g per year. Initially, the Government of Uruguay set a limit of  $\Delta$ -9-THC content at 2 per cent and CBD content at 6–7 per cent. In 2017, the Government introduced two varieties, with a  $\Delta$ -9-THC content of 9 per cent or less and CBD content of almost 3 per cent.<sup>87</sup> Overall, the implementation of the regulations has been slow and gradual; as at January 2021, five companies had been granted licences to cultivate, produce and distribute cannabis products for non-medical use. However, those products include only dried cannabis flower because psychoactive edibles and extracts are not allowed in Uruguay.<sup>88</sup>

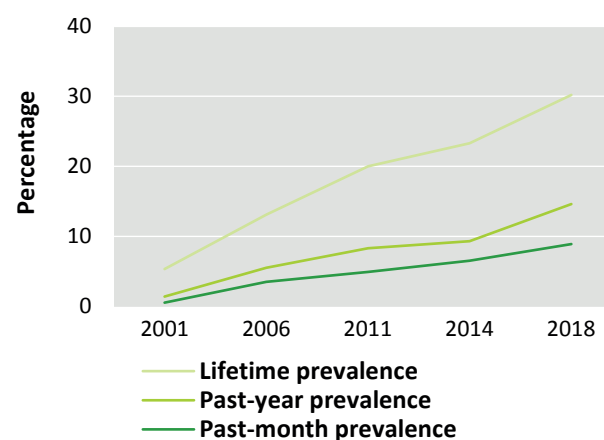
By April 2021, 16 pharmacies had been licensed to dispense cannabis for non-medical use, and 45,129 people had registered in order to acquire cannabis from those pharmacies.<sup>89</sup> Over the period July 2017–May 2020, over 833,000 cannabis transactions (packages of 5 g each) took place in pharmacies, totalling 4,166 kg of cannabis products sold. Of those sales, 59 per cent were made in the capital city. It is estimated that out of the total number of cannabis users registered with pharmacies, 4 out of 10 people bought between 5 and 15 g of cannabis products, averaging at 16.6 g of monthly cannabis purchases in May 2020.<sup>90</sup> However, the supply of cannabis products to pharmacies is still limited, with the result that pharmacies currently do not cover the demand of registered users, especially in parts of the country where there is a greater concentration of registered cannabis users.<sup>91</sup>

By April 2021, an additional 12,386 people had registered for domestic cultivation of cannabis and 171 cannabis clubs, with a total membership of 5,152 people, had been registered. Thus, more than 62,000 people in total – more than one third of the estimated number of past-month cannabis users in 2018 – had access to the regulated cannabis market in Uruguay at that time,<sup>92</sup> which is still a relatively small share of the overall population of cannabis users in the country.

In 2019, the Government of Uruguay also established the National Fund for Research on Cannabis, which is aimed at financing scientific research on cannabis use in the country. In addition, in 2019, the Senate passed a law to promote and allow access to cannabis for medical purposes. As a result, the National Programme for Access to Medicinal and Therapeutic Cannabis was created within the Ministry of Public Health.<sup>93</sup> Finally, on 1 February 2021, the price of a 5-g package of dried cannabis flower dispensed by participating pharmacies was set at 350 Uruguayan pesos (approximately \$8.20).<sup>94</sup>

In the 2018 survey on drug use in Uruguay, it was estimated that about 12 per cent of men and 5.8 per cent of women had used cannabis in the past month, with a total past-month prevalence of 8.9 per cent among the population aged 15–65, or about 158,000 users.<sup>95</sup> This reflects an increase in past-month use of more than one third since 2014 (when measures allowing non-medical use of cannabis were introduced in Uruguay), while past-year cannabis use increased by more than 50 per cent over the same period.

**FIG. 33** Non-medical use of cannabis, Uruguay, 2001–2018



Source: Uruguay, *VII Encuesta Nacional Sobre Consumo de Drogas en Población General: Informe de Investigación* (Montevideo, Junta Nacional de Drogas, Observatorio Uruguayo de Drogas, 2019).

87 John Hudak, Geoff Ramsey and John Walsh, "Uruguay's cannabis law: pioneering a new paradigm" (Washington D.C., Centre for Effective Public Management, Brookings Institution, 2018).

88 Uruguay, Institute for the Regulation and Control of Cannabis website ([www.ircca.gub.uy/](http://www.ircca.gub.uy/)).

89 Ibid.

90 Uruguay, Institute for the Regulation and Control of Cannabis, "Mercado regulado del cannabis: informe X", 31 May 2020.

91 Uruguay, Institute for the Regulation and Control of Cannabis, "Mercado regulado del cannabis: informe VIII", 31 October 2019.

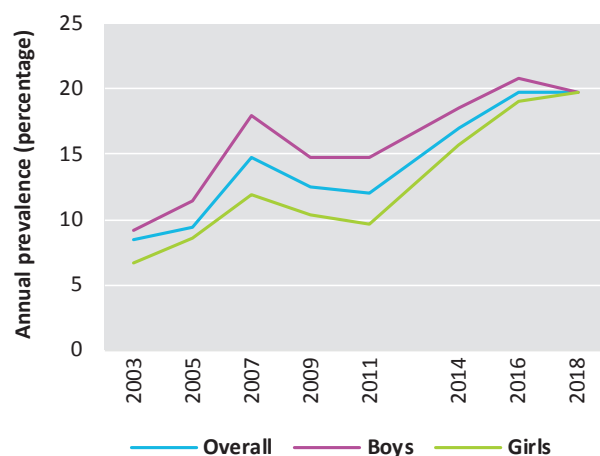
92 Uruguay, Institute for the Regulation and Control of Cannabis website ([www.ircca.gub.uy/](http://www.ircca.gub.uy/)).

93 Uruguay, Institute for the Regulation and Control of Cannabis, "Memoria Institucional 2019", approved by the Institute Board of Directors on 27 February 2020.

94 Uruguay, Institute for the Regulation and Control of Cannabis ([www.ircca.gub.uy/](http://www.ircca.gub.uy/)).

95 Uruguay, *VII Encuesta Nacional Sobre Consumo de Drogas en Población General: Informe de Investigación* (Montevideo, Junta Nacional de Drogas, Observatorio Uruguayo de Drogas, 2019).

**FIG. 34** Trend in cannabis use among secondary school students aged 13–17, Uruguay, 2003–2018



Source: Uruguay, *VIII Encuesta Nacional sobre Consumo de Drogas en Estudiantes de Enseñanza Media: Informe de Investigación* (Montevideo, Junta Nacional de Drogas, Observatorio Uruguayo de Drogas, 2020).

In 2018, the highest past-month prevalence of cannabis use was reported among young people aged 19–25 (20.8 per cent), followed by those aged 26–35 (16.4 per cent). According to the survey, about 25,500 people were estimated to be daily or near-daily users of cannabis, or 9.9 per cent of those who reported cannabis use in the past year (13.1 per cent of males and 5.2 per cent of females). Around 16 per cent of those who reported cannabis use in the past year and more than one third of regular cannabis users (those who consumed cannabis products daily or weekly) were considered to have a harmful pattern of cannabis use.<sup>96, 97</sup>

Another survey on drug use among secondary school students aged 13–17 in Uruguay revealed that, in 2018, 19.7 per cent of adolescents had used cannabis in the past year, while 11.1 per cent had used it in the past month. The highest prevalence of past-year cannabis use in that overall age group was among 17-year-olds (34.1 per cent) followed by those aged 15–16 (20.9 per cent). Moreover,

13 per cent of students who used cannabis in the past year were considered high-risk or problematic users of cannabis.<sup>98</sup> While the level of cannabis use has remained stable among adolescents over the past two years, past-year cannabis use among adolescents increased by one third over the decade 2007–2018. Over the years, there has also been a narrowing of the gap in the past-year use of boys and girls.

The impact of the provisions regulating the non-medical use of cannabis in Uruguay will only become evident in the coming years, once more information on the outcome measures related to public health and public safety is made available.

### Cannabis regulations and their implementation in the United States

In the United States, a total of 47 states had allowed the medical use of cannabis by the end of 2020, 36 states, as well as the District of Columbia, Guam, Puerto Rico and the United States Virgin Islands, had approved or had in place a comprehensive programme for the broad medical use of cannabis, and 11 states had allowed a more limited medical use of cannabis purely for specific disorders and only of specific, low  $\Delta$ -9-THC potency products.<sup>99</sup>

A medical cannabis programme is considered by the National Conference of State Legislatures to be comprehensive if the programme: (a) provides for protection from criminal penalties for using cannabis for a medical purpose; (b) provides for access to cannabis through home cultivation, dispensaries or some other system that is likely to be implemented; (c) allows a variety of strains or products, including those with more than a “low  $\Delta$ -9-THC” content; (d) allows either smoking or vaporization of some cannabis products, plant material or extract; and (e) is not a limited trial programme, that is, allowed as a trial for a limited period and not open to the public.

The 11 states that have limited measures on the medical use of cannabis may allow the use of cannabis products with low  $\Delta$ -9-THC and high CBD content for a set of defined medical conditions (although in limited situations and for varying medical conditions) or as a legal

<sup>96</sup> 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.

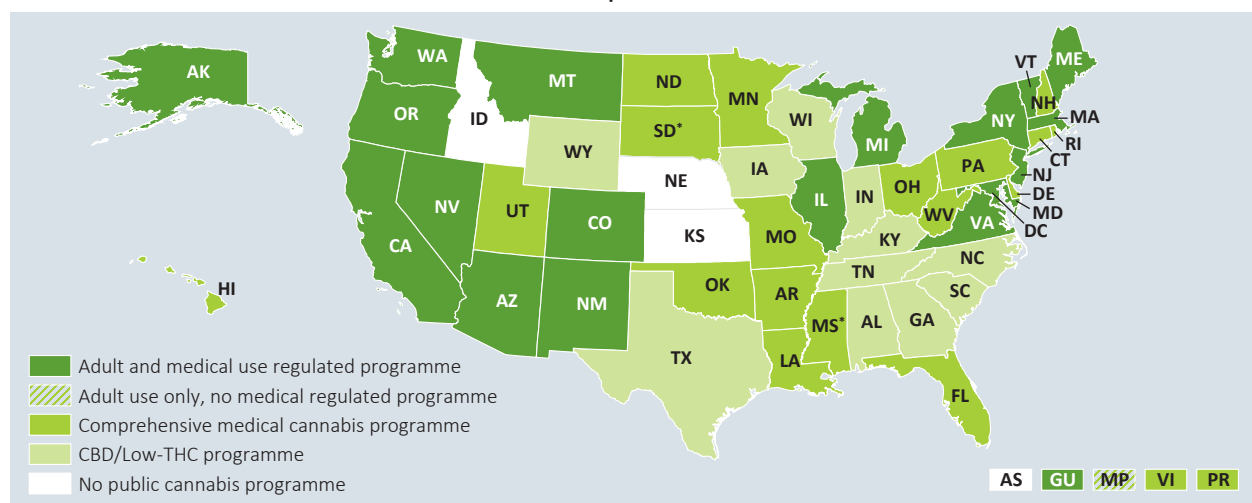
<sup>97</sup> Uruguay, *VII Encuesta Nacional Sobre Consumo de Drogas en Población General: Informe de Investigación* (Montevideo, Junta Nacional de Drogas, Observatorio Uruguayo de Drogas, 2019).

<sup>98</sup> Uruguay, *VIII Encuesta Nacional sobre Consumo de Drogas en Estudiantes de Enseñanza Media: Informe de Investigación* (Montevideo, Junta Nacional de Drogas, Observatorio Uruguayo de Drogas, 2020).

<sup>99</sup> United States, National Conference of State Legislatures, “State Medical Marijuana Laws”, April 2021.



**MAP 1** Jurisdictions in the United States that allow non-medical use of cannabis or medical use of cannabis and those that do not allow access to cannabis, April 2021



Source: National Conference of State Legislatures, April 2021.

\* Limited adult possession and growing allowed. No regulated production or sale: DC.

The boundaries and names shown and the designations used on this map do not imply official endorsement or acceptance by the United Nations.

defence as protection from criminal penalties for using cannabis for a medical purpose. For example, Alabama allows the use of cannabis products for “debilitating epileptic conditions, life-threatening seizures, wasting syndrome, chronic pain, etc., and any other severe condition resistant to conventional medicine”. In its similar programme, by comparison, the State of Georgia allows the use of cannabis products with low  $\Delta$ -9-THC content and high CBD content for medical conditions such as end-stage cancer, sclerosis (amyotrophic lateral sclerosis and multiple sclerosis), seizure disorders, Crohn’s disease, mitochondrial diseases, Parkinson’s disease and sickle cell disease.<sup>100</sup>

Other states, for example, South Dakota (prior to legalizing non-medical use of cannabis) and Nebraska, have limited trial programmes on medical use of cannabis that are not open to the public.

In the 2020 presidential elections, voters in four states, Arizona, Montana, New Jersey and South Dakota,<sup>101</sup> approved or voted for measures that allowed the non-medical use of cannabis by the adult population in

their states. Moreover, by April 2021 the state legislatures in New Mexico, New York and Virginia had also passed legislation allowing non-medical use of cannabis by the adult population in those states. As a result, by April 2021, 17 state-level jurisdictions in the United States,<sup>102</sup> plus the District of Columbia, Guam and the Northern Mariana Islands, had allowed the non-medical use of cannabis, and most had also allowed commercial production by for-profit industry.<sup>103,104</sup> It is worth noting that all the states that have legalized the non-medical use of cannabis previously had measures in place permitting the medical use of cannabis.

Among the states that have approved measures that allow the non-medical use of cannabis, in Virginia, while the bill for legalizing the non-medical use of cannabis will be effective as of July 2021, the actual provisions of the bill are subject to re-enactment by the 2022 session of the state General Assembly. In Montana, the application for issuing licensing for commercial production of cannabis products will begin in January 2022.

100 Ibid.

101 On February 8, 2021, a circuit judge in South Dakota ruled that the measure was unconstitutional, finding that it violated the state’s single-subject rule and that it constituted a revision of the constitution rather than an amendment.

102 In the United States, cannabis is federally prohibited as a substance listed in schedule I of the Controlled Substances Act.

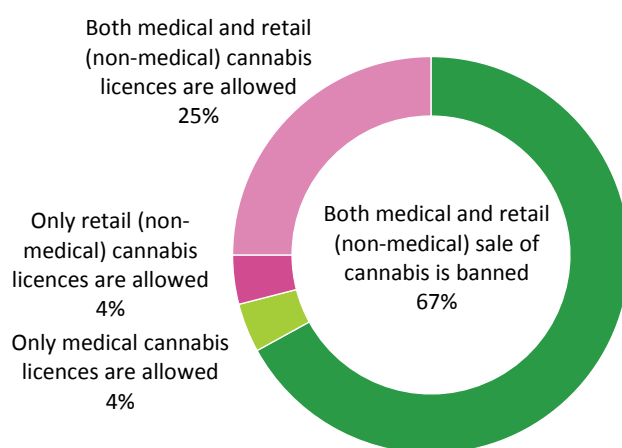
103 Home cultivation is not allowed in the State of Washington. The number of plants allowed in each State varies.

104 United States, National Conference of State Legislatures, “Cannabis overview”, 8 April 2021.

### Cannabis regulations allowing the non-medical use of cannabis are not implemented uniformly in each state where cannabis has been legalized

The level of implementation of the legislation permitting the non-medical use of cannabis varies across state jurisdictions and may even include different approaches within the same jurisdiction. For example, some states that have legalized the non-medical use of cannabis allow city administrations to formulate their own cannabis regulations and give options within those cities to not permit the sale of cannabis. In Colorado, 67 per cent of the state jurisdictions (216 jurisdictions) do not allow medical and non-medical retail of cannabis products, while only 25 per cent of jurisdictions (81) allow both medical and retail licences for the non-medical use of cannabis.

**FIG. 35** Share of county jurisdictions in Colorado, United States, according to licensing status for the medical and non-medical use of cannabis, January 2019



Source: Marijuana Enforcement Division of Colorado.

In Oregon, of the state's 36 counties and 241 cities, 17 counties and 81 cities have prohibited either the establishment of licensed producers, processors, wholesalers and/or retailers of cannabis products for non-medical use.<sup>105</sup> In California, the largest state to legalize the non-medical use of cannabis, only about 20 per cent of cities, that is, 89 out of 481 cities, allow retail shops

to sell cannabis for non-medical use.<sup>106, 107</sup> In Michigan, municipalities can place greater restrictions on cannabis businesses than the state legislation. Such restrictions may include capping the number of licences or banning the commercial production and sale of cannabis for non-medical use altogether. Residents can also petition their town for such ordinances.

### Cannabis market is regulated similarly to the alcohol market and is overseen by a variety of regulatory bodies

In the United States, cannabis remains a controlled substance at the federal level. As with other subject matters, such as regulating the production or sale of alcohol or gun control, each state has its own measures and control mechanisms that differ considerably across the country. For instance, while the federal Government regulates the production of alcoholic beverages, taxes alcohol sales and requires a health warning by the Surgeon General on alcoholic products, alcohol sales are regulated primarily by state and local governments. Notwithstanding the different context and ethos, states that have measures allowing the non-medical use of cannabis regulate the cannabis market in a manner similar to that of the alcohol market, for example, by prohibiting the sale of cannabis to people under 21 years of age, as in the case of alcohol, for which the legal drinking age in all states is 21 years, or by licensing commercial enterprises to produce, market and sell for profit a wide range of cannabis products.

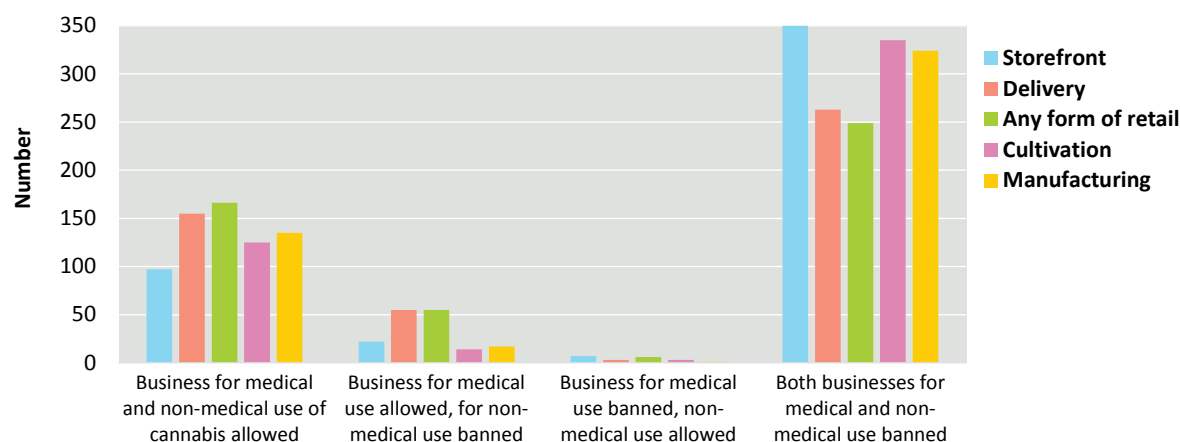
In states such as California, Colorado and Massachusetts, specialized cannabis regulatory bodies have been established, whereas in Nevada and Michigan, the cannabis market is regulated by the departments of revenue or of taxation. Some states, such as Alaska, Oregon and Washington, have tasked the existing alcohol or liquor boards with cannabis market regulation. In Washington and Oregon, the legalization initiatives were written to mirror state alcohol control laws, designating state liquor control boards as the lead regulatory agency. In Colorado, the Task Force on the Implementation of Amendment 64, which was charged with developing recommendations to the state legislature for the state's cannabis regulatory framework, included members from the cannabis and alcohol industries. In general, the role of health agencies

<sup>106</sup> Patrick McGreevy, "Court dismisses cities' lawsuit challenging cannabis deliveries in California", *Los Angeles Times*, 18 November 2020.

<sup>107</sup> Patrick McGreevy, "Legal pot sales fall short of expectations in California" *Los Angeles Times*, 3 January 2019.

<sup>105</sup> Oregon Liquor Control Commission, Record of Cities/Counties Prohibiting Licensed Recreational Marijuana Facilities, February 2021.

**FIG. 36** Number of cities in California, United States, that allow a different level of business operations for the medical and non-medical cannabis



Source: Lynn D. Silver, Amanda Z. Naprawa and Alisa A. Padon, "Assessment of incorporation of lessons from tobacco control in city and county laws regulating legal marijuana in California", *Journal of American Medical Association (JAMA) Network Open*, vol. 3, No. 6 (June 2020).

Note: Data included in the paper was for 58 counties and 476 cities in California; the authors could not find cannabis-related regulatory data for 5 of California's 481 cities.

to include public health best practices, as in the case of tobacco control framework, in regulatory debates or frameworks for non-medical use of cannabis in those states has remained limited, if any.<sup>108</sup>

#### Different limits for possession and home cultivation of cannabis

With the exception of the District of Columbia (56 g or less) and Maine (71 g or less), which permit the possession of larger quantities, most states allow for the possession of up to 28.5 g of cannabis. In addition, all states permit the home cultivation of around six plants, with a varying number of plants that can be flowering; Michigan and Colorado (as of 2018), which allow for the home cultivation of up to 12 plants, are exceptions. The conditions allowing home cultivation of cannabis vary but may include measures such as plants having to be grown out of public view or cultivation being subject to the permission of the house owners or other tenants in the building, or subject to neighbourhood zoning laws.

#### Taxes levied on cannabis differ considerably

One consideration in determining the taxes to be applied to cannabis products is that the total price including

taxes must be low enough to compete with the illegal cannabis market but not so low as to encourage frequent use, whereas public health-oriented price strategies recommend keeping prices high enough to discourage consumption and cover the external costs of commercial sector activity. In many states, rather than public health-oriented strategies, tax rates have been set to compete with the illicit market and to generate revenue.<sup>109</sup> However, part of the revenue from taxing cannabis is utilized for implementing the regulatory framework and investing, among other things, in the state education system and public health initiatives for preventing the harm caused by the non-medical use of cannabis.<sup>110</sup> In Colorado, for example, the first \$40 million of excise tax revenue raised from wholesale cannabis products is transferred to the Public School Capital Construction Assistance Fund for public school construction projects, and a portion of the tax revenue is used to support certified addiction counsellors at mental health institutes or community-based mental health and substance use disorders providers.<sup>111</sup>

<sup>109</sup> Ibid.

<sup>110</sup> See, for example, United States, Colorado State, Joint Budget Committee, *Appropriations Report Fiscal Year 2019–20* (June 2019); Northwest High Intensity Drug Trafficking Area, *Washington State: Marijuana Impact Report*, vol. 2 (August 2017).

<sup>111</sup> United States, State of Colorado, Joint Budget Committee, *Appropriations Report Fiscal Year 2019–20*.

<sup>108</sup> Rachel A. Barry and Stanton A. Glantz, "Marijuana regulatory frameworks in four US States: an analysis against a public health standard", *American Journal of Public Health*, vol. 108, No. 7 (July 2018), pp. 914–923.



On the basis of these considerations, all states have put together a structure of taxation and revenue collection from the cultivation, production and sale of cannabis. Current ad valorem state tax rates for cannabis range from about 10 to 37 per cent across states.<sup>112</sup> Local jurisdictions can also impose their own local taxes on the sale of cannabis. California has two sets of excise taxes: the first is a cultivation tax of \$9.65 per ounce of dried cannabis flower, \$2.87 per ounce of dried cannabis leaves and \$1.35 per ounce of fresh cannabis plant; the second is a 15 per cent retail excise tax on any cannabis product sold.<sup>113</sup> Paradoxically, illicit sales of cannabis currently play a much bigger role in the cannabis market of California than is the case with typical tobacco markets. As research shows, tobacco taxes raise tobacco prices and, notwithstanding illicit tobacco trafficking, thereby reduce the affordability of, access to and use of tobacco among adolescents and youth. By contrast, in the case of cannabis, despite relatively high tax rates on the legal market, it is likely that cannabis products on the illicit market will remain accessible to adolescents and youth in California.<sup>114</sup>

### Advertising of cannabis products

All states in which the use of cannabis is legalized have some degree of restriction on the advertising of cannabis products. For example, in California, advertising can be directed only at people aged 21 and older, there are restrictions on false claims of health benefits, and product labels cannot be appealing to children. In Colorado, advertising is restricted to media with audiences of which no more than 30 per cent are under the age of 21. In some states, such as Washington, advertisements cannot depict cartoon characters or contain pictures that could be appealing to children. Moreover, public education messages about cannabis in many states seem to mirror alcohol and tobacco control programmes that are primarily aimed at reducing risky and harmful or abusive use among vulnerable populations, such as children, pregnant women and problematic users.<sup>115</sup>

### Product proliferation

With regard to cannabis products and pricing in states that have implemented measures for the non-medical use of cannabis, there has been a proliferation of products that include cannabis flower, pre-rolled joints, vaporizers (vaping cannabis), concentrates and edibles such as candies and cakes, and a variety of beverages such as soda drinks. The potency of those products varies across states, and while many states have facilities for monitoring potency, the increasing potency of cannabis products, in particular products other than those made from cannabis flower, may be a public health concern. A public health-oriented best practices approach would include measures for limiting the potency of products in the interest of public health. For example, in Colorado, the average percentage of  $\Delta$ -9-THC in cannabis concentrates in 2017 was 69 per cent, with some stores advertising up to 95 per cent of  $\Delta$ -9-THC content in some products. In 2017, cannabis flower had an average of 19.6 per cent  $\Delta$ -9-THC content per gram, while overall, 92.9 per cent of all products sold in retail cannabis stores in Colorado had more than 15 per cent of  $\Delta$ -9-THC content.<sup>116</sup>

In California, the state has neither limited the potency of cannabis products, as products with  $\Delta$ -9-THC content of up to 90 per cent or more are allowed, nor limited the manufacturing or sale of flavoured products, such as flavoured vaping liquids, pre-rolled cigarettes or cannabis-infused sodas that mimic “alcopops”, although state regulations have put in place restrictions on products resembling existing foods or with characteristics that are particularly attractive to children.<sup>117</sup> However, in September 2020, the State Governor signed a bill by which a certificate of analysis will be required for edible cannabis products to guarantee that the number of milligrams of  $\Delta$ -9-THC per serving does not exceed 10 mg, plus or minus 12 per cent until 1 January 2022 and plus or minus 10 per cent after January 2022.<sup>118</sup>

<sup>112</sup> See table at the end of this chapter for details of taxation in each state.

<sup>113</sup> Gabriel Petek, “How high? Adjusting California’s cannabis taxes”, Legislative Analyst’s Office report (December 2019).

<sup>114</sup> Ibid.

<sup>115</sup> Barry and Glantz, “Marijuana regulatory frameworks in four US States: an analysis against a public health standard”.

<sup>116</sup> United States, Colorado Department of Public Health and Environment, *THC Concentration in Colorado Marijuana: Health Effects and Public Health Concerns* (July 2020).

<sup>117</sup> Lynn D. Silver, Amanda Z. Naprawa and Alisa A. Padon, “Assessment of incorporation of lessons from tobacco control in city and county laws regulating legal marijuana in California”, *Journal of American Medical Association (JAMA) Network Open*, vol 3, No. 6 (June 2020).

<sup>118</sup> Jennifer McGrath, “California cannabis bills introduced in the 2021 California legislature”.



**TABLE 1** Regulations for the legalization of the non-medical use of cannabis in Canada

	Federal law	Alberta	British Columbia	Manitoba
<b>Legal process</b>	Government legislation			
<b>Title</b>	Cannabis Act and Cannabis Regulations	Gaming, Liquor and Cannabis Act and Gaming, Liquor and Cannabis regulation	Cannabis control and licensing Act (CCLA) Cannabis distribution Act (CDA)	Safe and Responsible Retailing of Cannabis Act
<b>Date implemented</b>	17-Oct-18			
<b>Regulatory authority</b>	Health Canada	Alberta Gaming Liquor and Cannabis (AGLC)	Liquor and cannabis regulation branch	Liquor, Gaming and Cannabis Authority of Manitoba (LGCA) Manitoba Liquor and Lotteries (MBLL)
<b>Minimum age</b>	18	19	19	19
<b>Personal public possession limit</b>	30 g dried or equivalent i.e., 150 g of fresh cannabis 450 g of edible product 2,100 g of liquid product 7.5 g of concentrates (solid or liquid) 30 cannabis plant seeds 4 cannabis plants not budding or flowering	30 g or equivalent	30 g or equivalent	30 g or equivalent
<b>Home cultivation</b>	Grow 4 cannabis plants per residence for personal use. Prepare cannabis products such as food and drink at home if organic solvents are not used.	Maximum 4 plants	Maximum 4 plants	Maximum 4 plants
<b>Interpersonal sharing</b>	30 g or equivalent of legal cannabis product			
<b>Retail transaction limit</b>		30 g or equivalent		
<b>Maximum THC content</b>	Dried cannabis/fresh cannabis: No THC or THCA can be added to dried or fresh cannabis products. Dried cannabis to be consumed by inhalations must not exceed 1 g in each discrete unit of cannabis product. Edible cannabis: 10 mg of THC per package. Cannabis extract (for ingestion or nasal, rectal or vaginal use): 10 mg of THC per unit (such as a capsule) or dispensed amount, 1000 mg of THC per package (for inhalation). Cannabis topical (for applying externally): 1000 mg of THC per package. Products intended to be "administered orally, rectally, vaginally or topically" must not exceed a maximum yield quantity of 10 mg of THC. Cannabis oil must not exceed a maximum yield of 30 mg of THC per ml of the oil			
<b>Commercial production</b>	Federal processing licence is required in order to produce cannabis products and to package and label these products for sale to consumers via authorized distributors and retailers. Licensed producers. Each province has an Excise stamp that needs to be fixed on the cannabis products.			
<b>Commercial distribution</b>		Licensed retailers. Private retail stores, provincial online sales.	Private and provincial retail stores, online sales. Retail licensing regime similar as for liquor.	Private retail stores and online sales.

	Federal law	Alberta	British Columbia	Manitoba
<b>Restrictions on edibles</b>	<p>Cannabis edible products and concentrates legal for sale October 2019.</p> <p>Edible cannabis products must be shelf-stable and can only contain food and food additives as ingredients. If any components have a pH &gt; 4.6 and water activity &gt; 0.85, they must not be packaged in hermetically sealed containers.</p> <ul style="list-style-type: none"> <li>• Edible cannabis must not contain meat, poultry or fish products as ingredients unless they are dried products produced and have a water activity equal to or less than 0.85 at room temperature.</li> <li>• Edible cannabis products must not contain any food, vitamin or mineral fortification, poisonous or harmful substances, or anything considered unsafe that would cause the sale of a food to be prohibited under the Food and Drugs Act.</li> <li>• Caffeine, ethyl alcohol and nicotine are prohibited additives except for ingredients with naturally occurring caffeine provided the total amount of caffeine per package does not exceed 30 mg, and ethyl alcohol that does not exceed 0.5% weight by weight.</li> </ul>			
<b>Advertising</b>	No promotion, packaging or labelling that could be considered appealing to young people, and ensuring that important product information is presented clearly.	<p>No promotion, packaging or labelling that could be considered appealing to young people, and ensuring that important product information is presented clearly.</p> <p>Advertising allowed inside cannabis stores.</p>	Same as Federal Law	
<b>Taxation Cannabis excise duty rates in provinces and territories (Department of Finance, Canada)</b>	<p>Flower \$0.25/g</p> <p>Trim \$0.75/g</p> <p>Seed \$0.25/seed</p> <p>Seedling \$0.25/seedling</p> <p>Federal Ad Valorem Rate 2.5% of dutiable amount of cannabis product when delivered to purchaser</p>	<p>Flower: \$ 0.75/g plus 16.8% of base amount</p> <p>Trim: \$0.225/g plus 17.8% of base amount</p> <p>Seed: \$0.75/seed plus 16.8% of base amount</p> <p>Ad Valorem Additional Rate 7.5% plus 16.8% of deductible amount when delivered (total applicable rate 24.3%)</p>	<p>Flower \$0.75/g</p> <p>Trim \$0.22/g</p> <p>Seed and seedling: \$0.75/seed or seedling</p> <p>7.5% provincial sale tax in addition to Federal taxes</p>	Wholesale mark-up on non-medical cannabis, a \$0.75/g mark-up plus 9% per cent mark-up applied on top of the \$0.75/g
<b>Restrictions on use</b>	Provinces and territories can tailor rules in their own jurisdictions.	In cars, areas frequented by children, or tobacco-restricted areas.	In cars, areas frequented by children, or tobacco restricted areas.	Smoking and vaping cannabis is illegal in public places (including enclosed public places).

	New Brunswick	New Foundland and Labrador	Northwest Territories
<b>Legal process</b>			
<b>Title</b>	Cannabis Control Act Cannabis Management Corporation Act	Newfoundland and Labrador Cannabis Regulations Control and Sale of Cannabis Act	Cannabis Legalization and Regulation Implementation Act
<b>Date implemented</b>			
<b>Regulatory authority</b>	Cannabis Management Corporation	Newfoundland and Labrador Liquor Corporation (NLC)	North West Territories Liquor & Cannabis Commission (NTLCC)
<b>Minimum age</b>	19	19	19
<b>Personal possession quantity</b>	30 g or equivalent	30 g or equivalent	30 g or equivalent
<b>Home cultivation</b>	Can grow up to 4 plants at primary residence. Plants must be kept in a separate locked space. Outdoor plants must be located behind a locked enclosure at least 1.52 m in height.	Maximum 4 plants in a private dwelling	Maximum 4 plants
<b>Interpersonal sharing</b>			
<b>Retail transaction limit</b>			
<b>Maximum THC content</b>			
<b>Commercial production</b>			
<b>Commercial distribution</b>	Cannabis NB retail stores and online sales.	Private retail stores, provincial online sales.	NWT Liquor Stores, provincial online sales.
<b>Restrictions on edibles</b>			
<b>Advertising</b>			
<b>Taxation Cannabis excise duty rates in provinces and territories (Department of Finance, Canada)</b>	Flower: \$0.75/g Trim:\$0.225/g Seed/seedlings \$0.75 7.5% of the dutiable amount when delivered to purchaser	Flower: \$0.75/g Trim:\$0.225/g Seed/seedlings \$0.75 7.5% of the dutiable amount when delivered to purchaser	Flower: \$0.75/g Trim:\$0.225/g Seed/seedlings \$0.75 7.5% of the dutiable amount when delivered to purchaser
<b>Restrictions on use</b>	Illegal to smoke everywhere except private property or residence.	Illegal to smoke everywhere except private property or residence.	Illegal to smoke everywhere except private property or residence.

	Nova Scotia	Nunavut	Ontario
Legal process			
Title	Cannabis Control Act	Cannabis Act Cannabis Statutes Amendments Act	Cannabis, Smoke-Free Ontario, and Road Safety Statute Law Amendment Act, 2017 Cannabis Statute Law Amendment Act, 2018
Date implemented			
Regulatory authority	Nova Scotia Liquor Corporation	Nunavut Liquor and Cannabis Commission	Alcohol and Gaming Commission of Ontario
Minimum age	19	19	19
Personal possession quantity	30 g or equivalent	30 g or equivalent	30 g or equivalent
Home cultivation	Maximum 4 plants	Maximum 4 plants	Maximum 4 plants
Interpersonal sharing			
Retail transaction limit			
Maximum THC content			
Commercial production			
Commercial distribution	Designated NSLC stores or online.	Currently through government-operated online store or by phone.	Government retail stores and online sales.
Restrictions on edibles	Sale of edibles illegal under Federal law. Edibles can be produced at home for personal use.		
Advertising			
Taxation Cannabis excise duty rates in provinces and territories (Department of Finance, Canada)	Flower: \$0.75/g Trim: \$0.225/g Seed/seedlings \$0.75 7.5 % of the dutiable amount when delivered to purchaser	Flower: \$0.75/g plus 19.3% of base amount Trim: \$0.225/g plus 19.3% of base amount Seed/seedling: \$0.75 seed plus 19.3% of base amount 7.5% plus 19.3% of the dutiable amount of a cannabis product when delivered to a purchaser (total applicable rate of 26.8%)	Flower: \$0.75/g plus 3.9% of base amount Trim: \$0.225/g plus 19.3% of base amount Seed/seedling: \$0.75 seed plus 19.3% of base amount 7.5% plus 19.3 % of the dutiable amount of a cannabis product when delivered to a purchaser (total applicable rate of 26.8 %)
Restrictions on use	Illegal everywhere except for areas where tobacco may be smoked.	Illegal everywhere except for areas where tobacco may be smoked.	Illegal to smoke everywhere except private property.

	Prince Edward Island	Quebec	Saskatchewan	Yukon
<b>Legal process</b>				
<b>Title</b>	Cannabis Control Act Cannabis Management Corporation Act	Cannabis Regulation Act Act to constitute the Société québécoise du cannabis	The cannabis control (Saskatchewan) Act The cannabis control (Saskatchewan) regulations	Cannabis control and regulation act
<b>Date implemented</b>				
<b>Regulatory authority</b>	Provincial cannabis committee Cannabis management corporation	Société québécoise du cannabis	Cannabis Authority under the Saskatchewan Liquor and Gaming Authority	Yukon Liquor Corporation Cannabis Licensing Board (2019)
<b>Minimum age</b>	19	21	19	19
<b>Personal possession quantity</b>	30 g or equivalent	30 g or equivalent	30 g or equivalent	30 g or equivalent
<b>Home cultivation</b>	Maximum 4 plants	Maximum 4 plants	Maximum 4 plants	Maximum 4 plants
<b>Interpersonal sharing</b>				
<b>Retail transaction limit</b>		30 g per visit at Société québécoise du cannabis		30 g per purchase
<b>Maximum THC content</b>				
<b>Commercial production</b>		Licensed producers		
<b>Commercial distribution</b>	Four dedicated government-owned retail stores and online sales.	Government retail stores and online sales.	Private retail stores, provincial online sales.	Government retail stores and online sales. Cannabis Yukon retail store.
<b>Restrictions on edibles</b>				
<b>Advertising</b>				
<b>Taxation Cannabis excise duty rates in provinces and territories (Department of Finance, Canada)</b>	Flower: \$0.75/g Trim: \$0.225/g Seed/seedlings \$0.75 7.5 % of the dutiable amount when delivered to purchaser	Flower: \$0.75/g Trim: \$0.225/g Seed/seedlings \$0.75 7.5 % of the dutiable amount when delivered to purchaser	Flower: \$0.75/g plus 6.45% of base amount Trim: \$0.225/g plus 6.45% of base amount Seed/seedling: \$0.75 seed plus 6.45% of base amount 7.5% plus 6.45 per cent of the dutiable amount of a cannabis product when delivered to a purchaser (total applicable rate of 13.95%)	Flower: \$0.75/g Trim: \$0.225/g Seed/seedlings \$0.75 7.5% of the dutiable amount when delivered to purchaser
<b>Restrictions on use</b>	Illegal to smoke everywhere except private property, some exceptions for certain public spaces.	Illegal to smoke everywhere except for areas where tobacco may be smoked, excluding university and CEGEP campuses.	Illegal to smoke everywhere except private property or residence.	Illegal to smoke everywhere except private property or residence.



**TABLE 2** Regulations for the legalization of the non-medical use of cannabis in jurisdictions in the United States

	Alaska	Arizona	California	Colorado
<b>Legal process</b>	Voter initiative, state statute	Voter initiative	Voter initiative	Voter initiative, amendment to state constitution
<b>Title</b>	Ballot Measure 2	Proposition 207	Proposition 64	Amendment 64
<b>Date passed</b>	Nov-14	Dec-20	Nov-16	Nov-12
<b>Date implemented/ required date of rule adoption</b>	February 2015: Personal possession, consumption, cultivation. October 2016: Retail sales.	DHS to accept licences from early applicants from 19 January 2021 to 9 March 2021. Allow for cannabis deliveries beginning sometime between 1 January 2023 and 1 January 2025.	Licences issued 11 January 2018	December 2012: Personal possession, consumption, cultivation. January 2014: Retail sales.
<b>Regulatory authority</b>	Alcohol and Marijuana Control Office	Arizona Department of Health Services	Bureau of Marijuana Control	Marijuana Enforcement Division (Department of Revenue)
<b>Minimum age</b>	21	21	21	21
<b>Residency requirement</b>	None	None	Licences not issued to non-residents	None
<b>Personal possession limit</b>	28.5 g (1 oz or less)	28.5 g (1 oz or less) of cannabis or 5 g or less of concentrate	28.5 g of cannabis, or 4 g of concentrated cannabis	28.5 g
<b>Home cultivation</b>	Six plants, three of which can be flowering; not subject to public view; within property with lawful possession or with consent of the person in lawful pos- session.	Six plants, as long as cultivation takes place within an enclosed area with a lock and is not visible from public view.	Plant, cultivate, harvest, dry, or process plants in accordance with local ordinances: plants are in a locked space, and are not visible by normal unaided vision from a public place: six living plants may be planted, cultivated, harvested, dried, or processed within a single private residence; living plants and any cannabis produced by the plants in excess of 28.5 g are kept within the person's private residence, or upon the grounds of that private residence.	Six plants, three of which can be flowering; from 1 January 2018, all residences are limited to a maximum of 12 plants unless certain requirements are met; grow area must be enclosed and locked in a separate space that minors cannot access.
<b>Interpersonal sharing</b>	28.5 g	Yes, same as personal possession limits plus six plants	Yes	28.5 g
<b>Retail transaction limit</b>	28.5 g In addition, a store may not sell in a day: (1) more than 1 oz of usable cannabis; (2) more than 7 g of cannabis concentrate for inhalation; or (3) more than 5,600 mg of THC in com- bined sales of marijuana and cannabis products.	Not specified	Presumably same limits for personal possession	Residents: 28.5 g    Non-residents: 7 g
<b>Retail pricing structure</b>	Market	Market/commercial	Market/commercial	Market
<b>Maximum THC content</b>	(1) for a single serving of a cannabis product, 5 mg of active tetrahydro- cannabinol (THC) or Delta 9 THC; (2) in a single packaged unit of a cannabis product to be eaten or swallowed, not more than 10 servings or 50 mg of active THC or Delta 9; the THC content must be homogenous, or evenly distributed throughout the cannabis-infused product.	The potency of edible cannabis products are to be kept "at reasonable levels upon consideration of industry standards", but no more than 10 mg of THC per serving, 100 mg of THC per package, or packages with scored servings within the limits.	Standardized concentration of cannabi- noids not to exceed 10 mg tetrahydrocan- nabinol (THC) per serving.	Not set
<b>Registration requirements</b>	None	None	Not specified	None

	Alaska	Arizona	California	Colorado
<b>Commercial production</b>	Licensed cannabis producers	Licensed producers	Licensed cultivators and manufacturers, varying types	Licensed cannabis cultivation facilities
<b>Commercial distribution</b>	Licensed retail cannabis stores	Licensed stores with limitations; for example, one cannabis establishment licence per 10 pharmacies; or no more than two cannabis establishment licences in counties that contain no registered non-profit medical cannabis dispensaries.	Limits on market concentration	Licensed retail cannabis stores
<b>Restrictions on edibles</b>	5 mg of THC for single serving, no more than 50 mg of homogenous THC allowed per package. Child-resistant packaging required. Separate warnings on risks, not appealing to children.	The potency of edible cannabis products are to be kept "at reasonable levels upon consideration of industry standards" (see above).	10 mg THC per serving. Warning and potency labels. List of ingredients and cannabinoid content.	Maximum of 10 mg of THC in each individually packed serving; warning labels "keep out of reach of children"; THC symbol on labels and not attractive to children. Every single standardized serving (10 mg of THC) of an edible retail cannabis product must be individually marked, stamped or imprinted with the universal symbol.
<b>Advertising</b>	Logo or advertisement for licensed marijuana may not promote excessive consumption, depiction appealing to a person under 21 years of age. Restrictions on advertisements in school areas, public transport, and contain prescribed warning.	Prohibits the advertisement of cannabis products to children and prohibits the advertisement or sale of cannabis products with names that resemble or imitate food or drink brands marketed to children.	Restricted to those over 21. Restrictions on false advertisement or claims of untrue health benefits. Products cannot appeal to children.	Restricted to media with no more than 30% of the audience under the age of 21.
<b>Taxation</b>	\$50 excise tax per oz on sales or transfers from cultivation facility to retail store or product manufacturer; 1 January 2019, sales and transfers of marijuana are subject to new tax rates. Mature bud/flower are taxed at \$50 per oz; immature or abnormal bud is taxed at \$25 per oz; trim is taxed at \$15 per oz; and clones are taxed at a flat rate of \$1 per clone.	Excise tax of 16% on price of cannabis and cannabis products. Cannabis products are also subject to transaction privilege tax which in 2020 was 5.6% – different jurisdictions also levy TPT retail taxes.	15% excise on retail, \$9.25 per dry weight ounce on flower after harvest. \$2.75 per drug weight ounce on leaves. Tax rates for cannabis leaves to be adjusted annually to reflect fluctuations in the relative price of cannabis flowers to cannabis leaves.	State sales tax (2.9%) on cannabis sold in stores; state retail cannabis sales tax (15%) on retail cannabis sold in stores; state retail cannabis excise tax (15%) on wholesale sales/transfers of retail cannabis.
<b>On site consumption</b>	In-store consumption is allowed; stores can sell cannabis and cannabis products, excluding concentrates, to patrons for consumption on the licensed premises at the time of purchase only in a designated area with further conditions stipulated in the regulation.	Not specified	Not specified although they may exist in the form of microbusiness that allow on-site consumption.	Not allowed
<b>Restrictions on use</b>	Cannabis use in public is unlawful; violation punishable by a fine of up to \$100.	Cannabis smoking is illegal in public places and open spaces.	Prohibit cannabis use in a public place unlicensed for such use, including near schools and other areas where children are present.	Not permitted in public places
<b>Medical cannabis</b>	1998: Patient registry with a card, no dispensaries registration; out-of-state patients recognized for approved conditions but not for dispensary purchases; adults over 21 may also purchase at retail adult dispensaries.	2010: adult patients and those under 18. For patients under 18, the patient's custodial parent or legal guardian must be designated as his/her caregiver. Patients require a qualifying patient card which is based on diagnosis with one of the debilitating medical conditions, and a written certification from a physician (medical doctor, osteopath, naturopath, or homeopath licensed to practice in Arizona) with whom the person has a physician-patient relationship.	1996 and 2003; Patient registry - voluntary registration; cooperatives and collectives; State-wide licensing of dispensaries began 2018.	2000: Patient registry, dispensaries already existed; out-of-state patients not recognized; possession, consumption; 2010: commercial production and sales.

	District of Columbia	Illinois	Maine
Legal process	Voter initiative	Approved by legislature in May 2019	Voter initiative June 27, 2019, Governor signed into law 129th LD 719
Title	Initiative 71	Bill HB 1438 (Public Act 101-0027)	Question 1 (H.P. 1199 - L.D. 1719)
Date passed	Nov-14	Signed by Governor 25 June 2019	Nov-16
Date implemented/ required date of rule adoption	February 2015: Personal possession, consumption, cultivation.	Effective 1 January 2020	Take effect on 7 January 2017; regulation for business to be in place August 2017. On 27 January 2017 the legislature approved a moratorium on implementing parts of the law regarding retail sales and taxation until at least February 2018. Law finally took effect on 19 September 2019.
Regulatory authority	Not applicable; considering separate legislation to regulate commercial production and sale to adults.	Department of Agriculture	Department of Administrative and Financial Services (Office of Marijuana Policy)
Minimum age	21	21	21
Residency requirement	None	Partially required	Not specified
Personal possession quantity	2 oz (57 g)	30 g of cannabis flower; no more than 500 mg of THC contained in cannabis infused product; 5 g of cannabis concentrate. Half of these amounts allowed for non-residents	71.25 g (2.5 oz) Concentrates up to 5 g
Home ultivation	Six plants per person; 12 plants per household, six of which can be flowering.	Cultivation is allowed for qualifying persons under "Compassionate Use of Medical Cannabis Pilot Pro- gramme Act" Plants, with a limit of 5five plants that are more than 5 inches tall, per household without a cultivation centre or craft grower licence. Cannabis cultivation must take place in an enclosed, locked space. Adult registered qualifying patients may purchase cannabis seeds from a dispensary for the purpose of home cultivation. Seeds may not be given or sold to any other person. Cannabis plants shall not be stored or placed in a location where they are subject to ordinary public view.	Three flowering marijuana plants, 12 immature plants and unlimited seedlings. An adult may possess all of the cannabis produced by the plants. Property owners can prohibit home cultivation. Cultivation for medical purposes not subject to same restrictions. Plants must be tagged with the cultivator's name, driver's licence or ID number, and — if the plants are not on land owned by the cultivator — the name of the property owner.
Interpersonal sharing	28.5 gm or less (transfer without payment)		Same as personal possession limits; in addition no more than six seedlings or immature plants;
Retail transaction limit	Not applicable	Not applicable	28.5 g (1 oz); 12 seedlings
Retail pricing structure	No retail market	Market	Market/commercial
Maximum THC content	Not set initially	Initially 100 mg of THC per package; Department of Agri- culture may change maximum level of THC contained in each serving of cannabis infused product. Allow possession of cannabis-infused products such as capsules, consumables, tinctures, and other edibles that contain no more than 500 mg of THC.	Not set except for edibles
Registration requirements	None	Non-residents are allowed half the amounts allowed for residents	Not specified
Commercial production	None	Licensed cultivators and craft growers (who cultivate, dry, cure and package cannabis for sale)	Licensed cultivators; two types based on size
Commercial distribution	None	Licensed dispensers both for medical and non-medical use	State authority may not limit total number of stores; localities may regulate number and location of estab- lishments.

	District of Columbia	Illinois	Maine
<b>Restrictions on edibles</b>	Currently not allowed	Allowed but with information and warning on consumption	Edibles may not contain more than 10 mg of THC per serving of the product and may not contain more than 100 mg of THC per package of the product.
<b>Advertising</b>	Not applicable, no commercial market	Businesses cannot place advertisements that have false or misleading claims; or advertisements that promote overconsumption; depict actual consumption; depict a person under 21 consuming; make health, medicinal or therapeutic claims; contain images that can be appealing to minors or children; advertisements are not allowed within 1,000 feet of school or playground, public park or library, public transport or public property; no sales promotions are allowed; similar restrictions apply on packaging and labelling. Health warnings to be legibly displayed.	Restricted to those over 21. Restrictions on false advertisement or claims of untrue health benefits. Products cannot appeal to children.
<b>Taxation</b>	Not applicable, no commercial market	10% sales tax on cannabis flower or products with less than 35% THC; 20% tax on cannabis-infused products such as edibles; 25% tax on products with a THC concentration higher than 35%; Illinois municipalities and counties are able to levy additional local sales taxes. 6.25% State Retailers' Occupation Tax; Consumers may pay between 19.55% and 34.75% depending on a product's potency.	10% excise tax on retail; 15% excise tax on sale or transfer from a licensed commercial cultivation to licensed retail store.
<b>On site consumption</b>	Not allowed; currently under investigation by city task force.	Local jurisdictions and retail outlets may or may not allow; designated cannabis-centred businesses lounges.	State-licensed clubs
<b>Restrictions on use</b>	Not permitted in public places (use on private property)	Smoking cannabis is not allowed in any place where smoking is prohibited under the Smoke Free Illinois Act.	Not permitted in public places (allowed use in private property or smoking in a state-licensed marijuana social club).
<b>Medical cannabis</b>	1998/2010: Patient registry; dispensaries allowed.	Compassionate use of medical cannabis pilot programme act, August 2013. Eligible patients with a doctor's recommendation, with a recognized debilitating condition, after registering with the state, may legally consume medical marijuana. Purchase limit is 2.5 oz of cannabis flower every 14 days. New law also allows school nurses or administrators to give cannabis products to students who are registered medical patients and permits students to medicate under the supervision of those officials	1999: Patient registry or identification card; dispensaries, recognizes patients from other states but not for dispensary purchases.

	Massachusetts	Michigan	Montana	Nevada	New Jersey	New Mexico
<b>Legal process</b>	Voter initiative	Voter initiative	Voter initiative	Voter initiative	Voter initiative	Legislative process
<b>Title</b>	Question 4 Mass. General Laws c.94G	Proposal 18-1	Initiative 190	Question 2 Title 56 Nevada Revised Statutes 678	Question 1 New Jersey Cannabis Regulatory, Enforcement Assistance, and Market- place Modernization Act (A-21 (P.L.2021,c.16)	HB 2 Cannabis regulation act passed by legislature 31 March 2021
<b>Date passed</b>	Nov-16	6 December 2018	November 2020	Nov-16	Nov-20	Mar-21
<b>Date implemented/ required date of rule adoption</b>	15 September 2017. Licences issued starting 1 October 2017. Law updated on 20 June, 2019.	Commercial licences application began by 6 December 2019.	Application for licensure by 1 January 2022.	Takes effect on 1 January 2017 and regulations to be in place by 1 January 2018. Cannabis regulation effective 1 July 2020.	The Cannabis Act was signed on 22 February 2021 and went into immediate effect.	Signed by governor on 12 April 2021. Sales to begin in 2022.
<b>Regulatory authority</b>	1) Cannabis Control Commission and Cannabis Advisory Board	Marijuana Regulatory Agency	Department of Revenue	Cannabis Compliance Board	Cannabis Regulatory Commission	Cannabis Control Division to be established by September 2021
<b>Minimum age</b>	21	21	21	21	21	21
<b>Residency requirement</b>	Not specified	Not specified		Not specified	None	None
<b>Personal possession limit</b>	1 oz flower (28.5 g) 5g concentrate or 10 oz at home	2.5 oz (70.8 g) on person and 10 oz (283 g) at home	28.5 g (1 oz) or 8 g in concentrated form	28.5 g (1 oz) flower 1/8 oz or 3.5 g concentrate or edible	28.5 g (1 oz) of cannabis or its equivalent	56 g (2 oz) 16 g of cannabis concentrates and 800 mg of infused edibles
<b>Home cultivation</b>	6 plants, 12 in a single residence away from view; 10 oz of dried marijuana permitted at home.	Up to 12 plants per house- hold not visible from a public place.	4 mature plants and 4 seed- lings; not visible from a public place; not more than twice the number to be kept on the grounds.	6 plants, no more than 12 on property in indoor or in enclosed with permission of landlord and must be 25 miles away from retail cannabis store.	Home cultivation is prohibited at the moment.	6 plants per person, or 12 per household; away from public view.
<b>Interpersonal sharing</b>	Yes	2.5 oz with a max of 15 mg of concentrate as long as money is not exchanged.	Less than twice the amount of personal possession limit without any consideration or remuneration.	Yes	Not yet	Same as personal possession limits.
<b>Retail transaction limit</b>	Not specified, presumably same limits as for personal possession.	Not specified, presumably same limits as for personal possession.	Not specified	Not specified, presumably same limits as for personal possession.	To be determined - expected to be the same as personal possession limits.	Same as personal possession limits.
<b>Retail pricing structure</b>	Market/commercial	Market/commercial	Market/commercial	Market/commercial	Market/commercial when developed	Regulated market, expected to start in 2022
<b>Maximum THC content</b>	Not set initially	Not set	Not specified	Not set initially	Not set	Not specified
<b>Registration requirements</b>	Personal data collection not required	None	None	Personal data collection not required	None	None
<b>Commercial production</b>	Licensed establishments	Licensed establishments	Licensed	Licensed establishment	Licensed	Licensed cultivation/ production. Small cannabis micro- businesses can grow up to 200 plants.
<b>Commercial distribution</b>	Licensed establishments; localities can regulate, limit or prohibit the opera- tion of businesses.	A municipality may completely prohibit or limit the number of establishments operating.	Licensed	Limits on market concen- tration by population	Licensed establishments	Licensed

	Massachusetts	Michigan	Montana	Nevada	New Jersey	New Mexico
<b>Restrictions on edibles</b>	Serving size and potency limits to be developed in regulations. List of ingredients.	Not specified	Cannabis infused products may not be in shapes or packages that are attractive to children or that are easily confused with commercially sold candy.	Single-serving edible cannabis product offered for sale to a consumer containing not more than 10 mg of THC.	Edible cannabis product shall contain no more than 10 mg of active THC per unit of sale.	Not specified
<b>Advertising</b>	Restrictions on marketing to children to be developed in regulations.	Restrictions on public signs related to cannabis establishments.	Advertising cannabis is prohibited in any medium including electronic media.	A licensed marijuana establishment cannot engage in advertising that contains any false or misleading statements, promotes overconsumption, depicts actual consumption, or appeals to minors. Also applies 70/30 rule from Colorado.	Restrict advertising of cannabis items and cannabis 41 paraphernalia in ways that target or are designed to appeal to individuals under the legal age to purchase cannabis items includes objects, such as toys, characters, or cartoon characters suggesting the presence of a person under 21 years of age or any other depiction; also advertising on television and radio between 6:00 to 22:00 is prohibited; also prohibited to sponsor sports or cultural events.	Advertising cannabis to people under 21 is prohibited, with the use of cartoon characters or other imagery likely to appeal to children forbidden. Advertisements will also be barred from billboards or other public media within 300 feet of a school, day-care centre or church
<b>Taxation</b>	10.75% excise tax on retail sales. 6.25% state sales tax applies to retail purchases of all cannabis products. Up to 3% local excise tax, optional, on retail purchases of all products.	10% excise tax	20% of the retail price	15% excise on wholesale sale. 10% excise tax on retail sale.	General state sales rate of 6.625%; Annually adjusted excise fee based on average retail price: up to \$10 per oz if the average retail price of an ounce was \$350 or more; up to \$30 per oz if the average retail price of an ounce was less than \$350 but at least \$250; up to \$40 per oz if the average retail price of an ounce was less than \$250 but at least \$200; and up to \$60 per oz if the average retail price of an ounce was less than \$200.	12% excise tax to be gradually increased to 18% by 2030; plus 8% regular state sales tax.
<b>On site consumption</b>	Not allowed, although they may exist in establishments that allow on-site-consumption.	Not specified	Not specified	Not specified	Not specified	Is allowed if businesses offer
<b>Restrictions on use</b>	Cannot use cannabis in a place where smoking tobacco is prohibited	Not permitted in public places or places where prohibited by person who owns, occupies or manages the property, allowed in designated public places that are not accessible to persons under 21 years of age.	Not permitted in public places where smoking tobacco is prohibited, unless allowed by the department.	Cannabis consumption is for private use only. It is illegal to smoke in public, on federal land or in a vehicle without risking a fine.	Consumption is only permitted in a private residence.	Public consumption remains illegal, but business can offer on-site consumption if certain requirements are met.

	Massachusetts	Michigan	Montana	Nevada	New Jersey	New Mexico
Medical cannabis	2012/2013; patient registry or identification cards; dispensaries, out-of-state patients not recognized.	2008: patient registry, dispensaries can be established with local ordinances; dispensation for specific conditions, recognize out of state patients only for legal protection of possession but not for dispensary purchases.	2004: Registered card holders; signed physician statement for a debilitating condition.	2000: Patient registry or identification card, No dispensaries; recognize out of state patients if other state's programmes are substantially similar; patients must fill out Nevada paper work.	2009: Medical cannabis can be purchased from any state-licensed New Jersey cannabis dispensary. Physicians determine the proper dosage allowed for the patient, with a maximum set at 3 oz for a 30-day period. Each dose is sold in 0.25 oz denominations. Visiting patients with valid medical marijuana cards from their home state are granted the same protections and allowances surrounding possession and consumption as New Jersey resident cardholders.	2007: In 2020, registered patients are required to be state residents; patients need to have a certification from a prescriber with the qualifying conditions; patients are allowed to possess no more than 230 units (approx. 8 oz of flower or buds).

	New York	Oregon	South Dakota	Vermont	Virginia	Washington
Legal process	Legislative process	Voter initiative, state statute	Voter initiative	Legislative process	Legislative	Voter initiative, state statute
Title	Assembly bill A1248 A Marijuana regulation and taxation act	Measure 91		No. 86 S.54 (initiated in February 2020 and went into force in October 2020 without the Governor's signature	SB 1406 Marijuana; legalization of simple possession Signed by governor on 7 April 2021	Initiative 502
Date passed	March 31, 2021	Nov-14	Nov-20	Jan-18	Apr-21	Nov-12
Date implemented/ required date of rule adoption	Assembly bill signed by governor on 31 March 2021; Sales may begin in December 2022.	July 2015: Personal possession, consumption, cultivation. October 2015 up to December 2016: Retail sales through medical dispensaries January 2017: Retail sales through licensed retailers.	Anticipated date of implementation was 1 April 2022. The ballot measure overturned by courts in February 2021.	1 July 2018 Sale regulations effective October 2020	Effective July 2021, Bill provisions are subject to re-enactment by the 2022 Session of the state General Assembly. Sales beginning and regulations taking effect on 1 January 2024.	December 2012: Personal possession, consumption July 2014: Retail sales.
Regulatory authority	Cannabis Control Board	Oregon Liquor Control Commission	Department of Revenue	Cannabis Control Board (proposed under S.54)	Virginia Cannabis Control Authority Cannabis Oversight Commission; Cannabis Public Health Advisory Council Cannabis Equity Reinvestment Board and Fund, and Virginia Cannabis Equity Business Loan Program and Fund	Liquor and Cannabis Board (formerly the Liquor Control Board)
Minimum age	21	21	21	21	21	21
Residency requirement	None	None	None	None	None	None



	New York	Oregon	South Dakota	Vermont	Virginia	Washington
<b>Personal possession quantity</b>	85.5 g (3 oz) or 24 g of concentrated cannabis	In public: 28.5 g; At home: 228 g	28.5 g (1 oz or less) or 8 g of concentrate	28.5 (1 oz) or less or 5 g or less	28.5 (1 oz) or less	28.5 g
<b>Home cultivation</b>	6 plants, 3 mature and 3 seedlings, or up to 12 per household.	4 plants in flower.		2 mature plants or 7 immature plants.	Up to 4 plants for personal use per household. The plants should be kept away from public view, and each one should have a legible tag with owner's ID.	Not allowed
<b>Interpersonal sharing</b>	Same as personal possession limits but without compensation.	28.5 g		28.5 or 1 oz or less, or 5 g or less	Yes, same as personal limit.	Not allowed
<b>Retail transaction limit</b>	To be determined.	1 oz dried flower 16 oz edible form 72 oz cannabis in liquid form 10 cannabis seeds 4 immature cannabis plants		1 oz or cannabis or equivalent in cannabis products	28.5 g (1 oz) or equivalent	28.5 g
<b>Retail pricing structure</b>	Market/commercial	Market		Market	Market with limitation	Market
<b>Maximum THC content</b>	Not set	Not set initially		Flower is capped at 30% THC and concentrates cannot exceed 60% THC. Edibles have a 50mg limit per package, 5mg per serving.	Not specified	Not set initially
<b>Registration requirements</b>	None	None		None	None	None
<b>Commercial production</b>	Licensed	Licensed cannabis producers		Licensed	Number of licences (proposed) not to exceed: a) Marijuana manufacturing facilities, 60; and b) Marijuana cultivation facilities, 450	Licensed cannabis producers
<b>Commercial distribution</b>	Licensed establishments. Existing medical cannabis operators will be allowed to operate three adult-use stores, co-locating them with their medical dispensaries.	Licensed retail cannabis stores		Licensed	Number of licences issued shall not exceed the following limits: a) Retail marijuana stores, 400; b) Marijuana wholesalers, 25.	Cannabis can only be sold and purchased at state-licensed retail stores.
<b>Restrictions on edibles</b>	None	Maximum of 10 mg of THC in each individually packed serving; edible products to undergo a preapproval process; not appealing to children.		None	Not to contain more than 5 mg of THC per serving of the product; and shall not contain more than 50 mg of THC per package of the product.	10 mg of THC in each individually packaged serving; child-proof packaging; THC labelling; marijuana-infused products, packages and labels to be approved by the State Liquor Control Board before sale.

	New York	Oregon	South Dakota	Vermont	Virginia	Washington
<b>Advertising</b>	The board is authorized to promulgate rules and regulations governing the advertising	Entry sign required on exterior of dispensaries; Oregon Liquor Control Commission has authority to further regulate or prohibit advertising.		Advertising could not be deceptive, promote over-consumption, offer free samples, or be appealing to minors. Advertising would only be allowed where the licensee can reasonably expect no more than 15% of viewers will be under 21.	Board to regulate reasonable restrictions on advertising and promotion of products.	Cannabis business licensees are limited to two permanent signs on their licensed premises, and all other forms of outdoor ads on the premises are banned. New rules mandated that billboards and signs can no longer contain images of the cannabis plant or cannabis products. Cannot contain depictions of cartoon characters or any depictions that may be appealing to children.
<b>Taxation</b>	Proposed tax is 13%. Wholesale tax will be applied to products based on potency (0.5 cent per mg for flower, 8/10th of a cent per mg for concentrated cannabis and 3 cents per mg for edibles).	No tax on retail sales from October 2015 to December 2015; 25% sales tax after 5 January 2016; 17% sales tax in 2017 with options for local communities to establish local tax up to 3% .	15% tax proposed	14% of sales price of retail sale	20% retail sale tax	37% cannabis excise tax; Sales Tax: 7.0-10.4% (Option to apply existing local sales taxes (0.5-3.1%)).
<b>On site consumption</b>	Is allowed	Not allowed		Maybe allowed	Not specified	Not allowed
<b>Restrictions on use</b>	Smoking cannabis in any location is prohibited where smoking tobacco is prohibited.	Smoking marijuana in public is illegal.	Prohibited in public places other than in an area licensed by the Department for consumption; smoking in a location where smoking tobacco is prohibited.	Use is limited to individual dwellings. Prohibited in street, alley, park or sidewalk in addition to usual smoke free places.	Public use of cannabis will be prohibited.	It is illegal to consume cannabis in view of the public.
<b>Medical cannabis</b>	2014: Registration and ID card, medical cannabis to be given either to a certified patient (resident of the state) or by a designated caregiver for a certified medical use for defined "severe debilitating or life threatening conditions.	1998: Patient registry, dispensaries already existed but not clearly authorized by law or regulated; possession, home cultivation.	2020: court ruled it unconstitutional.	Department of health reviews application of qualifying patients diagnosed with qualifying conditions; DoH verifies the condition with the physician.	2020: Registration is based on certification from a practitioner for specified conditions.	1999/2010/2011: no registration or identification card; dispensaries approved as of November 2012, first stores opened in July 2014; 1999 possession 2012: Home cultivation.

**TABLE 3** Regulations for the legalization of the non-medical use of cannabis in Uruguay

	Uruguay		
<b>Legal process</b>	Government initiative, national law		
<b>Title</b>	Law No. 19.172		
<b>Date passed</b>	Dec-13		
<b>Date implemented/ required date of rule adoption</b>	August 2014: Personal cultivation	October 2014: Grower clubs	Mid-2017: Pharmacy sales
<b>Regulatory authority</b>	Institute for the Regulation and Control of Cannabis (IRCCA)		
<b>Minimum age</b>	18		
<b>Residency requirement</b>	Uruguayan citizenship or permanent Uruguayan residency required		
<b>Personal possession limit</b>	40 g per month		
<b>Home cultivation</b>	Six plants in flower		
<b>Interpersonal sharing</b>	Allowed within the home		
<b>Retail transaction limit</b>	40 g per month, 10 g per week (sale through pharmacies to registered users)		
<b>Retail pricing structure</b>	Government price control		
<b>Average retail price per gram after tax</b>	265 Uruguayan pesos per 5 g (approx. \$1.2 per gram)		
<b>Maximum THC content</b>	All products are required to indicate that CBD is equal to or more than 3% and THC is equal to or less than 9%		
<b>Registration requirements</b>	Yes, with IRCCA for any of the three modes of access		
<b>Commercial production</b>	Licensed marijuana producers		
<b>Commercial distribution</b>	Licensed pharmacies		
<b>Restrictions on edibles</b>			
<b>Advertising</b>	Prohibited		
<b>Taxation</b>	No tax, although IRCCA can impose tax in the future		
<b>Cannabis clubs</b>	Clubs with 15-45 members allowed to cultivate up to 99 plants, maximum 480 g of dried product per member per year		
<b>Restrictions on use</b>			
<b>Medical cannabis</b>	In 2013: Passed (Law 19.172). Decree N° 46/015. Oils under prescription (CBD) and cosmetics with CBD currently for sale in pharmacies.		



# OPIOIDS

3

## Overlap between the use of opioids

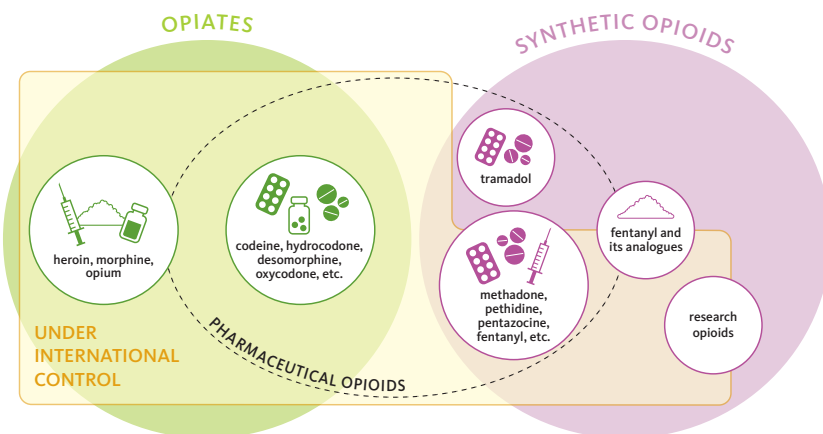
Opioids are a group of drugs comprising a range of substances, including opiates and their synthetic analogues. Opiates are the naturally occurring alkaloids found in the opium poppy and include morphine, codeine and thebaine. Their semi-synthetic derivatives include heroin, hydrocodone, oxycodone and buprenorphine. Opioids also include a range of synthetic or pharmaceutical opioids, such as methadone, pethidine, tramadol and fentanyl.<sup>119</sup>

The group also comprises a diverse group of chemicals – opioid receptor agonists – that were initially developed by pharmaceutical companies with the aim of producing more effective opioids for pain management, but were later discarded or considered unsuitable for further development.<sup>120</sup> Many of those substances, also known as research opioids, novel synthetic opioids or NPS opioids, are considered to be more potent than morphine;

synthetic opioids that are analogues of fentanyl are considered to be 50–100 times more potent than morphine.<sup>121, 122, 123</sup> Research or NPS opioids such as U-47700, AH-7921, fentanyl analogues (acrylfentanyl, butyrylfentanyl), the new class of benzimidazole (isotonitazene)<sup>124</sup> and the more recent bromphine,<sup>125</sup> to name but a few, have added to the ever-increasing complexity of opioids, both in terms of controlling the misuse of these substances and their public health implications. Many of the research opioids, such as U-47700 or butyrylfentanyl, have been put under international control in recent years, however. Moreover, some of the substances, such as W-15 and W-18, were initially introduced as potent opioids but were later found to have no activity on the opioid receptors, although they were put under national control in some countries.<sup>126</sup> Nevertheless, research opioids are among the fastest increasing group among the wider new psychoactive substances identified or reported each year.<sup>127, 128</sup>

Opioids act on three types of opioid receptors – mu ( $\mu$ ), delta ( $\Delta$ ) and kappa ( $\kappa$ ) – in the human body, through which they mediate their effects by: (a) depressing

FIG. 37 Opioids for medical and non-medical purposes



Source: UNODC elaboration.

119 WHO, *Lexicon of Alcohol and Drug Terms* (Geneva, 1994).

120 See also UNODC, *World Drug Report 2019*, booklet 3, *Depressants* (United Nations publication, 2019).

121 Gabriella Roda and others, "Ten years of fentanyl-like drugs: a technical-analytical review", *Analytical Sciences*, vol. 35, No. 5 (May 2019), pp. 479–491.

122 Clara Pérez-Mañá and others, "Drug interactions with new synthetic opioids", *Frontiers in Pharmacology*, vol. 9, art. No. 1145 (October 2018).

123 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 (July/August 2017), pp. 256–265.

124 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.

125 Nick Verougstraete and others, "First report on bromphine: the next opioid on the deadly new psychoactive substances' horizon?", *Journal of Analytical Toxicology*, vol. 44, No. 9 (November 2020), pp. 937–946.

126 Xi-Ping Huang and others, "Fentanyl-related designer drugs W-18 and W-15 lack appreciable opioid activity in vitro and in vivo", *JCI Insight*, vol. 2, No. 22 (November 2017).

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

128 Roda and others, "Ten years of fentanyl-like drugs: a technical analytical review".

breathing through the neurochemical activity in the brain stem where automotive body functions such as breathing and heart rate are controlled; (b) increasing feelings of pleasure by altering activity in the limbic system, which controls behavioural and emotional responses, such as the regulation of stress responses, feeding, mood, learning, memory and immune functions; and (c) blocking pain messages transmitted through the spinal cord from other parts of the body.<sup>129</sup> The abuse liability of an opioid is essentially determined by many factors, including the ease with which the opioid can cross the blood–brain barrier (lipophilicity of the drug), its binding affinity to opioid (mainly mu) receptors, and various pharmacokinetic characteristics such as the ease with which it can be injected or used with other means of administration (smoking or insufflation).<sup>130</sup>

Studies have shown that, in response to market dynamics, drug users may substitute different drugs, transition to alternative routes of drug administration, decrease consumption or enter treatment. Overlap between or substitution of different opioids is not a new phenomenon and has been observed in different settings. Findings from different studies have consistently shown a positive association between the non-medical use of pharmaceutical opioids and the use of opiates (heroin), given the common pharmacological principles and actions of opioid substances.<sup>131</sup>

Along with the availability of the drugs, economic factors and cross-price elasticity can affect the use of different opioids.<sup>132</sup> An increase in the price of one drug may result in the consumption of another (substitute) or an increase in the price of one drug may decrease the consumption of another, even though its price remains the same (complement).<sup>133</sup> In one study in Australia, for example, a cross-price elasticity analysis showed that, in the case

of heroin, there was significant substitution with pharmaceutical opioids and, to a lesser extent, substitution with benzodiazepines and methamphetamine.<sup>134</sup> Estonia and Finland are two countries where, owing to a shortage in the availability of heroin, two synthetic opioids, fentanyl (in the case of Estonia) and buprenorphine (in the case of Finland) have completely replaced heroin and established themselves on the opioid market.<sup>135, 136</sup>

There are essentially three different scenarios in the interplay of the use of different opioids: (a) typically used opioids are substituted with other opioids, or new opioids are experimented with, depending on their price, purity, availability and control measures; (b) different opioids are used consecutively or sequentially to self-medicate or manage withdrawal, including during opioid agonist<sup>137</sup> or antagonist<sup>138</sup> therapy; and (c) opioid users (novice or even regular users) are inadvertently exposed to other opioids used as adulterants or cutting agents for substances already established in the market.

### Switching between opioid use in response to market dynamics

The first pattern of use that involves an overlap, or rather substitution, between different opioids is the most common pattern of use of different opioids and has been observed for decades in different regions. Although pharmaceutical opioids and heroin have the potential to induce similar pharmacological mechanisms, as described earlier, some of their properties may differ. Thus, the choice of opioid is likely to be influenced by, among other factors, the balance between the subjective positive and negative effects produced by a specific opioid. For example, a study of heroin users in the United States showed

129 WHO, *Neuroscience of Psychoactive Substance Use and Dependence* (Geneva, 2004).

130 Wilson M. Compton, Christopher M. Jones and Grant T. Baldwin, “Relationship between nonmedical prescription-opioid use and heroin use”, *The New England Journal of Medicine*, vol. 374 (2016), pp. 154–163.

131 Danielle Horyniak and others, “How do drug market changes affect characteristics of injecting initiation and subsequent patterns of drug use? Findings from a cohort of regular heroin and methamphetamine injectors in Melbourne, Australia”, *International Journal of Drug Policy*, vol. 26, No. 1 (January 2015), pp. 43–50.

132 Peter Caulkins and P. Reuter, “The meaning and utility of drug prices”, *Addiction*, vol. 91, No. 9 (September 1996).

133 Nancy M. Petry and Warren K. Bickel, “Polydrug abuse in heroin addicts: a behavioural economic analysis”, *Addiction*, vol. 93, No. 3 (March 1998), pp. 321–335.

134 Jenny Chalmers, Deborah Bradford and Craig Jones, “The effect of methamphetamine and heroin price on poly drug use: a behavioural economics analysis in Sydney, Australia”, *International Journal of Drug Policy*, vol. 21, No. 5 (September 2010), pp. 381–389.

135 EMCDDA, “Finland: Finland drug report 2018” (Helsinki, 2018).

136 Ilkka Ojanperä and others, “An epidemic of fatal 3-methylfentanyl poisoning in Estonia”, *International Journal of Legal Medicine*, vol. 122, No. 5 (September 2008), pp. 395–400.

137 According to the WHO *Lexicon of Alcohol and Drugs Terms*, an agonist is a substance that acts on neuronal receptors to produce effects similar to those of a reference drug. For example, methadone is an agonist of morphine at the opioid receptors.

138 According to the WHO *Lexicon of Alcohol and Drugs Terms*, an antagonist is a substance that counteracts the effects of another substance or agent. Pharmacologically, an antagonist interacts with a receptor to inhibit (counter or stop) the action of the substance that produces specific effects mediated by that receptor. Methadone is an opioid agonist, whereas buprenorphine is an agonist and partial antagonist of opioid receptors.

that the subjective reinforcing effects of oxycodone were similar to those produced by morphine or heroin, but without the unwanted or unpleasant effects reported by the study participants.<sup>139</sup> The authors concluded that the abuse liabilities of fentanyl, morphine, oxycodone and heroin appeared to be similar, under the experimental conditions in which the study was conducted.

In the United States, the opioid market has fluctuated from the use of heroin to the non-medical use of pharmaceutical opioids, and currently to a dual epidemic of heroin use and non-medical use of pharmaceutical opioids. The non-medical use of pharmaceutical opioids in the country began to increase from 1997, at the same time as an increasing number of opioid prescriptions were being given for pain management, in particular chronic non-cancer pain management. Over the period 1997–2005, there was a more than 500 per cent increase in the number of opioid prescriptions given, which resulted in easy access to diverted supplies of opioids, the use of which was less stigmatized than of heroin.<sup>140</sup> Pharmaceutical opioids were considered safer than heroin, as they did not carry the stigma of using an “illicit” drug and were less affected by fluctuations in quality or dosage. A study of opioid users in treatment (2010–2013) reported that respondents who began using heroin in the 1960s were predominantly young men (83 per cent) and, in the majority (80 per cent) of cases, the first opioid they had used was heroin. By contrast, opioid users in treatment who began using more opioids recently were older and were men and women living in less urbanized areas (75 per cent) who were introduced, in the majority of cases (75 per cent), to opioids through pharmaceutical drugs.<sup>141</sup>

Beginning in 2006, a gradual increase in heroin use was observed in parts of the United States, which was attributed mainly to the availability of heroin that had a higher purity and was cheaper than in the past on the market and a change in the formulation of pharmaceutical opioids to make them crushproof and less liable to misuse. It has been hypothesized that the transition from the non-medical use of pharmaceutical opioids to the use of heroin, especially among young people, could

have been part of the progression of addiction in a subgroup of users of pharmaceutical opioids for non-medical purposes who considered it too costly to maintain their patterns of consumption and switched to heroin use as they considered the drug more reliably available through drug dealers, more potent and more cost-effective than pharmaceutical opioids.<sup>142</sup>

In the United States over the period 2002–2013, the considerable increase in the use of heroin translated into an increase in the rate of past-year use of the drug, in particular among people who self-reported past-year use of other substances, especially cocaine and pharmaceutical opioids. Between the periods 2002–2004 and 2011–2013, heroin use increased by 139 per cent among those who self-reported the non-medical use of pharmaceutical opioids.<sup>143</sup> A study from 2007 among a sample of opioid users aged 16 and older in Maine, United States, concluded that the use of multiple pharmaceutical opioids within the first year of initiation of opioid use was associated with a more rapid progression to heroin and injecting drug use than among those who were not misusing multiple pharmaceutical opioids.<sup>144</sup> Another study that looked at national data for 2002–2004 found that, among the population aged 18 and older, heroin users were 3.9 times more likely to report the non-medical use of opioids in the previous year and 2.9 times more likely to meet the criteria for abuse or dependence on opioids than people who did not use heroin.<sup>145</sup>

In 2019, about 10 million people in the United States self-reported the non-medical use of opioids in the past year: 9.3 million self-reported the non-medical use of pharmaceutical opioids and 745,000 self-reported the use of heroin. About 400,000 people self-reported the use of both heroin and non-medical pharmaceutical opioids.<sup>146</sup> It should be noted that the national survey does

139 Sandra D. Comer and others, “Abuse liability of prescription opioids compared to heroin in morphine-maintained heroin abusers”, *Neuropsychopharmacology*, vol. 33, No. 5 (April 2008), pp. 1179–1191.

140 Sarah G. Mars and others, “Every ‘never’ I ever said came true: transitions from opioid pills to heroin injecting”, *International Journal on Drug Policy*, vol. 25, No. 2 (March 2014), pp. 257–266.

141 Theodore J. Cicero and others, “The changing face of heroin use in the United States: a retrospective analysis of the past 50 years”, *JAMA Psychiatry*, vol. 71, No. 7 (July 2014), pp. 821–826.

142 Compton, Jones and Baldwin, “Relationship between nonmedical prescription-opioid use and heroin use”.

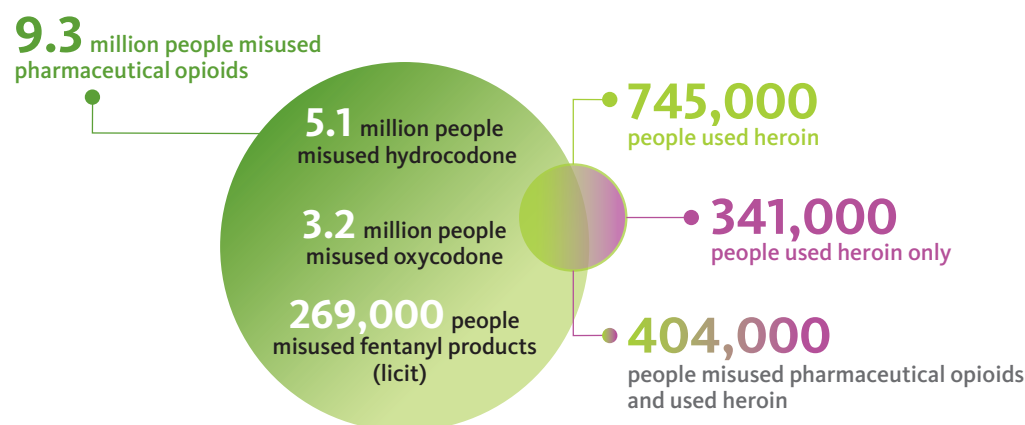
143 Christopher Jones and others, “Vital signs: demographic and substance use trends among heroin users – United States, 2002–2013”, *Morbidity and Mortality Weekly Report*, vol. 64, No. 26 (July 2015).

144 Laretta E. Grau and others, “Illicit use of opioids: is OxyContin a ‘gateway drug’?”, *The American Journal on Addictions*, vol. 16, No. 3 (May–June 2007), pp. 166–173.

145 William C. Becker and others, “Non-medical use, abuse and dependence on prescription opioids among U.S. adults: psychiatric, medical and substance use correlates”, *Drug and Alcohol Dependence*, vol. 94, Nos. 1–3 (2008), pp. 38–47.

146 United States, Substance Abuse and Mental Health Services Administration, *Key Substance Use and Mental Health Indicators: Results from the 2019 National Survey on Drug Use and Health* (Rockville, Maryland, Center for Behavioral Health Statistics and Quality, 2020).



**FIG. 38** Past-year non-medical use of pharmaceutical opioids and heroin, United States, 2019

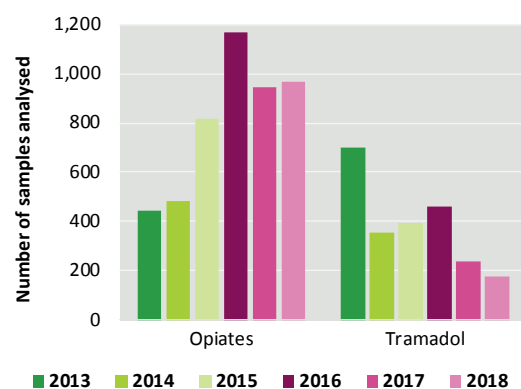
Source: United States, Substance Abuse and Mental Health Services Administration, *Key Substance Use and Mental Health Indicators: Results from the 2019 National Survey on Drug Use and Health* (Rockville, Maryland, Center for Behavioral Health Statistics and Quality, 2020).

not cover the homeless or institutionalized populations, who tend to have higher rates of opioid use in the United States.

Similar patterns of switch or replacement between opioids have also been reported in other countries. In a study of a cohort of people in treatment for substance use disorders in the United Arab Emirates between 2013 and 2018, polydrug use, including sequential or concurrent

use of opiates (codeine, heroin and morphine) and tramadol, was reported to be a common pattern. Moreover, although tramadol was the most commonly misused opioid in 2013, its pattern of misuse changed in subsequent years. When tramadol was put under national control in 2014, the use of opiates became more common among opioid users in drug treatment.<sup>147</sup>

Similar overlaps and switches between opioids have been observed in Europe. In Sweden, the opioid market was dominated by heroin until 2014, with a relatively limited share of the market for other opioids, such as diverted fentanyl patches that appeared in the drug market in 2006.<sup>148</sup> In 2014, fentanyl analogues were introduced onto the illegal drug market in Sweden through online sales of fentanyl analogues, mainly in the form of nasal sprays but also as tablets, powder and capsules, and have dominated the market ever since.<sup>149</sup> In Estonia and Finland, it is also well documented that two synthetic opioids, fentanyl (in the case of Estonia) and buprenorphine (in the case of Finland), have completely replaced heroin and established themselves on the opioid market.<sup>150</sup>

**FIG. 39** Trends in the use of opioids among people in drug treatment, United Arab Emirates, 2013–2018

Source: Abuelgasim Elrasheed A. Alhassan and others, "A 6-year review of drug trends in the United Arab Emirates from the perspective of the National Rehabilitation Centre (NRC), Abu Dhabi", *Current Topics in Toxicology*, vol. 16 (2020).

Note: Opiates include codeine, heroin and morphine.

147 Abuelgasim Elrasheed A. Alhassan and others, "A 6-year review of drug trends in the United Arab Emirates from the perspective of the National Rehabilitation Centre (NRC), Abu Dhabi", *Current Topics in Toxicology*, vol. 16 (2020).

148 Bryce Pardo and others, *The Future of Fentanyl and other Synthetic Opioids* (Santa Monica, California, RAND Corporation, 2019).

149 Swedish Police Authority, National Operations Department, "Swedish national threat assessment on fentanyl analogues and other synthetic opioids" (October 2018).

150 See also, UNODC, *World Drug Report 2020*, booklet 4, *Cross-Cutting*

## Multiple use of opioids as self-medication among regular opioid users

The second pattern of multiple use of opioids has been observed in the context of the concomitant use of opioids with non-prescribed opioid agonists and antagonists (methadone, buprenorphine or a buprenorphine and naloxone combination) available for the treatment of opioid use disorders.<sup>151</sup> The diversion of methadone and buprenorphine used in the treatment of opioid use disorders and the availability and use of illicit buprenorphine or morphine have been reported in different regions. One review showed that between 18 and 28 per cent of patients enrolled in outpatient opioid agonist programmes (methadone or buprenorphine) across different geographical regions with widely varying treatment structures had sold, given away or removed their medication while under supervision, or shared it with others who had been prescribed medication.<sup>152</sup>

In a study among clients in opioid agonist treatment across five sites in Sweden, the majority reported prior use of non-prescribed methadone (88 per cent), buprenorphine (80 per cent) and a combination of buprenorphine and naloxone (as partial agonist and antagonist) (50 per cent). Most respondents had bought or received the substances from other patients in opioid agonist maintenance programmes, but drug dealers were also a significant source of non-prescribed opioid agonists and antagonists. Buprenorphine appeared on the illegal drug market in Sweden in the 1980s in the form of temgesic, but it was launched as an opioid agonist and antagonist treatment in the 1990s.<sup>153</sup>

In Malaysia, the pattern of injecting buprenorphine emerged shortly after its introduction in 2002, during the rapid expansion of outpatient opioid agonist treatment for heroin users, which at that time was provided primarily by general practitioners.<sup>154, 155</sup> One survey undertaken among 276 opioid users in 2006 showed that more than 90 per cent of respondents had a prior history of using heroin, and about 60 per cent were injecting, on a daily basis, the buprenorphine that they had received for the treatment of opioid use disorders using a prescription from a private general practitioner.<sup>156</sup> Buprenorphine was withdrawn from the Malaysian pharmaceutical market in 2006 and replaced with a buprenorphine and naloxone combination<sup>157</sup> in 2007.<sup>158</sup>

Studies that have looked at the misuse of opioid agonists such as buprenorphine or methadone among regular opioid users, along with sequential or consecutive use of other drugs such as benzodiazepines, have suggested that these opioids, even if not prescribed in treatment settings, are more commonly used for therapeutic purposes than to get high; to self-medicate or to manage the effect of the main opioid used, for example, to reduce craving and withdrawal symptoms; to reduce or cease the use of heroin; and to self-medicate in order to treat depression or as a result of not being able to access or afford drug treatment.<sup>159, 160</sup> Studies have suggested that the use of buprenorphine obtained from the illicit market rarely represents an attempt to attain euphoria and that its abuse liability in heroin-dependent individuals seems low. Moreover, once opioid users are enrolled in a treatment programme, they typically decrease their misuse of buprenorphine obtained on the illicit market.<sup>161, 162</sup> It

*Issues: Evolving Trends and New Challenges* (United Nations publication, 2020).

- 151 Methadone is an opioid agonist. It is known to produce minimal tolerance and alleviates craving and compulsive use. As a long-acting agonist, buprenorphine prevents withdrawal and craving and stabilizes opioid receptors. As a high-affinity agonist, buprenorphine blocks other opioids from binding, preventing misuse of other opioids. Naloxone in combination with buprenorphine prevents misuse of buprenorphine because naloxone precipitates acute withdrawal if it is crushed and injected. See, Thomas R. Kosten and Tony P. George, "The neurobiology of opioid dependence: implications for treatment", *Science and Practice Perspectives*, vol 1, No.1 (July 2002), pp. 13–20.
- 152 Michelle R. Lofwall and Sharon L. Walsh, "A review of buprenorphine diversion and misuse: the current evidence base and experiences from around the world", *Journal of Addiction Medicine*, vol. 8, No. 5 (September–October 2014), pp. 315–326.
- 153 Bjorn Johnson and Torkel Richert, "Non-prescribed use of methadone and buprenorphine prior to opioid substitution treatment: lifetime prevalence, motives, and drug sources among people with opioid dependence in five Swedish cities", *Journal of Harm Reduction*, vol. 16, No. 31 (May 2019).

- 154 Lofwall and Walsh, "A review of buprenorphine diversion and misuse: the current evidence base and experiences from around the world".
- 155 Balasingam Vicknasingam and others, "Injection of buprenorphine and buprenorphine/naloxone tablets in Malaysia", *Drug and Alcohol Dependence*, vol. 111, Nos. 1 and 2 (September 2010), pp. 44–49.
- 156 Ibid.
- 157 To prevent misuse of buprenorphine, as naloxone precipitates acute withdrawal if it is crushed and injected.
- 158 Vicknasingam and others, "Injection of buprenorphine and buprenorphine/naloxone tablets in Malaysia".
- 159 Zev Schuman-Olivier and others, "Self-treatment: illicit buprenorphine use by opioid-dependent treatment seekers", *Journal of Substance Abuse Treatment*, vol. 39, No. 1 (July 2010), pp. 41–50.
- 160 Alexander R. Bazazi and others, "Illicit use of buprenorphine/naloxone among injecting and noninjecting opioid users", *Journal of Addiction Medicine*, vol. 5, No. 3 (September 2011), pp. 175–180.
- 161 Comer and others, "Abuse liability of prescription opioids compared to heroin in morphine-maintained heroin abusers".
- 162 Schuman-Olivier and others, "Self-treatment: illicit buprenorphine use by opioid-dependent treatment seekers".

seems that both inadequate and stringently controlled access to opioid maintenance treatment may be a potential risk factor for the continued diversion and misuse of opioid agonist therapeutic agents.<sup>163</sup>

Beyond the misuse of opioid agonists, there is a niche for the use of NPS opioids among some segments of recent NPS users who may also have used opioids in the past, or currently use them. The use of NPS opioids among this group is also seen in the context of self-medication, in particular for coping with everyday life situations and physical or emotional issues such as pain, stress, anxiety and sometimes drug withdrawal and addiction.<sup>164</sup>

### Inadvertent exposure to or use of opioids

The third pattern of use of multiple opioids, inadvertent exposure to or use of opioids, is common as part of the current opioid crisis in North America and also in the context of NPS opioids emerging on different markets. It is more of a supply-driven dynamic. In such contexts, fentanyl is used as an adulterant of heroin or are used to manufacture falsified pharmaceutical opioids, such as falsified oxycodone or hydrocodone and even falsified benzodiazepines, which are then usually sold to a large and unsuspecting population of users of not only opioids but also cocaine and other stimulants.<sup>165, 166</sup> The inadvertent use of fentanyl in the United States is clear: only 0.1 per cent of the population aged 12 and older self-reported the non-medical use of fentanyl in 2019, yet they account for the majority of the overdose deaths recorded in the country.<sup>167</sup> Fentanyl and NPS opioids have also been sold on illegal markets in Western and Central Europe, both on online platforms and the streets, as, or mixed with, heroin and falsified opioids.<sup>168, 169</sup>

Another situation in which opioid users can inadvertently be exposed to other opioids is through the use of falsified or substandard substances to self-treat drug use disorders. One study in Tehran, Islamic Republic of Iran, that looked at medication purportedly sold to treat opioid use disorders found that the most common substances present in the samples collected were diphenoxylate, tramadol, other opioids (morphine, codeine) and acetaminophen.<sup>170</sup> These falsified medicines are purportedly sold by herbalists in that country to people seeking self-treatment for opioid use disorders.

### Supply of opiates versus supply of synthetic opioids

The point of origin of opiates and synthetic opioids differs greatly. Opiates found on illicit markets originate primarily in or close to the few areas where opium is produced, namely, South-West Asia (notably Afghanistan), South-East Asia (notably Myanmar) and Latin America (notably Mexico).<sup>171</sup> By contrast, the origin of synthetic opioids is far less limited, although in recent years, depending on the specific substance, manufacture has been concentrated in just a few subregions: East and South-East Asia, South Asia and, to a lesser extent, North America and Europe.<sup>172</sup> While many synthetic opioids found on illicit markets are legally manufactured before being diverted into illicit channels (mainly within national borders),<sup>173</sup> some are also illegally manufactured and subsequently trafficked.

Other than from a few reports published in some countries or regions, which show a rather mixed picture, it is difficult to assess in a systematic way whether opiates and synthetic opioids are trafficked by the same or different organized crime groups. Data from the United States, for example, suggest that many of the groups involved in trafficking in heroin are now also involved in trafficking in synthetic opioids. Mexican organized crime groups are involved in the export not only of heroin from Mexico to the United States, but also of fentanyl and its analogues.

163 Lofwall and Walsh, "A review of buprenorphine diversion and misuse: the current evidence base and experiences from around the world".

164 Christophe Soussan, Martin Andersson and Anette Kjellgren, "The diverse reasons for using novel psychoactive substances: a qualitative study of the users' own perspectives", *International Journal of Drug Policy*, vol. 52 (2018), pp. 71–78.

165 Patil Armenian and others, "Fentanyl, fentanyl analogs and novel synthetic opioids: a comprehensive review", *Neuropharmacology*, vol. 134, part A (2018), pp. 121–132.

166 United States, Department of Justice, Drug Enforcement Administration, *2018 National Drug Threat Assessment* (October 2018).

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

168 EMCDDA, *European Drug Report 2017: Trends and Developments* (Luxembourg, Publications Office of the European Union, 2017).

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

170 Hamid Reza Khoddami-Vishteh and others, "Component analysis of the illegal handmade pills and capsules for self-medicating substance dependence in Tehran, Iran", *Addiction and Health*, vol. 10, No. 1 (January 2018), pp. 17–23.

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

172 INCB, *Narcotic Drugs: Estimated World Requirements for 2020 – Statistics for 2018* (E/INCB/2019/2), (New York 2020) and previous years.

173 Ibid.

Those groups include the Sinaloa Cartel and the Jalisco New Generation Cartel. In a number of cases, fentanyl-laced heroin, namely, mixtures of heroin with fentanyl analogues, originating in Mexico have been found in the United States.

Mexican organized crime groups, in particular the Sinaloa Cartel, were also identified as suppliers of Dominican organized crime groups operating in the United States that are involved in the sale of heroin and fentanyl in the north-east of the country, most notably in New England. Some of the fentanyl sold by Dominican organized crime groups operating in the United States is also shipped from fentanyl-milling operations in the Dominican Republic. By contrast, Colombian organized crime groups operating in the United States that are involved in cocaine and heroin trafficking do not yet appear to have taken up trafficking in fentanyl and its analogues. Street gangs, prison gangs and outlaw motorcycle gangs have been found to be involved in trafficking a number of drugs, including methamphetamine, cocaine, heroin and, to a lesser extent, prescription and counterfeit pills.<sup>174</sup>

In Europe, on the other hand, information suggests that the markets for opiates and synthetic opioids are more separated than in the United States. There is one very large and distinct market for heroin and, depending on the country, quite large markets for diverted opioid pharmaceuticals such as buprenorphine, methadone and tramadol, and a small, although potentially highly problematic, market for fentanyl and its analogues.

Heroin is mainly trafficked to Western and Central Europe overland along the Balkan route and partly by sea along the southern route, with the subsequent redistribution of heroin from trafficking hubs, such as the ports of Rotterdam in the Netherlands and Antwerp in Belgium, to major consumer markets in Western and Central Europe. By contrast, synthetic opioids are increasingly traded online and dispatched to countries in the subregion by post from legal or quasi-legal sources, including in China and India and, to a far lesser extent, in Europe: a few illicit laboratories have been detected in France, Estonia, Latvia and Ukraine in recent years.<sup>175</sup>

For years, fentanyl derivatives originating from illicit manufacture in the Russian Federation have been trafficked for distribution in the Baltic States, in particular Estonia, although in both 2018 and 2019, no shipments from the Russian Federation were discovered and shortages in the availability of fentanyl resulted in sharp declines in the number of fentanyl-related deaths in Estonia in 2018 and 2019.<sup>176</sup> Most of the fentanyl derivatives originating in China are purchased throughout the European Union on online platforms on the clear web and the dark web.<sup>177</sup>

174 United States, Department of Justice, Drug Enforcement Administration, *2019 National Drug Threat Assessment* (December 2019).

175 EMCDDA and European Union Agency for Law Enforcement Cooperation (Europol), *EU Drug Markets Report 2019* (Luxembourg, Publications Office of the European Union, 2019).

176 UNODC, responses to the annual report questionnaire.

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



## Demand for opioids

Among people who use drugs, the non-medical use of opioids has always been associated with more negative health consequences than the use of any other drug type. The non-medical use of opioids is attributed to 12.9 million DALYs (healthy years of life lost due to disability and premature death), or 70 per cent of the total 18 million DALYs attributed to drug use disorders. The use of opioids also contributes to the majority of deaths attributed to drug use disorders and contributes significantly to the number of deaths attributed to liver cancer, cirrhosis and other chronic liver diseases resulting from hepatitis C, as well as to those attributed to HIV and AIDS.<sup>178</sup> Heroin remains the opioid of major concern for the great majority of countries, but in some countries and subregions, the non-medical use of pharmaceutical opioids has triggered new health threats in the last few years and has come to be known as an opioid crisis.

The non-medical use of pharmaceutical opioids is not a new phenomenon, however. It has been observed for decades as part of the polydrug use pattern seen among high-risk or regular opioid users. What characterizes the most recent opioid epidemic in North America is the alarming rate of opioid overdose deaths that are attributed mainly to synthetic opioids (fentanyl), while in West, Central and North Africa, the non-medical use of pharmaceutical opioids such as tramadol is of concern. The health impacts of the surge in the markets for fentanyl and tramadol appear to be different: the emergence of fentanyl has not increased the number of people who use opioids, but it has driven up the number of overdose cases mainly among existing opioid users. Tramadol, on the other hand, seems to have driven up use among a wider segment of the population and has led to an increasing number of people in treatment rather than driving up the number of deaths, although reliable information on overdoses is not available for Africa.

## Common characteristics of the opioid crises in Africa and North America

- The ease and low cost of manufacture and easy accessibility of tramadol and fentanyl make the illicit markets for those substances substantially more profitable for traffickers than the markets for other opioids, such as heroin.
- The large-scale manufacture of tramadol and fentanyl for the illicit market emerged in the context of an absence of international regulations on tramadol and many fentanyl analogues and their precursors.
- The fact that the substances available on pharmaceutical markets can be misused interchangeably with those on the illicit market makes it increasingly difficult to prevent their misuse, especially when their use is seen in the context of medical use and is thus perceived to carry less stigma or is subject to less severe legal sanctions than other controlled drugs.

In North America, the introduction of fentanyl and its analogues (fentanyl) into the drug market has resulted in an unprecedented increase in opioid overdoses attributed to synthetic opioids. Earlier, the opioid epidemic in North America was characterized by cyclical waves of heroin use and non-medical use of pharmaceutical opioids although in recent years, the non-medical use of opioids and use of heroin has stabilized (in the United States). Fentanyl found on the illicit market are mainly used as adulterants in heroin or other drugs or sold as falsified pharmaceutical drugs, with the result that users are often unaware that they are consuming them. As a result, due to the unpredictability of the potency of the different fentanyl, many users end up with non-fatal or fatal overdose.

In West, Central and North Africa and the Middle East, tramadol, a pharmaceutical opioid not under international control, has emerged as a major opioid of concern. The drug, in addition to being diverted from the legal market, is mainly trafficked into those subregions in

<sup>178</sup> See also booklet 2, *Global Overview of Drug Demand and Drug Supply*, of the present report.



dosages higher than those prescribed for pain management, resulting in an increasing number of people with tramadol use disorder entering treatment in recent years.<sup>179,180</sup> While the rapid spread of the non-medical use of tramadol is evident, in general there are serious information gaps with respect to its market, and measurable information on its impact on health (or on drug-related deaths and overdoses) is limited.

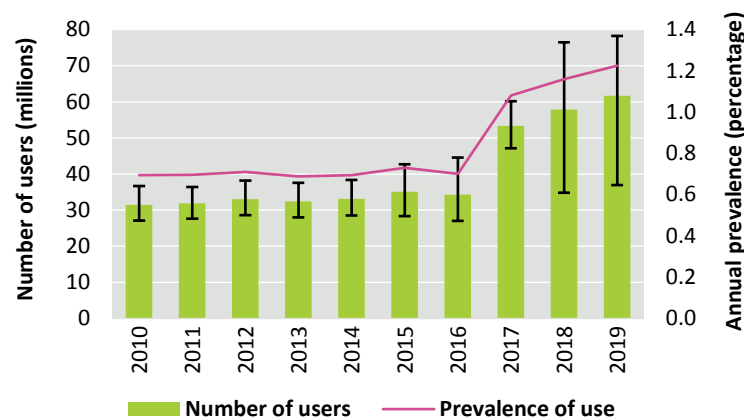
Another key difference in the spread of the non-medical use of tramadol and fentanyl is that the use of fentanyl is mainly supply driven. In the case of tramadol, this is less clear. Although in some areas the market for the non-medical use of tramadol may have emerged as a result of easy access in unregulated pharmaceutical markets, there are indications that it may have been mainly demand driven, at least until 2017. In addition, the use of use a drug is to a large extent related to the availability of the drug more than to an individual's preference to use or misuse a particular substance.<sup>181</sup>

### Number of opioid users worldwide has nearly doubled since 2010

In 2019, nearly 62 million people were estimated to be past-year users of opioids, including people who use opiates and people who use pharmaceutical opioids for non-medical purposes; this corresponds to 1.2 per cent of the global population aged 15–64. Among opioid users, about half (31 million) had used opiates (heroin and opium) in the past year (0.6 per cent of the population aged 15–64). Between 2010 and 2019, the estimated number of opioid users worldwide nearly doubled, from just over 31 million to just under 62 million estimated past-year users. Over the same period, the prevalence of opioid use increased by 76 per cent, whereas the global population increased by 10 per cent.

The main increase in the global number of opioid users in recent years has been driven by a number of new estimates made available for Asia and Africa. The estimates

**FIG. 40** Global estimates of the number of people who use opioids and prevalence of opioid use, 2010–2019



Source: UNODC estimates, based on responses to the annual report questionnaire.

Note: Annual prevalence of opioid use in the past year among the population aged 15–64. Number of users aged 15–64 in the past year. Opioids include opiates and synthetic opioids, including pharmaceutical opioids used for non-medical purposes.

for South Asia have been revised upward, mainly owing to the availability of new estimates from India; the increase in Africa is attributed to more robust estimates from Nigeria in 2019.

### Opioid use in Asia increased in South-West and South Asia but declined in East and South-East Asia

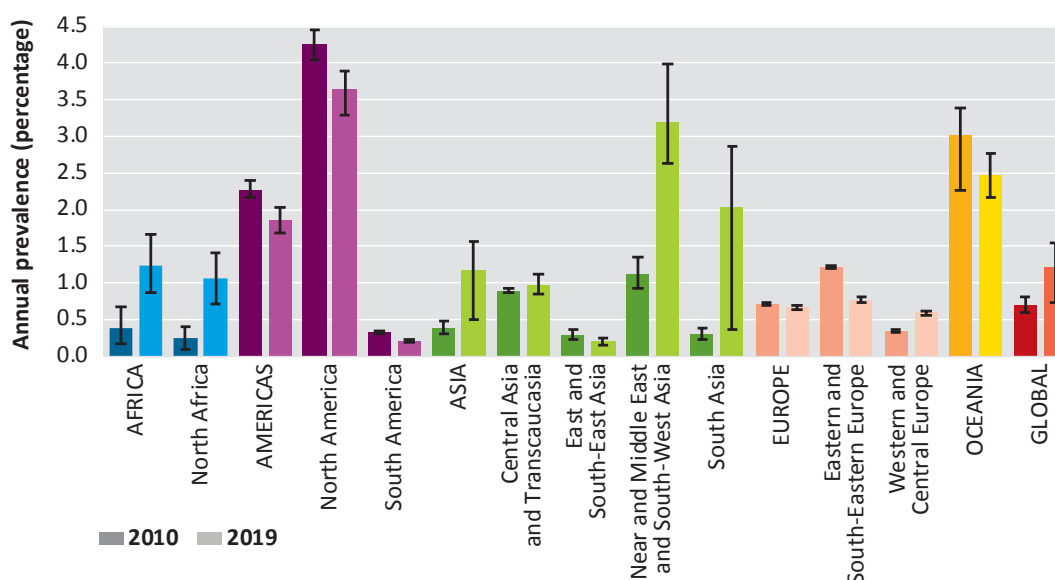
Although the prevalence of opioid use in Asia is comparable to the global average, more than half of the global estimated number of opioid users reside in the region. High levels of opioid use are estimated in South-West Asia (Afghanistan, Iran (Islamic Republic of) and Pakistan), where the past-year prevalence is estimated at 3.2 per cent of the adult population, or 6.8 million estimated past-year users of opioids. In both South-West Asia and South Asia, opiates (heroin in the case of Pakistan and India and opium in the case of Afghanistan and Iran (Islamic Republic of)) are the predominant opioids that are misused. The non-medical use of pharmaceutical opioids is, however, at a comparable level to that of opiates in those subregions. In the Islamic Republic of Iran, the non-medical use of tramadol is also reported; a systematic review estimated the pooled past-year prevalence among the general population as ranging between 3.7 and 6.0 per cent among men and 0.1 and 3.3 per cent

179 UNODC, European Union and ECOWAS, *West African Epidemiology Network on Drug Use (WENDU) Report: Statistics and Trends on Illicit Drug Use and Supply 2014–2017* (2019).

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

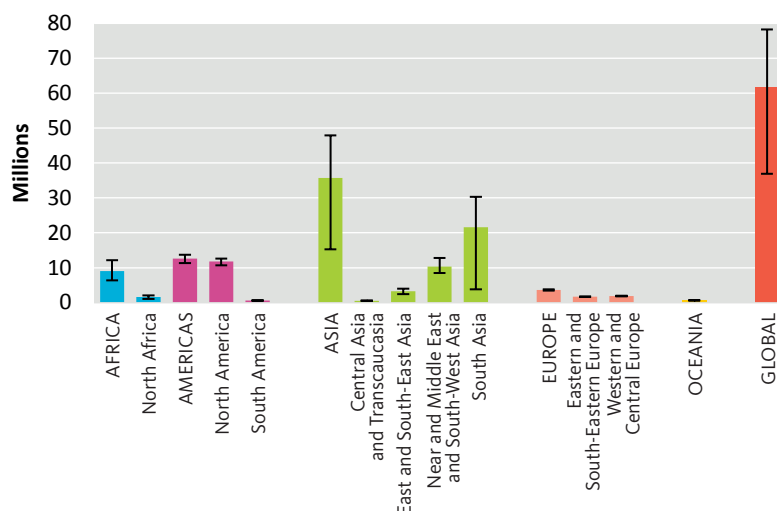
181 Mai Taha and others, “Cannabis and tramadol are prevalent among the first episode drug-induced psychosis in the Egyptian population: single center experience”, *Reports: Medic Cases, Images and Videos*, vol. 10 2, No. 2, art. No. 16 (June 2019).



**FIG. 41** Opioid use, by region and subregion, 2010 and 2019

Source: UNODC estimates, based on responses to the annual report questionnaire.

Note: Opioids include opiates and synthetic opioids, including pharmaceutical opioids used for non-medical purposes. The prevalence of opioid use for 2010 and 2019 are the best estimate based on the available data for those years and should be interpreted with caution, considering the data caveats and the limited availability of data in a given year.

**FIG. 42** People who use opioids, by region and subregion, 2019

UNODC estimates, based on responses to the annual report questionnaire.

Notes: Opioids include opiates and synthetic opioids, including pharmaceutical opioids used for non-medical purposes. Data are not shown for subregions where recent estimates (not older than 10 years) were not available from countries and subregional estimates could therefore not be computed. For 2019, the estimated number of people who used opioids in the past year is based on prevalence 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.

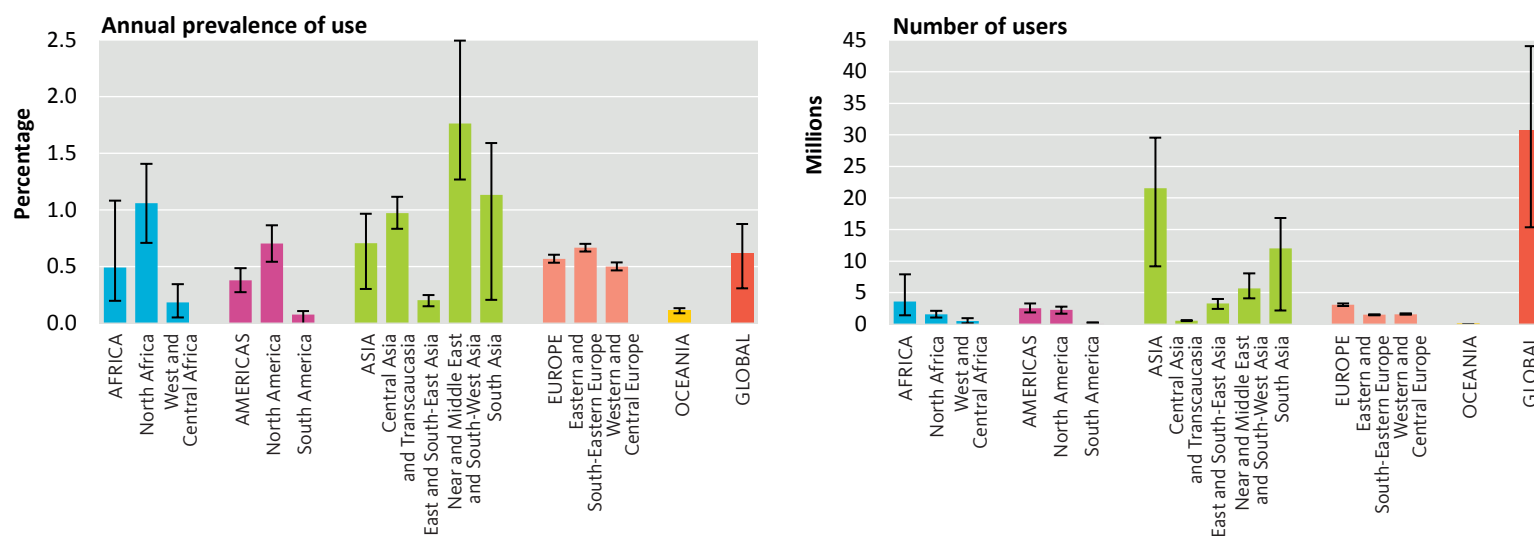
among women, based on studies conducted between 2006 and 2018.<sup>182</sup>

In India, 2.1 per cent of the population aged 10–75, a total of 23 million people, were estimated to be past-year opioid users in 2018. The opioid with the highest prevalence of use was heroin, with a past-year prevalence of 1.1 per cent among the population aged 10–75, followed by the non-medical use of pharmaceutical opioids, the prevalence of which reached almost 1 per cent of the general population, and opium, the prevalence of which was almost 0.5 per cent.<sup>183</sup> Among the 23 million past-year opioid users, 7.7 million were estimated to suffer from opioid use disorders.

Although no recent survey estimates are available from individual countries in East and South-East Asia, based on UNODC estimates, opioid use in the subregion appears to have declined over the period 2010–2019. In 2019, in East and South-East Asia, nearly 3.3 million people, or 0.2

<sup>182</sup> Yasna Rostam-Abadi and others, "Tramadol use and public health consequences in Iran: a systematic review and meta-analysis", *Addiction*, vol. 115, No. 12 (December 2020).

<sup>183</sup> Atul Ambekar and others, *Magnitude of Substance Use in India* (New Delhi, Ministry of Social Justice and Empowerment, 2019).

**FIG. 43** Use of opiates, by region and subregion, 2019

UNODC estimates, based on responses to the annual report questionnaire.

Notes: 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 subregional estimates could therefore not be computed. For 2019, the estimated global prevalence and number of people who used opiates in the past year is based on prevalence 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.

per cent of the population, were estimated to have used opioids in the past year. In China, notwithstanding the limitations of data on registered drug users and in the absence of data on the prevalence of opioid use among the population, the absolute number of heroin users registered declined by a quarter over the period 2010–2019; the number of opioid users declined by 50 per cent as a proportion of the total number of drug users registered in the country.<sup>184</sup>

Wastewater analysis undertaken in 2018 and 2019 in 25 cities across China showed an average drug consumption of 56.7 mg per day per 1,000 inhabitants ( $56.7 \pm 56.8$  mg per day per 1,000 inhabitants), with heroin consumption second after methamphetamine.<sup>185</sup> The consumption of heroin was higher in south-west China ( $108 \pm 147$  mg per day per 1,000 inhabitants), central China ( $59.2 \pm 48.0$  mg per day per 1,000 inhabitants) and in north-west China ( $51.5 \pm 50.3$  mg per day per 1,000 inhabitants) than in other parts of the country. The level of heroin

consumption was considered to be similar to that seen in previous wastewater studies in the country.

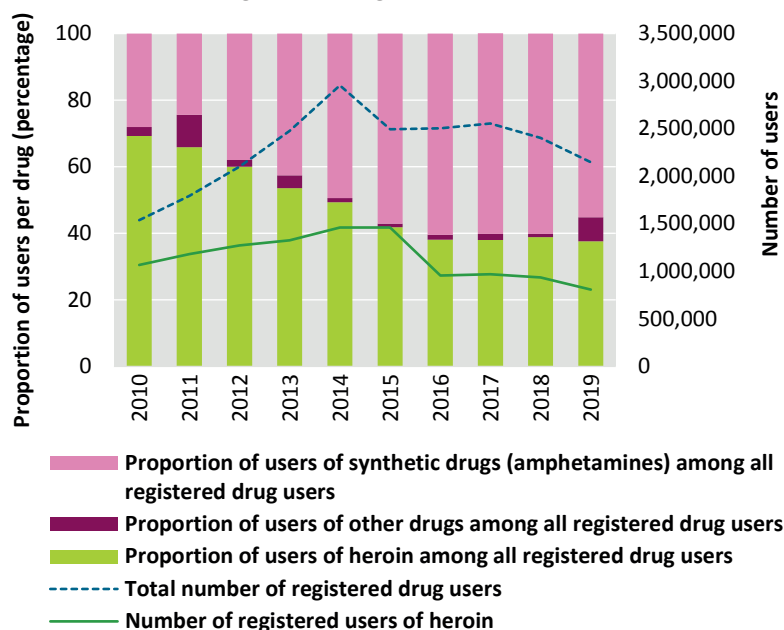
With a past-year prevalence of 1 per cent of the adult population (more than half a million users), opioid use in Central Asia and Transcaucasia is also high. Although heroin has been the predominant opioid used in the subregion, in recent years there has been a reported decline in the official numbers of registered opioid users and of those in drug treatment. An increasing number of synthetic drugs, such as amphetamines, mephedrone and *alpha*-PVP, have also appeared on the market, although it remains to be seen whether they have substituted opiates or attracted new users. It seems that, rather than substituting opiates, the consumption of these stimulants is often combined with cannabis and opioids, resulting in polydrug use patterns. Regular opioid users, as reported by Uzbekistan, for example, may substitute opiates with pharmaceutical opioids such as tramadol or other pharmaceutical drugs with sedative effects, such as pregabalin, zaleplon and tropicamide.<sup>186</sup>

In Kazakhstan, 120,500 people (about 1 per cent of the adult population) were estimated to be injecting drugs in

<sup>184</sup> China, National Narcotics Control Commission, *Report on Drug Control in China*, different years.

<sup>185</sup> Si-Yu Liu and others, "Tracing consumption patterns of stimulants, opioids, and ketamine in China by wastewater-based epidemiology", *Environmental Science and Pollution Research*, vol. 28, No. 13 (April 2021).

<sup>186</sup> Tomas Zabransky and Viktor Mravcik, eds, *The 2019 Regional Report on the Drug Situation in Central Asia* (Prague, 2019).

**FIG. 44** Trends in registered drug users, China, 2010–2019

Source: China, National Narcotics Control Commission, *Report on Drug Control in China*, different years.

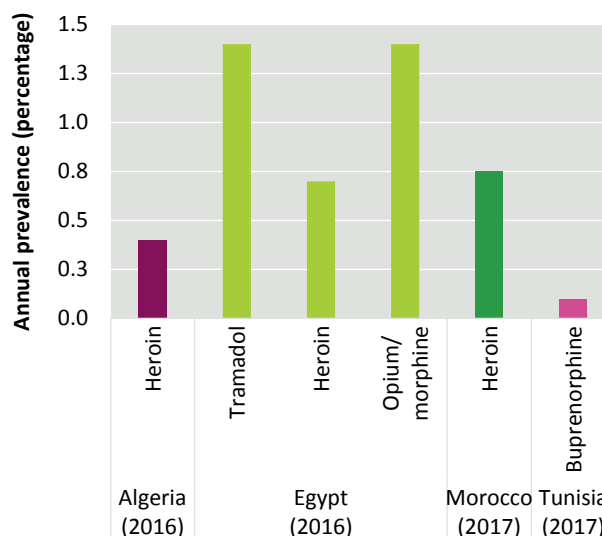
2016. This estimate has remained more or less unchanged over the past 10 years. Among those injecting, although they were injecting multiple drugs, consecutively or sequentially, the majority reported injecting heroin, followed by concoctions of opium poppy (*koknar* or *khanka*, desomorphine and tropicamide).<sup>187, 188</sup>

### Opioid use in Africa

With 1.2 per cent of the population having used opioids in the past year, opioid use in Africa was comparable to the global average in 2019. While the population aged 15–64 in the region grew by 10 per cent over the period 2010–2019, the estimated number of past-year opioid users increased fourfold and the prevalence of opioid use increased threefold. Although heroin use is commonly reported by many countries in the region, the non-medical use of tramadol has emerged as a major problem, especially in West and Central Africa and in North Africa.

187 Ganina L. Yu and others, *Report on the Population Size Estimation of People Who Inject Drugs (PWID) in the Republic of Kazakhstan* (Almaty, Ministry of Health and Social Development of Kazakhstan, Republican Centre for AIDS Prevention and Control, 2016).

188 Oleg Yussopov and others, *National Report on Drug Situation in the Republic of Kazakhstan 2018* (Central Asia Drug Action Programme, 2018).

**FIG. 45** Opioid use among adolescents (aged 15–17), selected countries in North Africa

Source: Council of Europe, Pompidou Group, Mediterranean School Survey Project on Alcohol and other drugs (MedSPAD) reports for Algeria, Egypt, Morocco and Tunisia.

In 2018 in Nigeria, 4.6 million people, or 6.0 per cent of the male and 3.3 per cent of the female population aged 15–64, were estimated to have used opioids (mainly tramadol but also codeine and morphine) in the past year. In addition, 2.3 per cent of the population (an equal proportion of men and women) reported the misuse of codeine-based cough syrups in Nigeria in 2018.<sup>189</sup>

In North Africa, the non-medical use of tramadol is also a major issue in Egypt, where an estimated 3 per cent of the adult population misused tramadol in 2016, the latest year for which data are available. Similarly, in 2016, 1.4 per cent of secondary school students in Egypt reported the non-medical use of tramadol in the past year.<sup>190</sup> Among other countries in the subregion, for which recent information is available from school surveys, the pattern of opioid use differs, with heroin reportedly used by adolescents in Algeria and Morocco and buprenorphine misused in Tunisia.<sup>191</sup>

189 UNODC and Nigeria, *Drug use in Nigeria 2018* (Vienna, 2019).

190 Menan Rabie and others, "Prevalence updates of substance use among Egyptian adolescents", *Middle East Current Psychiatry*, vol. 27, No. 4 (February 2020).

191 Council of Europe, Pompidou Group, Mediterranean School Survey Project on Alcohol and other drugs (MedSPAD) reports for Algeria, Egypt, Morocco and Tunisia.

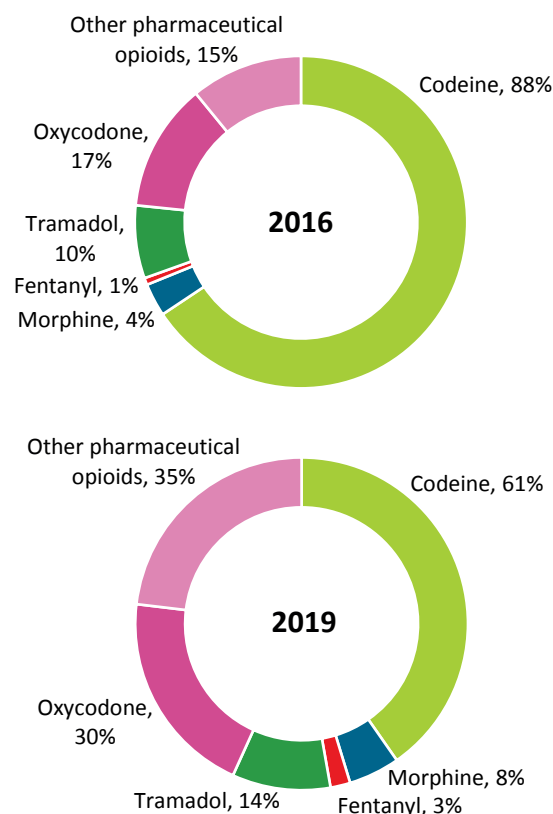
Among people in treatment, heroin remained one of the main problem drugs across most sites reporting treatment data for 2019 in South Africa.<sup>192</sup> Across different reporting sites, between 2 and 40 per cent of people attending specialized drug treatment services reported heroin as their primary or secondary substance of concern. The use of heroin also includes the local variants of heroin known as *nyaope* and *whoonga*.<sup>193</sup> In addition, about 3 per cent of people accessing drug treatment services in South Africa reported the non-medical use of codeine.<sup>194</sup>

### Opioid use declining in Australia

The past-year prevalence of opioid use in the subregion of Australia and New Zealand (3.6 per cent) was higher than the global average in 2019, although it only reflects the situation in Australia because recent estimates of opioid use are available only for that country. The non-medical use of pharmaceutical opioids and the frequency thereof have decreased since 2016 in Australia. In 2019, 2.7 per cent of the population aged 14 and older misused pharmaceutical opioids in Australia, a decline from 3.6 per cent in 2016; among those who had misused the substances in the past 12 months, the proportion of people misusing them at least weekly declined from 29 per cent in 2016 to 19.5 per cent in 2019, although the proportion of those misusing them just once or twice a year increased from 28 per cent in 2016 to 43 per cent in 2019.<sup>195</sup>

In February 2018, medications containing codeine were reclassified as schedule 4 drugs in Australia, meaning that they could no longer be purchased from a pharmacy or chemist without a prescription. The reduced ease of access to these substances resulting from the scheduling change may account for some of the reductions in the non-medical use of painkillers and opioids. In 2019, although the majority of people misusing pharmaceutical opioids continued to misuse codeine, there was

**FIG. 46** Non-medical use of pharmaceutical opioids in the past 12 months, Australia, 2016 and 2019



Source: Australian Institute of Health and Welfare, *National Drug Strategy Household Survey 2019*, Drug Statistics Series, No. 32 (Canberra, 2020).

increased diversification of the other substances misused in comparison with 2016.<sup>196</sup>

### Opioid use in South America

The prevalence of opioid use in South America was estimated at 0.2 per cent of the adult population (600,000 people) in 2019; recent estimates from Central America and the Caribbean were not available to enable the production of estimates of the extent of opioid use in those subregions. The only recent surveys were conducted in Chile (2018), which reported a prevalence of non-medical use of pharmaceutical opioids of 1.1 per cent and negligible use of opiates (heroin or opium), in Uruguay (2018),

192 Siphokazi Dada and others, "Monitoring alcohol, tobacco and other drug use trends in South Africa: July–December 2019 – Phase 47", Research Brief (Cape Town, South Africa, South African Community Epidemiology Network on Drug Use, 2020).

193 These are street names for heroin that is often mixed with other regulated and unregulated substances. In South Africa, it is usually sprinkled on cannabis and/or tobacco and the mixture is rolled into a cigarette, or "joint", and smoked.

194 Dada and others, "Monitoring alcohol, tobacco and other drug use trends in South Africa: July–December 2019 – Phase 47".

195 Australian Institute of Health and Welfare, *National Drug Strategy Household Survey 2019*, Drug Statistics Series, No. 32 (Canberra, 2020).

196 Ibid.

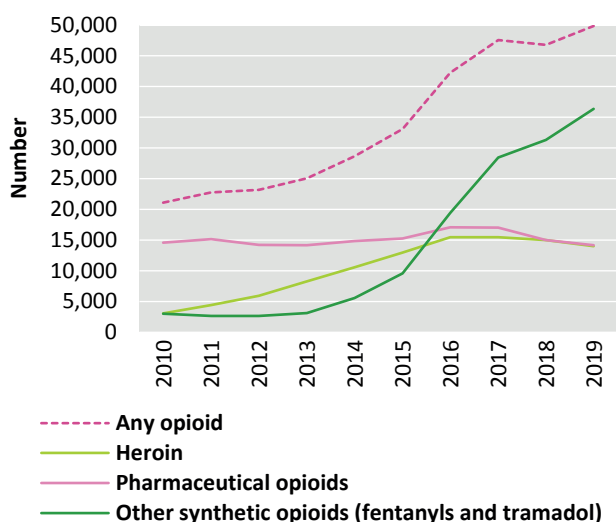
which reported that 4.9 per cent of the adult population had misused pharmaceutical opioids in the past year,<sup>197</sup> and in Colombia (2019), which reported a prevalence of 0.3 per cent of non-medical use of opioids.<sup>199</sup>

### Opioid use in North America appears stable but number of overdose deaths continues to increase

In North America, although the non-medical use of pharmaceutical opioids is a major issue, it appears to be stable and the opioid crisis is driven mainly by an increase in the number of opioid overdoses attributed to fentanyl and its analogues.

Thus, one of the main adverse health outcomes of the opioid crisis in the United States is the unprecedented number of fatal overdose cases attributed to opioids.

**FIG. 47** Trends in opioid overdose deaths, United States, 2010–2019



Source: United States, Centers for Disease Control and Prevention, National Center for Health Statistics, Wide-ranging Online Data for Epidemiologic Research (CDC WONDER), "Multiple cause of death 1999–2019".

Note: The category "Any opioid" includes all categories of opioid overdose deaths.

197 Uruguay, *Uruguay, VIII Encuesta Nacional sobre Consumo de Drogas en Estudiantes de Enseñanza Media: Informe de Investigación* (Montevideo, Junta Nacional de Drogas, Observatorio Uruguayo de Drogas, 2020).

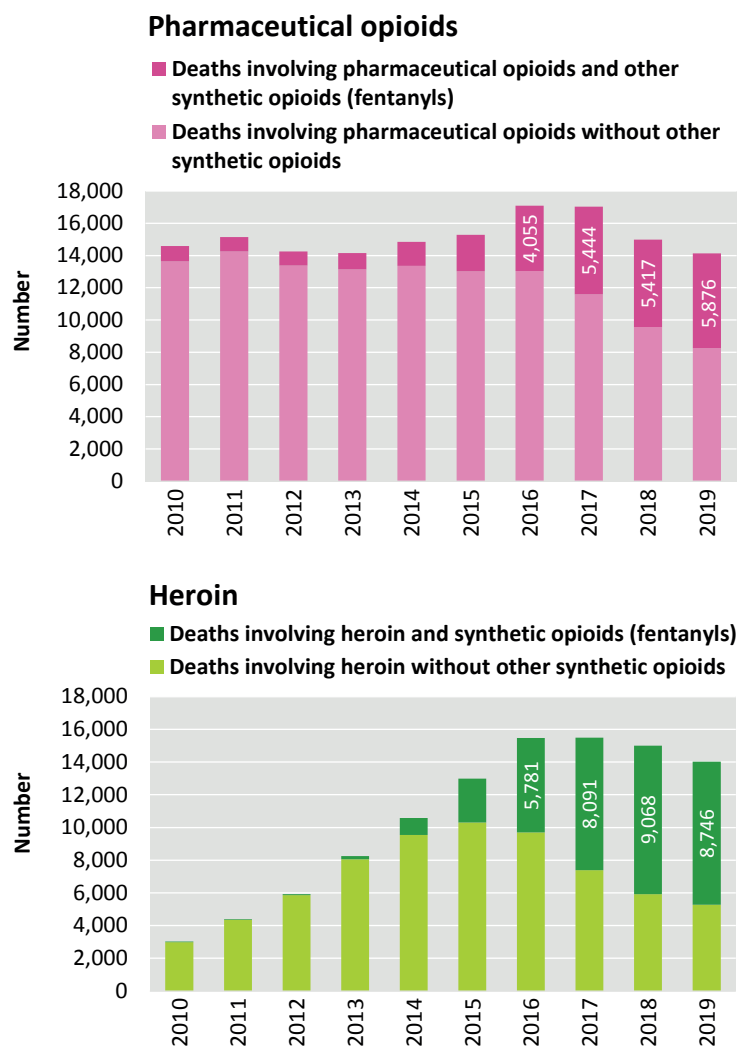
198 Response submitted by Chile to the annual report questionnaire for 2019.

199 Colombia, *Encuesta Nacional de Consumo de Sustancias Psicoactivas, Resultados 2019* (Ministerio de Justicia y del Derecho, August 2020).

In 2019, of over 70,000 overdose deaths reported in the United States, nearly 50,000 were opioid overdose deaths. Between 2010 and 2019, the number of overdose deaths attributed to opioids more than doubled, from 21,000 to nearly 50,000.

Although the number of overdose deaths attributed to the misuse of pharmaceutical opioids and the use of heroin has stabilized in recent years, this gain is offset

**FIG. 48** Trends in overdose deaths attributed to pharmaceutical opioids and heroin, United States, 2010–2019



Source: United States, Centers for Disease Control and Prevention, National Center for Health Statistics, Wide-ranging Online Data for Epidemiologic Research (CDC WONDER), "Multiple cause of death 1999–2019".

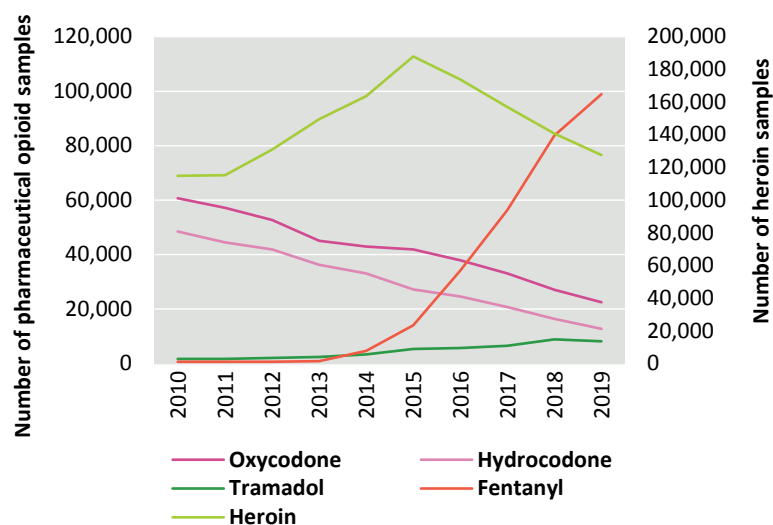
by the continuing increase in the number of deaths attributed to synthetic opioids (mainly fentanyl). It is important to keep in mind that most fatal overdose cases involve more than one type of drug. Even in the case of deaths attributed to opioids, the mixing of different opioids along with other drugs is common. A large proportion of overdose deaths attributed to heroin (62 per cent of the total 14,000 deaths attributed to heroin) and pharmaceutical opioids (42 per cent of the total 14,000 deaths attributed to pharmaceutical opioids) also involved synthetic opioids (fentanyl). Fentanyl also contribute significantly to the increased number of overdose deaths attributed to the use of cocaine and other psychostimulants such as methamphetamine.<sup>200, 201</sup>

Among the reasons for the large number of overdose deaths attributed to fentanyl is that their lethal doses are often small in relation to those of other opioids: fentanyl, for example, is approximately 100 times more potent than morphine, and carfentanil may be as much as 10,000 times more potent than morphine for an average user. A lethal dose of carfentanil for a human can be as low as 20 micrograms.<sup>202, 203</sup>

The spread of fentanyl in the United States continues to be visible in the analysis of drug samples from seizures, which shows the gradual diversification of synthetic opioids on the market, with a considerable increase since 2014 in the number of samples identified as fentanyl. Furthermore, while fentanyl has been the predominant substance seized over the years, its analogues have rapidly proliferated in the United States. As a percentage of all pharmaceutical opioid samples seized and identified in 2019, among notable fentanyl analogues, acetylfentanyl accounted for 6 per cent of identified samples, followed by carfentanil (1.6 per cent), valeryl fentanyl (1.0 per cent) and fluoroisobutyrylfentanyl (0.2 per cent).<sup>204</sup>

Tramadol has also been increasingly identified in seizure samples: over the period 2010–2019, there was an

**FIG. 49** Substances submitted to and analysed by forensic laboratories, by type of drug identified, United States, 2009–2019



Source: United States, Department of Justice, Drug Enforcement Administration, Diversion Control Division, National Forensic Laboratory Information System reports for different years.

increase in the proportion of samples analysed that were identified as tramadol in 44 states, mostly in the south and north-east of the United States, although tramadol is often mixed with other substances. In 2019, of the 8,196 samples that were identified as tramadol, 44 per cent (3,961 samples) contained at least one other drug, the majority (85 per cent) being fentanyl, while more than half (57 per cent) contained heroin, 10 per cent contained acetylfentanyl and 7 per cent contained cocaine.<sup>205</sup>

In contrast to the increase in the number of opioid overdose deaths, the misuse of pharmaceutical opioids and use of heroin in the United States appears to be stabilizing, especially since 2017. In 2019, 3.7 per cent of the population (10.2 million people) aged 12 and older in the United States had misused opioids in the past year, 3.6 per cent of the population aged 12 and older (97 per cent of all opioid users) had misused pharmaceutical opioids and 0.3 per cent had used heroin.

However, as in any other country, estimates of heroin users based on household surveys are considered as underestimates as they are based on self-reporting and

200 Calculated from the overdose deaths reported by the Centers for Disease Control and Prevention, National Center for Health Statistics, in the Wide-ranging Online Data for Epidemiologic Research (CDC WONDER), "Multiple cause of death 1999–2019".

201 See also, "Cocaine use" in booklet 4 of the present report.

202 EMCDDA, "Fentanyl drug profile".

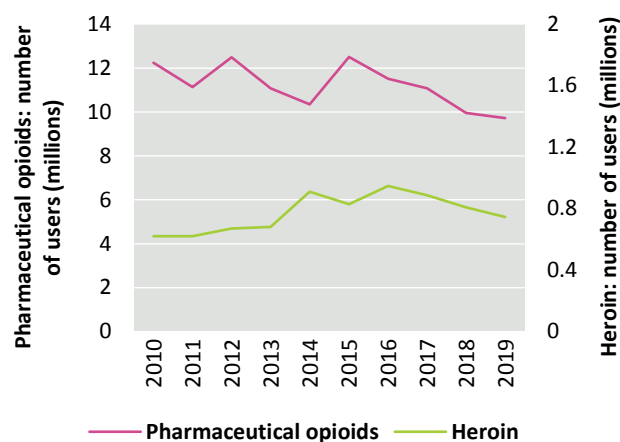
203 United States, Department of Justice, Drug Enforcement Administration, 2019 National Drug Threat Assessment, December 2019.

204 United States, Department of Justice, Drug Enforcement Administration, Diversion Control Division, "National Forensic Laboratory Information System: drug 2019 annual report" (Springfield, Virginia, 2020).

205 United States, Department of Justice, Drug Enforcement Administration, Diversion Control Division, "National Forensic Laboratory Information System: drug special report – tramadol reported in NFLIS, 2010–2019" (Springfield, Virginia, 2020).



**FIG. 50** Trends in past-year use of heroin and non-medical use of pharmaceutical opioids, as reported in household surveys, United States, 2010–2019



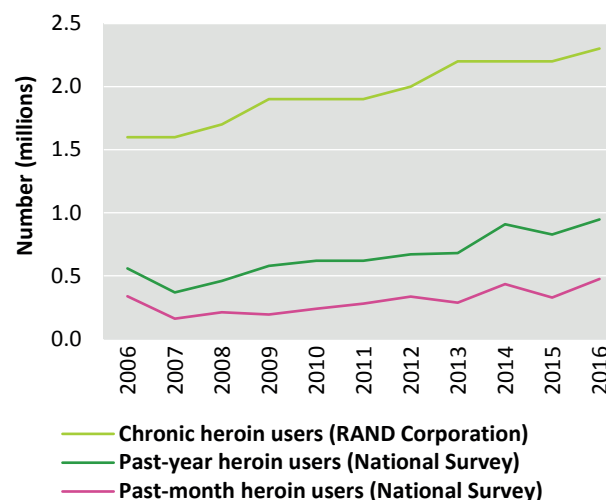
Source: United States, Substance Abuse and Mental Health Services Administration, *Results from the 2019 National Survey on Drug Use and Health (NSDUH): Detailed Tables* (Rockville, Maryland, Center for Behavioral Health Statistics and Quality, 2020).

do not cover the homeless or the institutionalized populations, which tend to have higher rates of opioid use in the United States. For example, in 2016, based on another study, 2.3 million people were estimated to be chronic heroin users in the United States, while the National Survey on Drug Use and Health conducted the same year estimated the number of past-year heroin users to be about 950,000 and the number of past-month heroin users to be just under half a million.<sup>206</sup> Although 2.3 times higher, the estimates of chronic heroin users in the 2016 study show a similar trend over time to the estimates of past-year use of heroin based on the household survey.

The extent of the non-medical use of opioids varies considerably across sociodemographic characteristics in the United States. For example, more men than women use opioids for non-medical purposes, as do American Indian/Alaska Natives when compared with other ethnic groups. People who are unemployed also report a higher rate of misuse than people who are employed; also, the rate of opioid use among those who did not attend or complete a college degree was higher than among those who were college graduates.

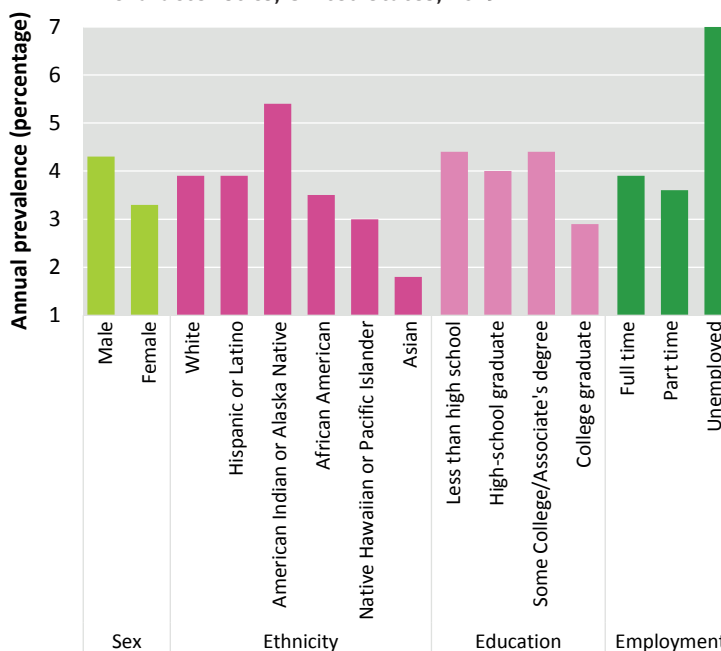
<sup>206</sup> Gregory Midgette and others, *What America's Users Spend on Illegal Drugs, 2006–2016* (Santa Monica, California, RAND Corporation, 2019).

**FIG. 51** Trends in the use of heroin in the United States, based on different studies, 2006–2016



Sources: Gregory Midgette and others, *What America's Users Spend on Illegal Drugs, 2006–2016* (Santa Monica, California, RAND Corporation, 2019); and United States, Substance Abuse and Mental Health Services Administration, *Results from the 2019 National Survey on Drug Use and Health (NSDUH): Detailed Tables* (Rockville, Maryland, Center for Behavioral Health Statistics and Quality, 2020).

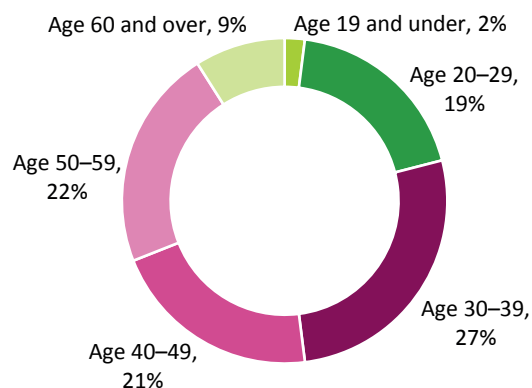
**FIG. 52** Non-medical use of opioids by sociodemographic characteristics, United States, 2019



Source: United States, Substance Abuse and Mental Health Services Administration, *Results from the 2019 National Survey on Drug Use and Health: Detailed Tables* (Rockville, Maryland, Center for Behavioral Health Statistics and Quality, 2020).



**FIG. 53** Opioid overdose deaths in Canada, by age group, 2019



Source: Canada, Special Advisory Committee on the Epidemic of Opioid Overdoses, *Apparent Opioid and Stimulant Toxicity Deaths: Surveillance of Opioid and Stimulant-related Harms in Canada*, (Ottawa, Public Health Agency, 2021).

In Canada, the opioid crisis is also driven by the use of pharmaceutical opioids, both diverted from licit channels and originating in the illicit market, and an increasing number of opioid overdose deaths have been attributed to fentanyl since 2016.<sup>207, 208</sup> In 2017, an estimated 12 per cent of the population aged 15 and older in Canada (3.5 million people) had used pharmaceutical opioids in the past year, of whom about 2 per cent reported the non-medical use of pharmaceutical opioids.<sup>209</sup>

Following an almost 50 per cent increase between 2016 and 2018, from 3,023 deaths (age-adjusted rate of 8.4 deaths per 100,000 population) in 2016 to 4,383 deaths (age-adjusted rate of 11.8 deaths per 100,000 population) in 2018, the reported number of opioid overdose deaths in Canada declined in 2019 (3,811 deaths, or age-adjusted rate of 10.1 per 100,000 population). However, by September 2020, the rate of overdose deaths rebounded, to 16.0 deaths per 100,000 population (4,395 deaths).<sup>210</sup> The majority (72 per cent) of the deaths reported in 2019

were among men; more than a quarter of all the victims were aged 30–39. The majority of the opioid overdose deaths in 2019 were attributed to fentanyl and/or fentanyl analogues.

The geographical spread of opioid overdose deaths is uneven in Canada. Most opioid overdose deaths are seen in the western parts of the country: British Columbia (19.9 opioid overdose deaths per 100,000 population); Alberta (14.6 opioid overdose deaths per 100,000 population); and Ontario (10.4 opioid overdose deaths per 100,000 population). In the north, Yukon saw 10.2 opioid overdose deaths per 100,000 population in 2019.<sup>211</sup>

Opioid use in the past year in Mexico was estimated at 0.1 per cent of the adult population in 2016.<sup>212</sup> More recently, wastewater analysis of samples collected between November 2017 and February 2018 in 15 cities across Mexico indicated the emergence of fentanyl use, at least in the northern parts of the country.<sup>213</sup> This analysis showed heroin metabolites in six sites and none, that is below-detection levels, in seven others; fentanyl metabolites above the detection and quantifiable levels were found only in two cities, Monterrey and San Luis Río Colorado, which are respectively in the north-east and north-west of the country. The levels of heroin metabolites in Monterrey were the highest, at 15.8 mg per day per 1,000 population. Low levels of fentanyl metabolites were found in Monterrey (1.1 mg per day per 1,000 population) and in San Luis Río Colorado, which borders California, United States (0.99 mg per day per 1,000 population). Such levels suggest that, although fentanyl consumption does exist in Mexico, it remains low compared with that in the neighbouring country of the United States. In Eastern Kentucky in the United States, for example, the level of fentanyl metabolites found in wastewater analysis in 2018 was 169 mg per day per 1,000 population.<sup>214</sup>

### Opioid use in Europe has remained generally stable since 2016

The past-year prevalence of opioid use in Europe in 2019 is estimated at 0.7 per cent of the population aged 15–64, or 3.6 million people. Heroin remains the most commonly used opioid in the region.

207 Opioid overdose data for Canada are available from 2016.

208 Lisa Belzak and Jessica Halverson, "The opioid crisis in Canada: a national perspective," *Health Promotion and Chronic Disease Prevention in Canada*, vol. 38, No. 6 (June 2018).

209 Health Canada, "Canadian Tobacco, Alcohol and Drugs Survey (CTADS): summary of results for 2017", 4 January 2019.

210 Canada, Special Advisory Committee on the Epidemic of Opioid Overdoses, *Apparent Opioid and Stimulant Toxicity Deaths: Surveillance of Opioid and Stimulant-related Harms in Canada*, (Ottawa, Public Health Agency, 2021).

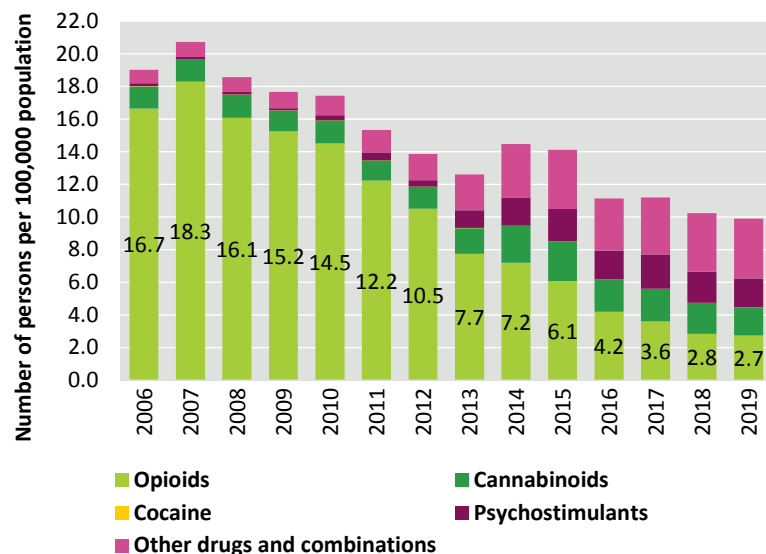
211 Ibid.

212 Response submitted by Mexico to the annual report questionnaire.

213 Copytzy Cruz-Cruz and others, "Opioids, stimulants, and depressant drugs in fifteen Mexican cities: a wastewater-based epidemiological study", *International Journal of Drug Policy*, vol. 88 (2021).

214 Ibid.

**FIG. 54** First-time entrants in drug treatment, Russian Federation, 2006–2019

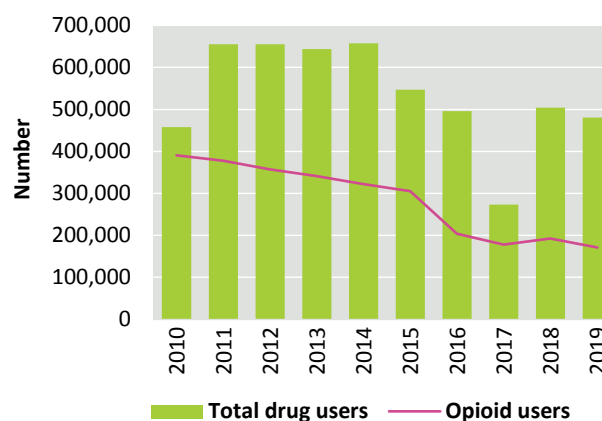


Source: Russian Federation, Ministry of Health.

With an estimated 1.7 million past-year opioid users in Eastern and South-Eastern Europe, the prevalence of opiate use remains high (0.8 per cent), despite a decrease in the previous years in the overall use of opioids in the subregion, driven primarily by a decrease in the estimated number of opioid users in the Russian Federation, based on those registered. On the basis of law enforcement data, it is considered that the drug market in the Russian Federation has diversified in the last few years, with an increasing number of synthetic drugs, such as the cathinones *alpha*-PVP and mephedrone, and amphetamine, having rapidly gained a share of the market; however, it remains to be seen whether they have substituted opiates or have attracted new users. Nevertheless, notwithstanding the limitations of the data on drug treatment provision, there are indications of a substantial decline over the past 10 years or more in the rate of people entering treatment for the first time for any drug or for opioid use disorders in the Russian Federation, as well as in the number of drug users and opioid users registered in the country.

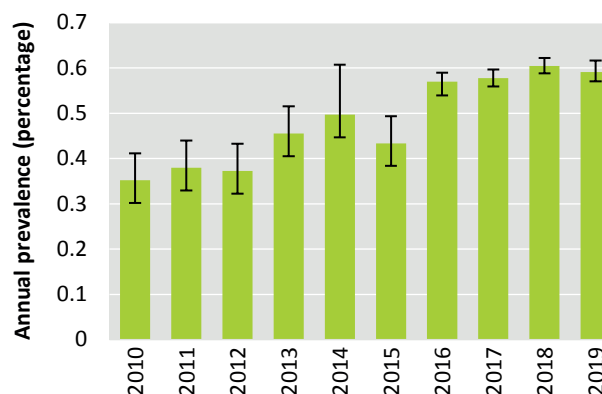
In Ukraine, the only available estimates of opioid use are indirect: in 2018, 350,000 people (1.1 per cent of the adult population) were estimated to be injecting drugs, mostly opiates, including heroin and methadone sold on illicit

**FIG. 55** Trends in registered drug users, Russian Federation, 2010–2019



Source: UNODC, responses to the annual report questionnaire for different years.

**FIG. 56** Opioid use in Western and Central Europe, 2010–2019



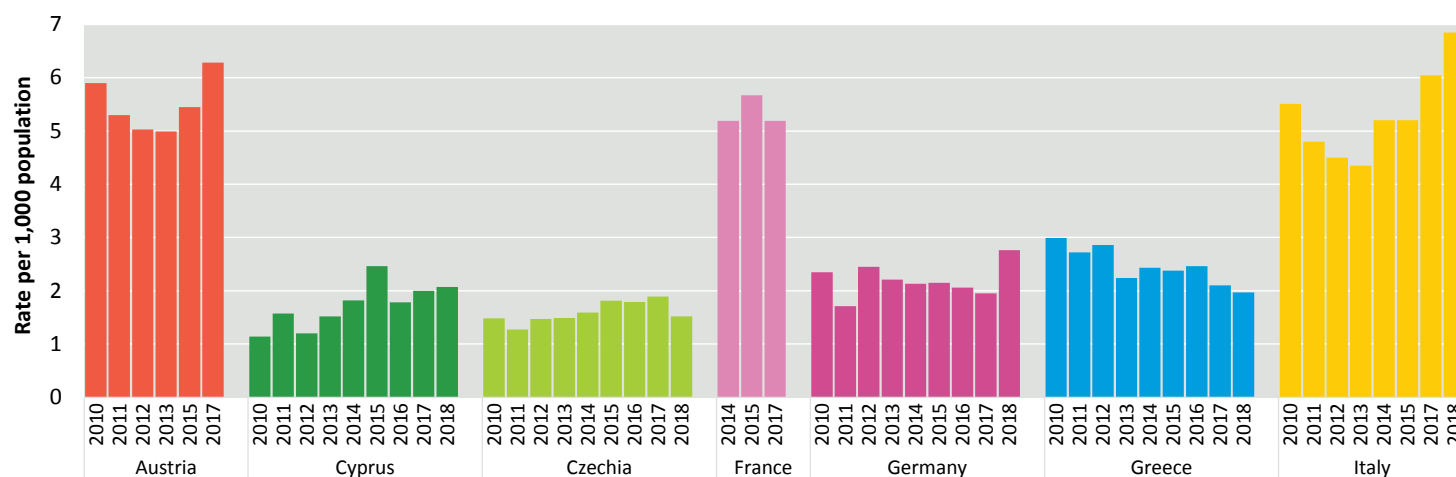
Source: UNODC estimates, based on responses to the annual report questionnaire.

drug markets.<sup>215, 216</sup> However, in recent years, there has also been an increase in the injecting of stimulant NPS (mixed in different proportions) such as mephedrone, MPVP 5-APV, methylone and other cathinones in the country.<sup>217</sup>

<sup>215</sup> UNAIDS, *AIDS Data 2020* (Geneva, 2020).

<sup>216</sup> UNODC, Regional Programme Office for Eastern Europe, *The Short History of New Psychoactive Substances in Ukraine* (Kyiv, 2020).

<sup>217</sup> Ibid.

**FIG. 57** Trends in high-risk opioid use, selected countries in Western and Central Europe, 2010–2018

Source: EMCDDA, "Statistical bulletin 2020".

Note: "High-risk opioid use" is defined by EMCDDA as the recurrent use of opioids or other drugs that causes actual harm (negative consequences, including dependence, but also other health, psychological or social problems) to the person, or places the person at a high probability or risk of suffering from such harm.

In Western and Central Europe (mainly the States members of the European Union) heroin also remains the main opioid used. Between 2010 and 2019, the estimated number of people who use opioids and the past-year prevalence of opioid use (essentially heroin use) in Western and Central Europe increased by about 65 per cent. However, since 2016, opioid use in the subregion has remained generally stable.

Nonetheless, recent estimates in Austria, Germany and Italy suggest an increase in the use of heroin. In the European Union, there are an estimated 1.3 million high-risk opioid users<sup>218</sup> (0.4 per cent of the population aged 15–64 in 2018); they use mainly heroin. Heroin availability in the European Union appears to be stable; the purity of heroin, which increased between 2008 and 2014, and its price, which declined, have both remained stable since then.<sup>219</sup>

In the European market, fentanyl analogues have begun to be detected in seizures and overdose deaths. Since 2012, more than 30 fentanyl analogues have been detected

and reported in the European Union. They are available on the clear web, the dark web and street drug markets, are used to manufacture falsified medicines and are sold as legal replacements for opioids under international control. In the European Union, cyclopropylfentanyl, carfentanyl and acrylfentanyl in particular were associated with a number of fentanyl-related deaths reported in 2018.<sup>220</sup> However, attempts to gain a share of the illicit opioid market with those drugs have been detected and suppressed in Sweden and the United Kingdom of Great Britain and Northern Ireland, for example.<sup>221</sup> Data on opioid overdose deaths over the period 2016–2019 in Sweden clearly show a sudden reduction in the markets for fentanyl analogues.

To date, there is no indication of an established market for fentanyl analogues as an adulterant or as a main substance of use in Europe, other than in Estonia, where an isolated niche market for fentanyl has developed since 2013.<sup>222</sup> There are, however, indications that other opioids, such as methadone, buprenorphine, fentanyl, codeine, morphine, tramadol and oxycodone, are being misused in

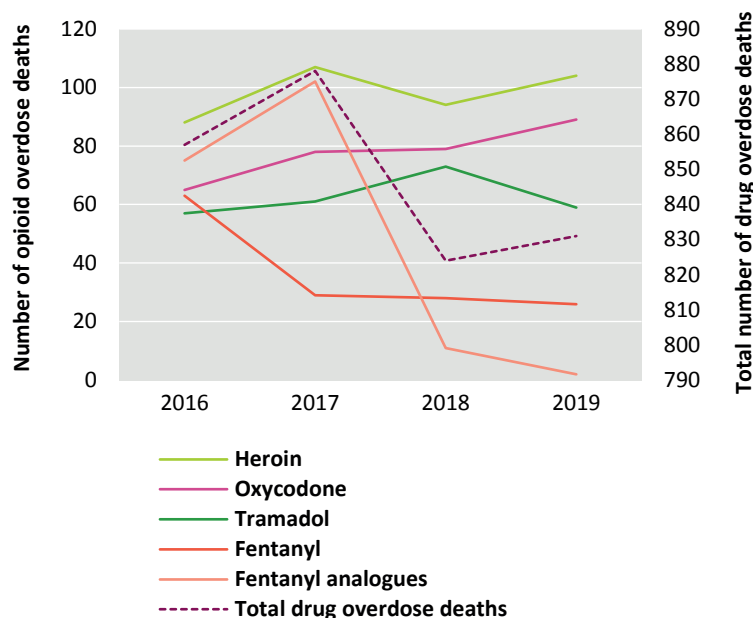
218 As defined by EMCDDA, "high-risk opioid use" is the recurrent use of opioids or other drugs that causes actual harm (negative consequences, including dependence, but also other health, psychological or social problems) to the person, or places the person at a high probability or risk of suffering from such harm.

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

220 EMCDDA, *Drug-related Deaths and Mortality in Europe: Update from the EMCDDA Expert Network*, July 2019 (Luxembourg, Publications Office of the European Union, 2019).

221 See, for instance, UNODC, *World Drug Report 2020*, booklet 4, *Cross-Cutting Issues: Evolving Trends and New Challenges*.

222 Ibid.

**FIG. 58** Trends in drug overdose deaths, Sweden, 2016–2019

Source: Sweden, National Board of Forensic Medicine, 2020.

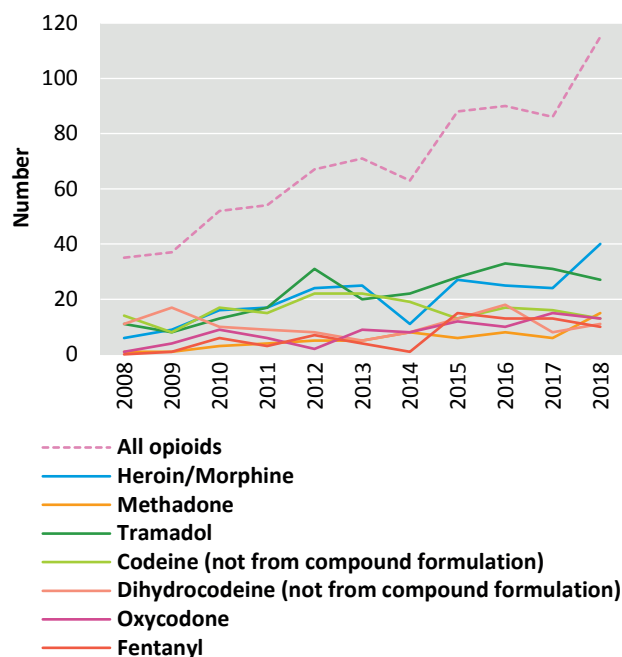
*Note: Number of poisoning deaths in relation to which the specified substance or substances were detected in blood and assessed as contributing to the death, either alone or in combination with other substances.*

the European Union. For instance, 16 per cent of clients entering drug treatment for an opioid-related problem in 2019 reported a synthetic opioid as their main problem drug.<sup>223</sup> By comparison, nearly 10 per cent of all opioid users entering treatment in 2013 did so for disorders related to the use of opioids other than heroin.<sup>224</sup>

Over the past five years, in particular, there has also been an increase in the number of drug overdose deaths, with 8 or 9 overdose deaths out of every 10 such deaths in the European Union involving heroin. In 2018, 8,300 overdose deaths (22.3 deaths per million population aged 15–64), primarily involving opioids, were reported in the European Union, as compared with about 6,000 such deaths reported in 2013. Overdose deaths in Germany and the United Kingdom together accounted for half of overdose deaths in the European Union, where the mean age of those who died from a drug overdose continued to increase, reaching 42 years in 2018. This reflects the

<sup>223</sup> EMCDDA, *European Drug Report 2020: Trends and Developments*.

<sup>224</sup> EMCDDA, *European Drug Report 2015: Trends and Developments* (Luxembourg, Publications Office of the European Union, 2015).

**FIG. 59** Trends in opioid-related deaths, Northern Ireland, 2008–2018

Source: Northern Ireland Statistics and Research Agency, “Drug-related and drug misuse deaths 2008–2018”, 16 January 2020.

ageing of a large proportion of the opioid-using population, who remain at the greatest risk of drug overdose death.<sup>225</sup>

The trend in opioid-related deaths in Northern Ireland, where the rate of drug-related deaths is high (10.0 per 100,000 population) and has more than doubled over the past decade, provides an example of the diversification and spread of the different opioids on the market.<sup>226</sup>

<sup>225</sup> EMCDDA, *European Drug Report 2020: Trends and Developments*.

<sup>226</sup> Northern Ireland Statistics and Research Agency, “Drug-related and drug misuse deaths 2008–2018”, 16 January 2020.



## Access to pharmaceutical opioids for pain management

### Access to and availability of pharmaceutical opioids are highly unequal across regions and subregions

Access to and availability of pharmaceutical opioids for pain medication and/or opioid-substitution treatment remain highly unequal across geographical regions and subregions and show diverging trends.<sup>227, 228</sup> In 2019, on a per capita basis, the availability of pharmaceutical opioids for medical consumption in Africa as a whole and for Melanesia, Polynesia, Micronesia, the Caribbean, South Asia, Central America and South America was less than 1 per cent of the availability in North America.

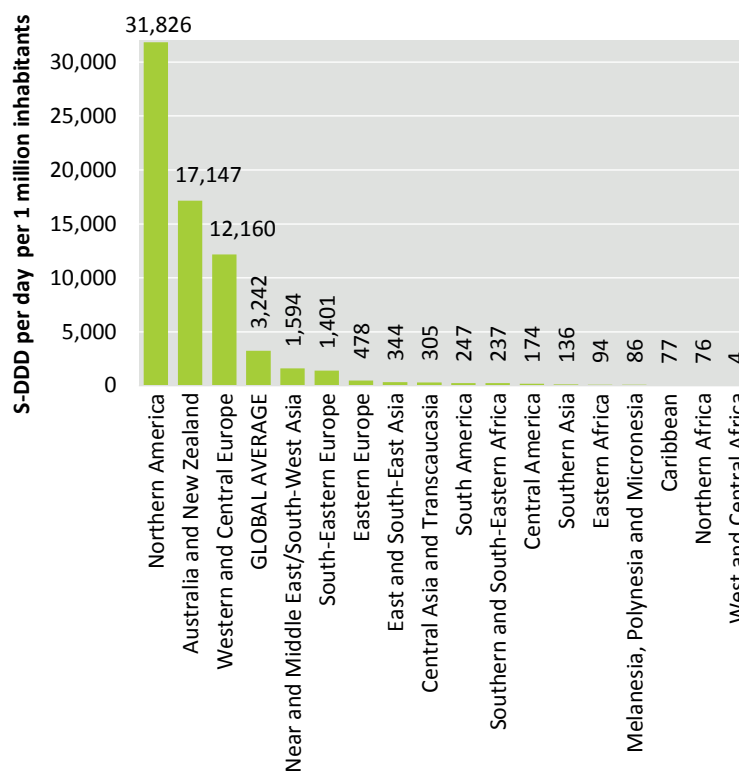
Low- and middle-income countries, which are home to 84 per cent of the global population, had the lowest availability, equivalent to less than 1 per cent of the per capita amount of pharmaceutical opioids available for medical consumption in high-income countries in 2019.

Nevertheless, between 2015 and 2019, the amount of opioids controlled under the international drug conventions available for medical consumption increased by 48 per cent in low- and middle-income countries and declined by 11 per cent in high-income countries.

These trends were not uniform across subregions, however. The decline in the medical use of such opioids in the subregions where availability is high over the period 2015–2019 occurred mainly in North America (even though data show an increase between 2017 and 2019) and in Western and Central Europe, while the increase in medical use in the subregions where availability is low was observed mainly in the Near and Middle East/South-West Asia,

as well as in Eastern and South-Eastern Europe, Central Asia and Transcaucasia and South Asia. In other regions and subregions, the trend was stable, notably in Africa, or even declining, such as in South America, Central America and the Caribbean (particularly after 2017) and in East and South-East Asia.

**FIG. 60** Amounts of opioids under international control (excluding preparations) available for medical consumption, by sub-region, 2019



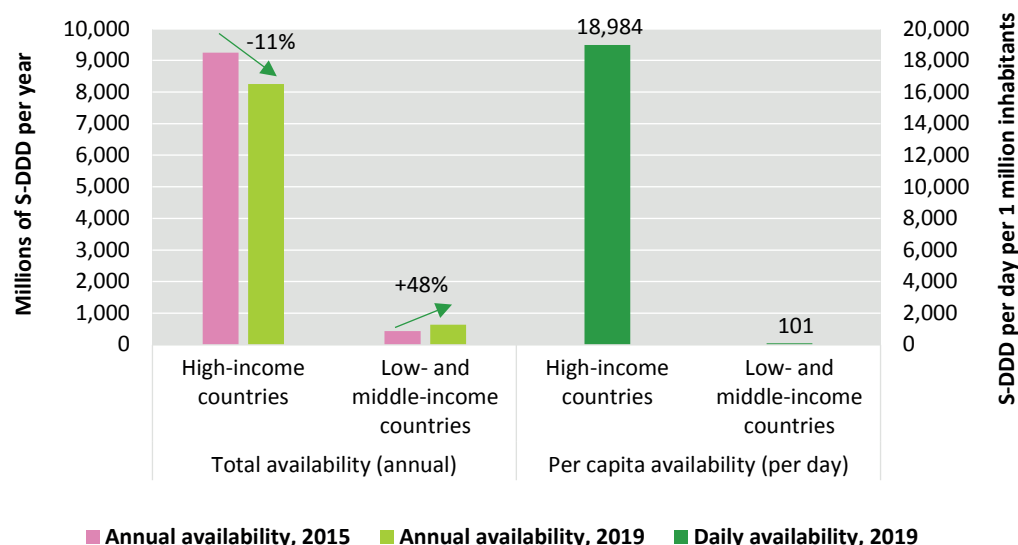
Sources: UNODC calculations based on the following INCB reports: *Narcotic Drugs: Estimated World Requirements for 2021 – Statistics for 2019* (E/INCB/2020/2); and *Psychotropic Substances: Statistics for 2019 – Assessments of Annual Medical and Scientific Requirements for Substances in Schedules II, III and IV of the Convention on Psychotropic Substance of 1971* (E/INCB/2020/3).

Note: S-DDD 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 to the present report. Regions and subregions are those designated by UNODC in the World Drug Report; they may differ partly from those used by INCB in its publications.

227 INCB, *Narcotic Drugs: Estimated World Requirements for 2021 – Statistics for 2019* (E/INCB/2020/2).

228 INCB, *Psychotropic Substances: Statistics for 2019 – Assessments of Annual Medical and Scientific Requirements for Substances in Schedules II, III and IV of the Convention on Psychotropic Substance of 1971* (E/INCB/2020/3).

**FIG. 61** Amount of opioids under international control (excluding preparations) available for medical consumption, by country income level group, 2019



Sources: UNODC calculations based on the World Bank classification of countries by income levels and the following INCB reports: *Narcotic Drugs: Estimated World Requirements for 2021 – Statistics for 2019* (E/INCB/2020/2); and *Psychotropic Substances: Statistics for 2019 – Assessments of Annual Medical and Scientific Requirements for Substances in Schedules II, III and IV of the Convention on Psychotropic Substance of 1971* (E/INCB/2020/3).

Notes: S-DDD 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 to the present report.

The pharmaceutical opioids most available for consumption at the global level in 2019, expressed in S-DDDs, were hydrocodone (26 per cent of the total), followed by methadone (20 per cent), fentanyl (20 per cent), buprenorphine (17 per cent), oxycodone (8 per cent) and morphine (4 per cent).<sup>229</sup> While most pharmaceutical opioids (codeine, fentanyl, hydrocodone, hydromorphone, morphine, oxycodone, oxymorphone and pethidine) are used in pain management, methadone<sup>230</sup> and buprenorphine are mostly used in the medically assisted treatment of opioid use disorders, including in combinations (such as buprenorphine and naloxone).<sup>231</sup> In some instances,

methadone (notably in the management of cancer pain)<sup>232</sup> and buprenorphine (for acute and chronic pain) are also used for pain management.<sup>233</sup>

The types of pharmaceutical opioids available on the medical market, however, vary significantly between regions and subregions. For example, in North America in 2019, hydrocodone, buprenorphine and methadone were the most widely available pharmaceutical opioids, expressed in daily doses per inhabitant; the market in Australia and New Zealand in 2019 was dominated by methadone and fentanyl; and the market in Western and Central Europe in 2019 was dominated by fentanyl, followed by methadone. Fentanyl also plays an important role in the consumption of opioids for medical purposes in Eastern Europe and South-Eastern Europe, as well as in Melanesia, Polynesia and Micronesia, the Caribbean and Central America, while

229 UNODC calculations based on INCB reports: *Narcotic Drugs: Estimated World Requirements for 2021 – Statistics for 2019* (E/INCB/2020/2), and previous years; and *Psychotropic Substances: Statistics for 2019 – Assessments of Annual Medical and Scientific Requirements for Substances in Schedules II, III and IV of the Convention on Psychotropic Substance of 1971* (E/INCB/2020/3), and previous years.

230 WHO, *Clinical Guidelines for Withdrawal Management and Treatment of Drug Dependence in Closed Settings* (Geneva, 2009).

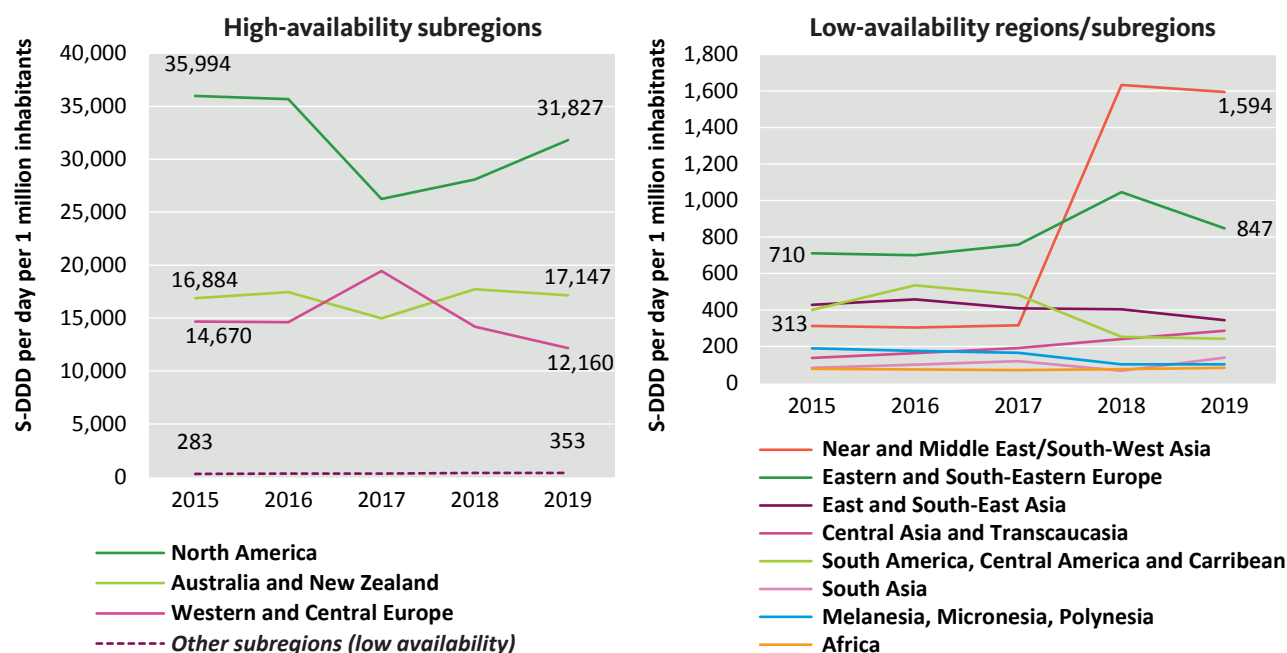
231 Danny S. Lee and others, “Rapid induction of buprenorphine/naloxone for chronic pain using a microdosing regimen: a case report”, *Anesthesia and Analgesia Practice*, vol. 14, No. 2 (January 2020), pp. 44–47.

232 James D Toombs and Lee A Kral, “Methadone treatment for pain states”, *American Family Physician*, vol. 71, No. 7 (April 2005), pp. 1353–1358.

233 Rohit Aiyyer and others, “Treatment of chronic pain with various buprenorphine formulations: a systematic review of clinical studies”, *Anesthesia and Analgesia*, vol. 127, No. 2 (August 2018), pp. 529–538.



**FIG. 62** Trends in the availability of opioids under international control (excluding preparations) for medical consumption, by region and subregion, 2015–2019



Sources: UNODC calculations based on the following INCB reports: *Narcotic Drugs: Estimated World Requirements for 2021 – Statistics for 2019* (E/INCB/2020/2), and previous years; and *Psychotropic Substances: Statistics for 2019 – Assessments of Annual Medical and Scientific Requirements for Substances in Schedules II, III and IV of the Convention on Psychotropic Substance of 1971* (E/INCB/2020/3), and previous years.

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 to the present report.

Regions and subregions are those designated by UNODC in the *World Drug Report*; they may differ partly from those used by INCB in its publications; extrapolation techniques have been used in case of missing data.

“High-availability subregions” include subregions with per capita availability of opioids for medical purposes that is above the global average, i.e., North America, Western and Central Europe, Australia and New Zealand.

“Low-availability regions and subregions” include regions and subregions with per capita availability of opioids for medical purposes that is below the global average, i.e., Africa, Asia, Eastern Europe, South-Eastern Europe, the Caribbean, Central America, South America, Melanesia, Micronesia and Polynesia, i.e., all regions and subregions except North America, Western and Central Europe, and Australia and New Zealand.

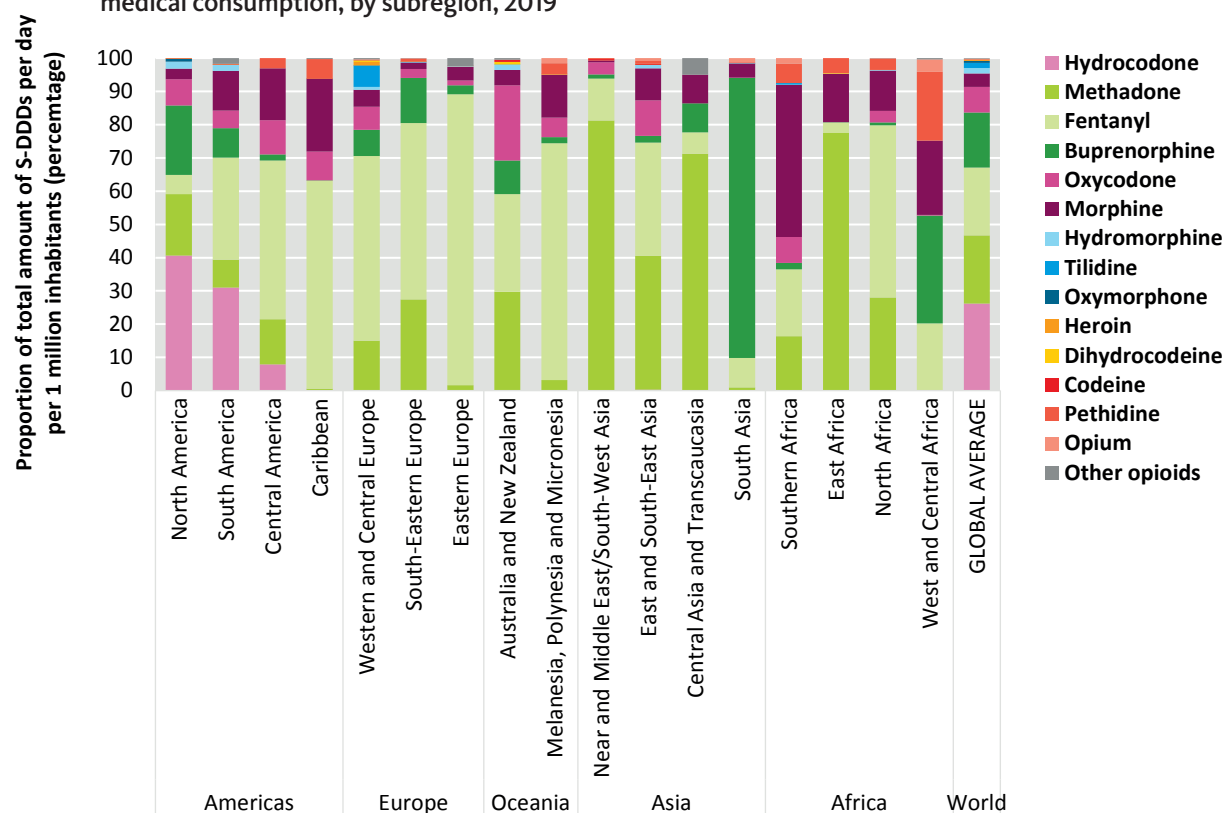
the use of methadone seems to be relatively widespread in South-West Asia, Central Asia and Transcaucasia and East Africa. The availability of buprenorphine for medical consumption, on the other hand, is widespread in South Asia and, to a lesser extent, in West and Central Africa, while morphine is more readily available, in relative terms, in Africa, most notably in Southern Africa, West and Central Africa and East Africa.

The data and trends reviewed above should, however, be interpreted with caution as they exclude tramadol, an opioid that is not under international control and is widely used in some regions. In addition, the limited availability of codeine for medical consumption shown in the data analysed is a result of the fact that most codeine is

sold in the form of preparations (often as cough syrup), which fall under Schedule III of the Single Convention on Narcotic Drugs of 1961 as amended by the 1972 Protocol and are less strictly controlled internationally than other pharmaceutical opioids. For this reason, the availability of such preparations is less well documented and therefore not included in the above analysis by region and subregion, which is based on national data. At the global level, indeed, preparations of opiates (dominated by codeine) accounted for a large share (more than 40 per cent) of all opioids available for medical consumption in 2019.<sup>234</sup>

<sup>234</sup> UNODC calculations based on INCB, *Narcotic Drugs: Estimated World Requirements for 2021 – Statistics for 2019* (E/INCB/2020/2).

**FIG. 63** Distribution of amounts of opioids under international control (excluding preparations) available for medical consumption, by subregion, 2019



Sources: UNODC calculations based on the following INCB reports: *Narcotic Drugs: Estimated World Requirements for 2021 – Statistics for 2019* (E/INCB/2020/2); and *Psychotropic Substances: Statistics for 2019 – Assessments of Annual Medical and Scientific Requirements for Substances in Schedules II, III and IV of the Convention on Psychotropic Substance of 1971* (E/INCB/2020/3).

Note: S-DDD 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 to the present report. Regions and subregions are those designated by UNODC in the World Drug Report; they may differ partly from those used by INCB in its publications.

### Availability of methadone and buprenorphine for medical consumption on the increase at the global level in the last decade, despite diverging trends in recent years

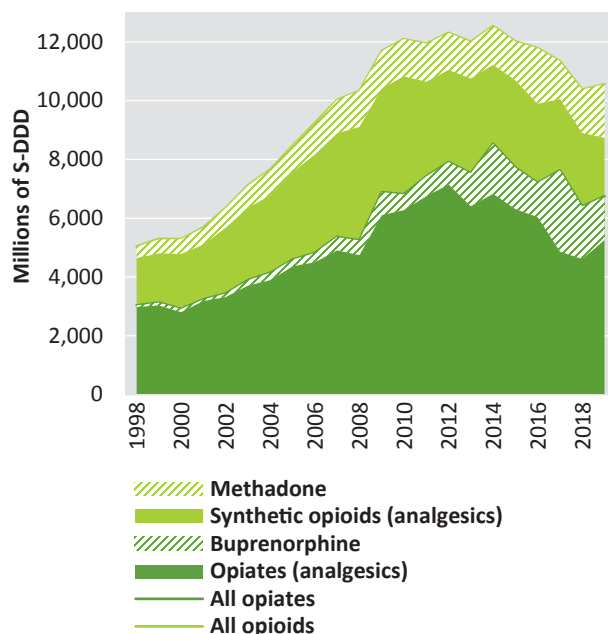
Following a rapid expansion over the period 1998–2010, the amount of pharmaceutical opioids (expressed in S-DDD) available for medical consumption declined at the global level over the period 2014–2018 and stabilized in 2019.<sup>235</sup>

Most of the increase until 2010 was the result of the higher availability in North America of pharmaceutical opioids, mostly oxycodone, hydromorphone, hydrocodone and oxymorphone. The availability of methadone and buprenorphine, the opioids used in the medically assisted treatment of opioid use disorders, also saw marked increases, as did the availability of fentanyl (for medical use).

Following the introduction of stricter rules to reduce diversion to markets for non-medical use in North America, the decline in availability since 2014 has been particularly marked in the case of oxycodone, hydrocodone and hydromorphone. Nonetheless, in 2019, the subregion continued to account for the main share of the global

<sup>235</sup> INCB, *Narcotic Drugs 2020: Estimated World Requirements for 2021 – Statistics for 2019* (E/INCB/2020/2), and previous years.

**FIG. 64** Global amounts of pharmaceutical opioids under international control available for medical consumption, 1998–2019



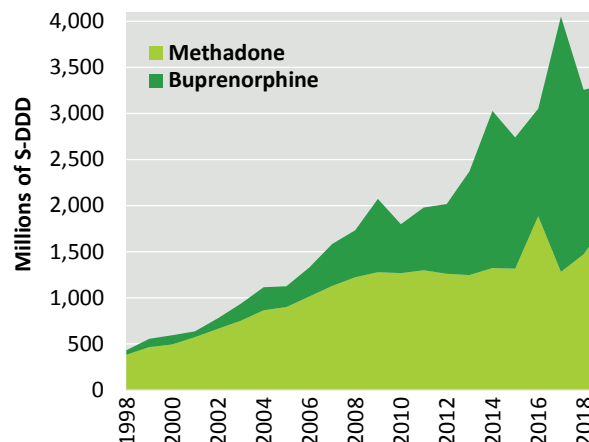
Source: INCB, *Narcotic Drugs 2020: Estimated World Requirements for 2021 – Statistics for 2019* (E/INCB/2020/2).

Notes: S-DDD 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. The statistics exclude preparations of opioids listed in Schedule III of the Single Convention on Narcotic Drugs of 1961 as amended by the 1972 Protocol. Details of S-DDDs used for these calculations are provided in the methodological annex to the present report. The categories “opiates” and “synthetic opioids” include substances used as analgesics, excluding those used in opioid-substitution treatment. Buprenorphine and methadone are substances used in opioid-substitution treatment and also as analgesics.

amounts of oxycodone (65 per cent), hydromorphone (83 per cent) and hydrocodone (99 per cent) available for medical consumption.

By contrast, the amounts of buprenorphine and methadone available for medical consumption have clearly increased since the late 1980s. Between 2009 and 2019, the amount of buprenorphine available for medical consumption rose by 89 per cent, while that of methadone rose by 42 per cent at the global level, although in recent years availability of buprenorphine for medical consumption showed a decline, while that of methadone continued increasing. The overall availability for medical consumption of methadone and that of buprenorphine globally remained at similar levels in 2018 and 2019.

**FIG. 65** Global amounts of methadone and buprenorphine available for medical consumption, 1998–2019



Source: INCB, *Narcotic Drugs 2020: Estimated World Requirements for 2021 – Statistics for 2019* (E/INCB/2020/2), and previous years.

Notes: S-DDD 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 to the present report.

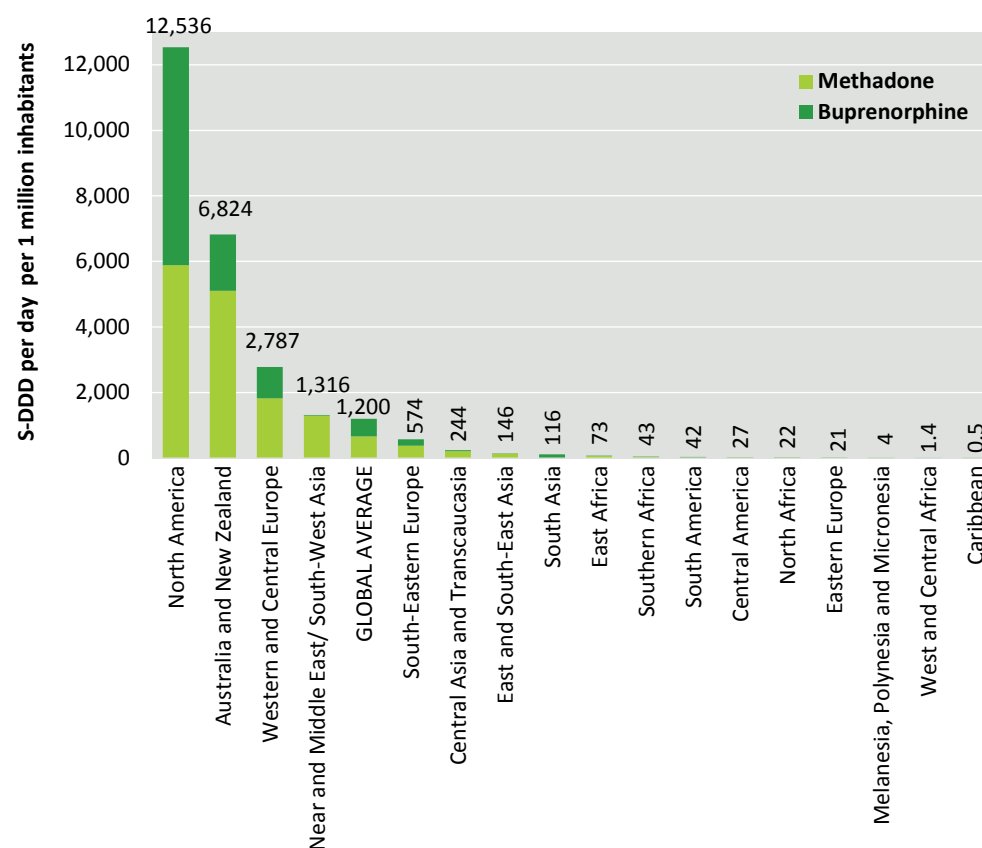
As with other pharmaceutical opioids, there are large differences across countries in the availability of buprenorphine and methadone for medical purposes, reflecting a number of factors, including income level,<sup>236</sup> the use of such substances for analgesic purposes, the number of people with opioid use disorders and policies regarding opioid-substitution treatment. This results in varying coverage of opioid agonist treatment for opioid use disorders.

The availability of methadone for medical consumption is generally high in North America, Western and Central Europe and in the most developed parts of Oceania. Nonetheless, the individual countries with the highest availability of methadone for medical consumption on a per capita basis were widely dispersed across continents, with the highest levels reported in the Seychelles, followed by the United States, Canada, Australia, Mauritius and the Islamic Republic of Iran over the period 2017–2019.<sup>237</sup> A total of 88 countries reported the availability

<sup>236</sup> UNODC, *World Drug Report 2020*, booklet 6, *Other Drug Policy Issues* (United Nations publication, 2020).

<sup>237</sup> INCB, *Narcotic Drugs: Estimated World Requirements for 2021 – Statistics for 2019* (E/INCB/2020/2).

**FIG. 66** Amounts of methadone and buprenorphine available for medical consumption, by region and subregion, 2019



Sources: UNODC calculations based on the following INCB reports: *Narcotic Drugs: Estimated World Requirements for 2021 – Statistics for 2019* (E/INCB/2020/2); and *Psychotropic Substances: Statistics for 2019 – Assessments of Annual Medical and Scientific Requirements for Substances in Schedules II, III and IV of the Convention on Psychotropic Substance of 1971* (E/INCB/2020/3).

Notes: S-DDD 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 to the present report.

of methadone for medical consumption in 2019, while 67 others, mostly located in Africa, Asia, Oceania, Latin America and Eastern Europe, reported no such availability in 2019.<sup>238</sup>

At the global level, as well as in most subregions, methadone is more widely used than buprenorphine. Overall, 74 countries reported higher levels of availability of methadone than buprenorphine for medical consumption in 2019, while in 39 others, buprenorphine was more widely available for medical consumption than methadone.

Exceptions are South Asia, West and Central Africa and Eastern Europe: in those subregions, overall, more buprenorphine is available for medical purposes than methadone.

In total, 50 countries and territories reported the availability of buprenorphine for medical consumption over the period 2017–2019, while 57 countries, mostly located in the Americas, Africa and Asia, reported no availability of this opioid for medical consumption.<sup>239</sup>

<sup>238</sup> INCB, *Narcotic Drugs: Estimated World Requirements for 2021 – Statistics for 2019* (E/INCB/2020/2), and previous years.

<sup>239</sup> INCB, *Psychotropic Substances: Statistics for 2019 – Assessments of Annual Medical and Scientific Requirements for Substances in Schedules II, III and IV of the Convention on Psychotropic Substance of 1971* (E/INCB/2020/3).

# OPIOIDS

3

## Supply of opiates

### Cultivation of opium poppy and production of opium

Opium production is highly concentrated, with 97 per cent of estimated production over the period 2015–2019 coming from just 3 of the 50 countries worldwide where opium production is reported, directly or indirectly.

The country in which the largest amount of opium is produced continues to be Afghanistan. Accounting for an estimated 83 per cent of global opium production over the period 2015–2020, opium produced in Afghanistan supplies markets in neighbouring countries and in Europe, the Near and Middle East, South Asia and Africa. A small proportion of the opium produced in Afghanistan supplies markets in North America (notably Canada) and Oceania.

### GLOBAL CULTIVATION 2020

Change from  
previous year

↑ +24%



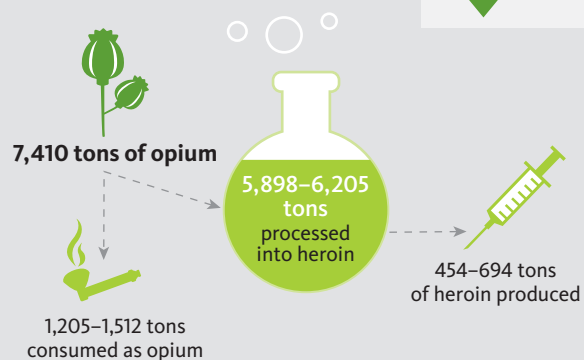
### GLOBAL NUMBER OF USERS 2019



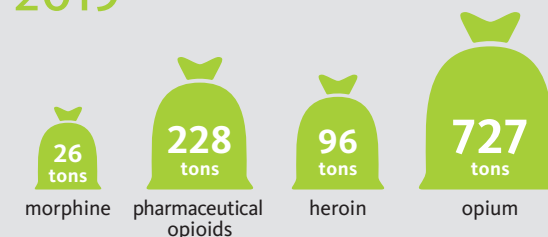
### GLOBAL PRODUCTION 2020

Change from  
previous year

↓ -3%



### GLOBAL SEIZURES 2019



Change from previous year

↓ -41%    ↑ +94%    ↑ +1%    ↑ +3%

Opium produced in countries in South-East Asia, mostly Myanmar (accounting for 7 per cent of global opium production) and, to a lesser extent, the Lao People's Democratic Republic (about 1 per cent of global opium production), supplies markets in East and South-East Asia and in Oceania. Opium produced in countries in Latin America, mostly Mexico (6 per cent of global opium production) and, to a far lesser extent, Colombia and Guatemala (less than 1 per cent of the global total each), accounts for most of the heroin supplied to the United States and the relatively limited heroin markets of South America.

### Estimated area under opium poppy cultivation grew in 2020

The global area under opium poppy cultivation increased by 24 per cent in 2020 to about 294,000 ha, primarily owing to increases in Afghanistan, where the area under opium poppy cultivation increased by 37 per cent, to 224,000 ha, the third highest level ever reported in the country, and more than 80 per cent higher than a decade earlier.<sup>240</sup> Increases were reported in most parts of the country, with the exception of the eastern region, where cultivation declined by 28 per cent, and two provinces in northern Afghanistan (Balkh and Jawzjan). In Helmand province, which accounts for more than 50 per cent of total area under opium poppy cultivation in Afghanistan, opium poppy cultivation rose by 27 per cent in 2020. In a number of other provinces, including Badghis and Faryab, bordering Turkmenistan, and Ghazni and Zabul, close to Pakistan, the areas under opium poppy cultivation doubled.<sup>241</sup>

By contrast, the area under opium poppy cultivation continued to decline in Myanmar and fell by 11 per cent, to 29,500 ha in 2020. Since 2013, the area under opium poppy cultivation in Myanmar has shrunk by almost 50 per cent.<sup>242</sup> Opium poppy cultivation in Myanmar continues to take place mainly in Shan State (bordering China, the Lao People's Democratic Republic and Thailand), which accounted for 84 per cent of the total area under opium poppy cultivation in that country in 2020.<sup>243</sup>

240 UNODC and Afghanistan, "Afghanistan opium survey 2020: cultivation and production – executive summary" (April 2020), and previous years.

241 Ibid.

242 UNODC, *Myanmar Opium Survey 2020: Cultivation, Production, and Implications* (January 2021), and previous years.

243 Ibid.

No data for Mexico, the country where most opium is produced in the Americas, are yet available for 2020. However, data available for the period 1 July 2018–30 June 2019 show a decline of 23 per cent in the area under opium poppy cultivation compared with the same period a year earlier, to 21,500 ha, the smallest area since 2014. At the same time, most of the opium poppy continues to be grown in six states located along or close to the Pacific coast, most notably the states of Sinaloa and Chihuahua, in the north, and the state of Guerrero, in the south.<sup>244</sup>

Data show that, in 2019, the last year for which comprehensive cultivation data are available, 69 per cent of the global area under opium poppy cultivation was located in Afghanistan, 14 per cent in Myanmar and 9 per cent in Mexico, suggesting that these three countries accounted for 92 per cent of global illicit cultivation of opium poppy that year.

### Global opium production stabilized in 2020

Global opium production, which has shown a long-term upward trend, remained largely stable in 2020 compared with the previous year. Nonetheless, at 7,410 tons, it was almost 60 per cent higher than a decade earlier, although it remained below the peak reported for 2017 (10,240 tons).

The stabilization of opium production in 2020 was the result of a decline of 20 per cent in opium production in Myanmar<sup>245</sup> and the stabilization of opium production in Afghanistan.<sup>246</sup> This occurred despite the increase in the area under opium poppy cultivation in Afghanistan and was the result of a lower yield than in the previous year. Estimated yields ranged from about 18 kg per ha in western Afghanistan to 41 kg of opium per ha in eastern Afghanistan, with about 29 kg per ha in south-western Afghanistan, which accounted for 71 per cent of total opium production in the country in 2020. Opium yields in Afghanistan thus continued to exceed those in Mexico (around 21 kg per ha in 2018/19)<sup>247</sup> and were double those in Myanmar (around 14 kg per ha in 2020).<sup>248</sup>

244 UNODC and México, *México: Monitoreo de Plantíos de Amapola 2018–2019* (forthcoming).

245 UNODC, *Myanmar Opium Survey 2020: Cultivation, Production, and Implications*.

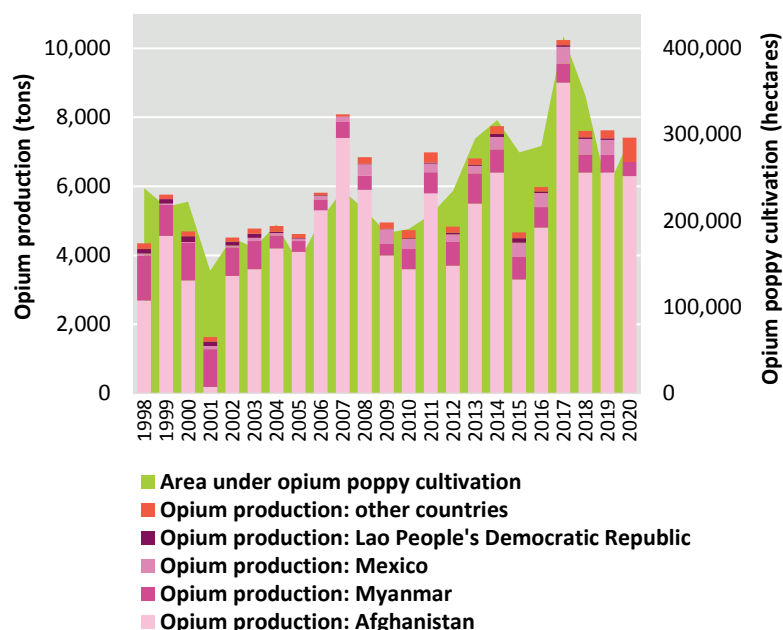
246 UNODC and Afghanistan, "Afghanistan opium survey 2020: cultivation and production – executive summary".

247 UNODC and México, *México: Monitoreo de Plantíos de Amapola 2018–2019*.

248 UNODC, *Myanmar Opium Survey 2020: Cultivation, Production, and Implications*.



**FIG. 67** Opium poppy cultivation and production of opium, 1998–2020



Source: UNODC calculations based on UNODC and Afghanistan opium surveys and on responses to the annual report questionnaire.

Note: Data for 2020 are preliminary.

Taking opium consumption into account, estimated global opium production in 2020 would have been sufficient to potentially manufacture 454–694 tons of heroin (expressed in export purities), which was similar to the level reported in the previous year (474–722 tons).<sup>249</sup>

#### Drug prices in Afghanistan suggest the availability of heroin continues unabated

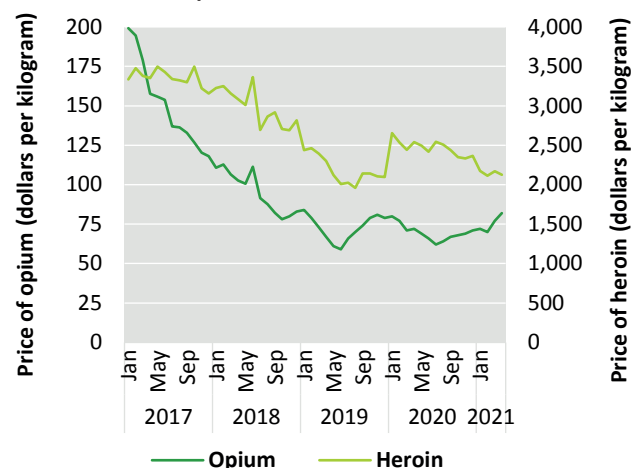
Global opium production remained high in 2020 and there have been no indications of any shortages in the supply of the drug to consumer markets in recent years.

Heroin prices increased at the beginning of 2020 in Afghanistan and remained quite stable until July 2020 before gradually decreasing to the level reported in mid-2019.<sup>250</sup> Although it is difficult to attribute the price hike of heroin in early 2020 to any factor in particular, a temporary shortage of acetic anhydride in Afghanistan

<sup>249</sup> UNODC, *World Drug Report 2020*, booklet 3, *Drug Supply* (United Nations Publication, 2020).

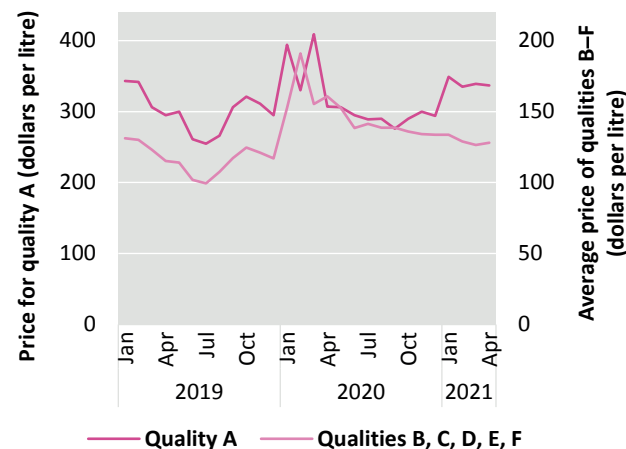
<sup>250</sup> Afghanistan, Ministry of Interior Affairs, “Afghanistan drug price monitoring monthly report” (April 2021).

**FIG. 68** Farmgate price of dry opium and price of high-quality heroin in Afghanistan, January 2017–April 2021



Source: Afghanistan, Ministry of Interior Affairs, “Afghanistan drug price monitoring monthly report” (April 2021), and previous years.

**FIG. 69** Price of acetic anhydride in Afghanistan, January 2019–April 2021



Source: Afghanistan, Ministry of Interior Affairs, “Afghanistan drug price monitoring monthly report” (April 2021).

during the first few months of 2020, reflected in a short-lived peak in its price,<sup>251</sup> could have played a role. In any case, prices of high-quality heroin were slightly higher in 2020 than in 2019, suggesting ongoing demand for heroin during the global COVID-19 pandemic, most notably in the vicinity of Afghanistan, although the amount of

<sup>251</sup> Ibid.



heroin seized,<sup>252</sup> and probably also the amount trafficked, seem to have declined in Europe in 2020.<sup>253, 254, 255, 256, 257, 258</sup>

## Trafficking in opiates

**Global quantities of opiates seized have increased steadily over the past two decades despite marked annual fluctuations in opium production**

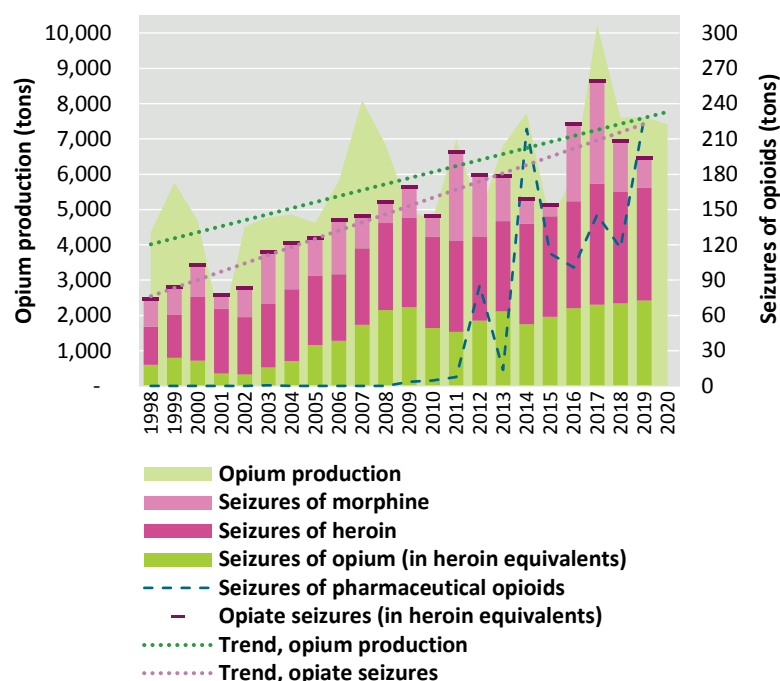
The quantities of both opium produced and opiates seized have shown an upward trend over the past two decades, although the increase has been more pronounced in the amount of opiates seized, suggesting that law enforcement authorities may have become more efficient in intercepting trafficked opiates worldwide.

At the same time, the quantity of opium produced annually has been fluctuating more than the quantity of opiates seized and even more so than the quantity of heroin seized annually. This suggests the existence of opiate inventories to offset fluctuations in opium production, whereby opium may be temporarily stocked along the supply chain, thus ensuring a smooth supply of heroin to the main consumer markets.

**Global quantities of opium and heroin seized remained stable in 2019**

In terms of weight, opium continued to be the most intercepted opiate in 2019 (726 tons), followed by heroin (96 tons) and morphine (26 tons), although when expressed in heroin equivalents, heroin continued to dominate seizures of opiates. Despite an overall decline in the quantity of opiates seized globally in 2019 (7 per cent less than a year earlier, calculated in terms of heroin equivalents), it

**FIG. 70** Global quantities of opioids seized and global opium production, 1998–2020



Sources: UNODC and Afghanistan opium surveys; UNODC, responses to the annual report questionnaire; and other government sources.

Note: A ratio of 10:1 was used to convert opium into heroin equivalents.

was still one of the fifth largest ever reported. The decline in the quantity of opiates intercepted in 2019 was mostly due to smaller quantities of morphine being seized (41 per cent less than a year earlier). The quantities of opium and heroin seized, by contrast, remained quite stable (3 per cent more opium and 1 per cent more heroin compared with a year earlier).

On the basis of the number of countries reporting seizures of opiates, trafficking in heroin continued to be more widespread in 2019 (102 countries) in geographical terms than trafficking in opium or morphine (52 and 36 countries, respectively). In parallel, seizures of opium and morphine continued to be concentrated in a few countries, with just three countries accounting for close to 98 per cent of the total global quantities of the two substances seized. By contrast, the three countries where most heroin was seized (Turkey, Islamic Republic of Iran and Pakistan) accounted for 48 per cent of the global total in 2019.

252 UNODC, Drugs Monitoring Platform.

253 EMCDDA and Europol, *EU Drug Markets: Impact of COVID-19* (Luxembourg, Publications Office of the European Union, 2020).

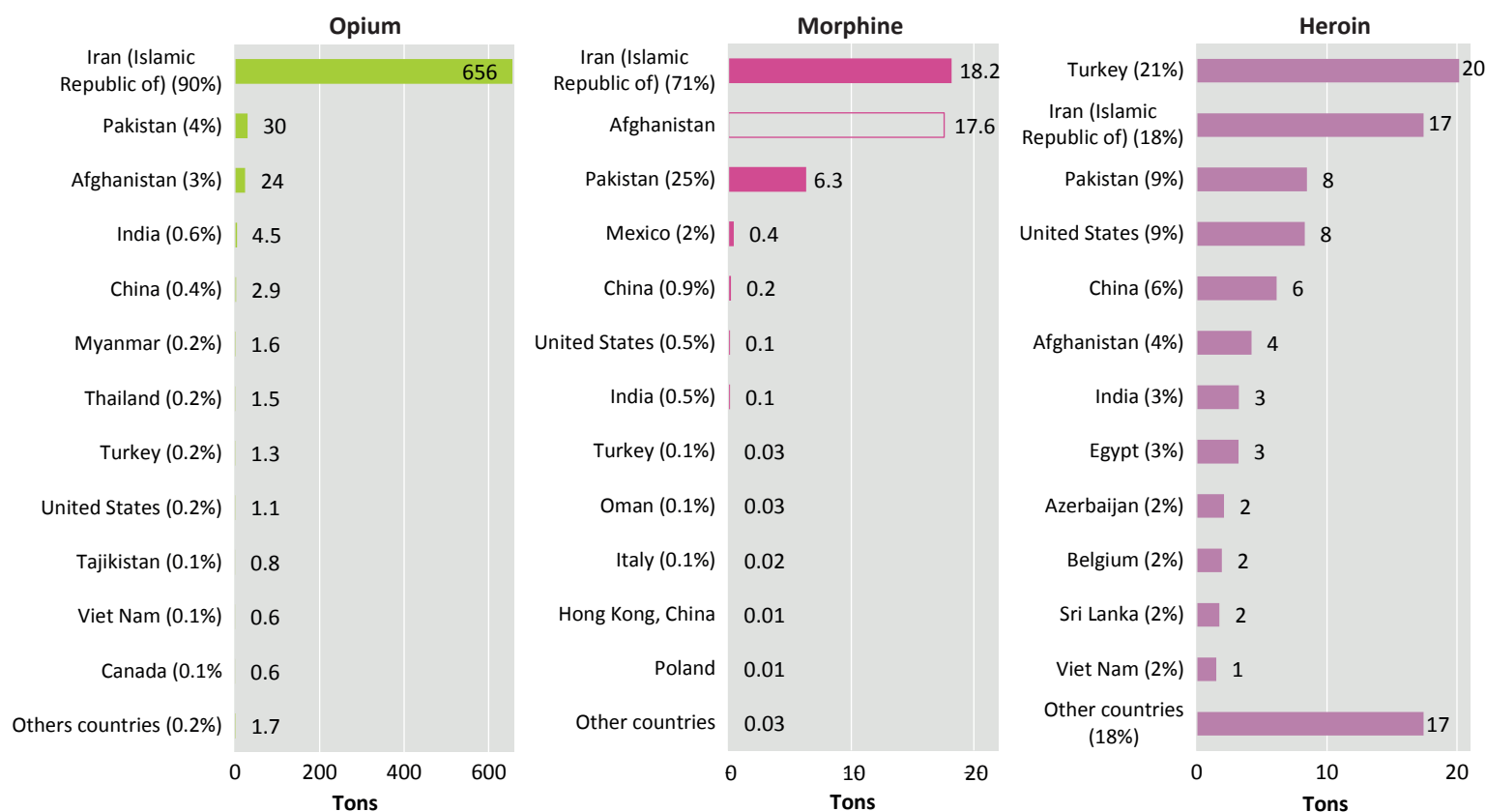
254 EMCDDA, "Impact of COVID-19 on patterns of drug use and drug-related harms in Europe", Trendspotter Briefing (Luxembourg, Publications Office of the European Union, 2020).

255 EMCDDA, "Impact of COVID-19 on drug use and drug services in Western Balkans", Trendspotter Briefing (Luxembourg, Publications Office of the European Union, 2021).

256 EMCDDA, "Impact of COVID-19 on drug markets, drug use, drug-related harms and responses in south European Neighbourhood Policy area", Trendspotter Briefing (Luxembourg, Publications Office of the European Union, 2020).

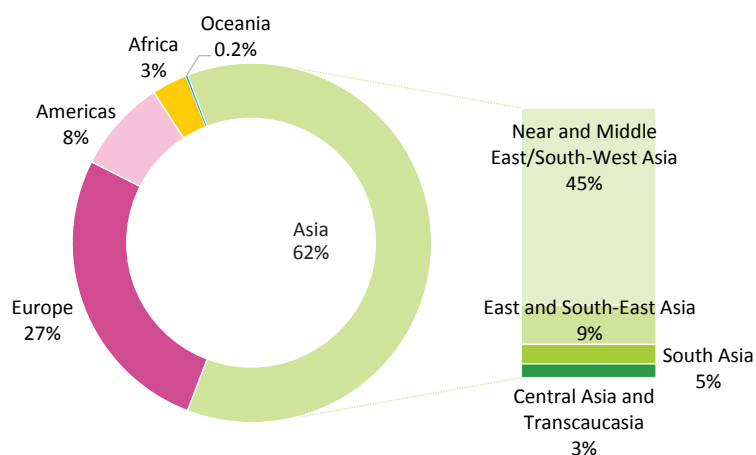
257 Amrei Krings and others, "COVID-19 impact on harm reduction programs (testing and counselling) in low threshold drug services in Germany" (Berlin, Robert Koch Institut, 2020).

258 EMCDDA, "Impact of COVID-19 on drug markets, drug use, drug-related harms and responses in east European Neighbourhood Policy countries", Trendspotter Briefing (Luxembourg, Publications Office of the European Union, 2020).

**FIG. 71** Countries and territories reporting the largest quantities of opiates seized, 2019

Sources: UNODC, responses to the annual report questionnaire; and other government sources.

Note: Seizures of morphine in Afghanistan refer to 2018. The percentage distribution for each country refers to 2019, thus Afghanistan is not included.

**FIG. 72** Geographical distribution of global quantities of heroin and morphine seized, 2019

Source: UNODC, responses to the annual report questionnaire.

Note: Total of 121 tons of heroin and morphine seized in 2019.

**Majority of the quantities of opiates seized continues to be reported in Asia, most notably in South-West Asia**

Most opiate seizures are made in or close to the main opium-producing areas. Thus, Asia, where more than 90 per cent of global illicit opium production takes place, accounted for 76 per cent of all the quantities of opiates (opium, morphine and heroin) seized worldwide (expressed in heroin equivalents) in 2019.

Expressed in heroin equivalents, the country reporting the largest quantity of opiates seized in 2019 continued to be the Islamic Republic of Iran, which accounted for more than half (52 per cent) of the global total, followed by Turkey (10 per cent), Pakistan (9 per cent), the United States (4 per cent), China (3 per cent) and Afghanistan (3 per cent).

### Decline in quantities of heroin and morphine seized in the main opium-producing areas continued in 2019

The Near and Middle East/South-West Asia continued to report the largest quantities of heroin and morphine seized at the global level. Those subregions together accounted for almost half (45 per cent) of the global quantities of heroin and morphine seized in 2019, with the largest quantities reported by the Islamic Republic of Iran, followed by Pakistan and Afghanistan, accounting for 99 per cent of all such quantities seized in these subregions. Parallel to the decline in opium production in Afghanistan from a peak in 2017, the quantities of heroin and morphine seized in the Near and Middle East/South-West Asia also declined from a peak in 2017 (60 per cent decline between 2017 and 2019). Preliminary data suggest, however, that in parallel with the stabilization in opium production in Afghanistan in 2020, the downward trend in the quantities seized came to a halt in 2020.<sup>259, 260</sup>

Accounting for 9 per cent of the global total in 2019, the quantities of heroin and morphine seized in East and South-East Asia also continued to decline, in parallel with ongoing declines in opium and heroin production in the subregion. The largest quantities of heroin and morphine intercepted in East and South-East Asia in 2019 were again reported by China, which accounted for more than half (59 per cent), followed by Viet Nam, Thailand, Malaysia and Myanmar. The decline in the quantities of heroin seized is also in line with reports of persistent decreases in the demand for opiates in East and South-East Asia, including in China, as reflected in the number of registered drug users in that country.<sup>261</sup>

By contrast, the amount of opiates seized in other subregions of Asia (8 per cent of the global total) increased in 2019, reflecting increases in South Asia (notably India), Central Asia (notably Kazakhstan) and Transcaucasia (notably Azerbaijan). Preliminary data based on individual drug seizures suggest that the upward trend in the quantities of heroin and morphine seized may have continued in South Asia in 2020.<sup>262</sup>

259 Information made available to the Subcommittee on Illicit Drug Traffic and Related Matters in the Near and Middle East at its meetings during the extraordinary sessions of the subsidiary bodies of the Commission on Narcotic Drugs, held online on 1 and 2 October 2020.

260 UNODC, Drugs Monitoring Platform.

261 See the chapter, "Demand for opioids", in the present booklet.

262 UNODC, Drugs Monitoring Platform.

### Record quantities of opiates intercepted in Europe in 2019

Accounting for 27 per cent of the global total in 2019, the largest quantities of heroin and morphine seized outside Asia were reported in Europe; these quantities tripled from 2016 to 2019 to reach a record high of 32 tons. This was likely a direct result of the increase in trafficking stemming from the record peak in opium production in Afghanistan two years prior to that. Although the quantities seized were still increasing in 2019, the rate of increase slowed, from 116 per cent in 2017 to 22 per cent in 2018 and 9 per cent in 2019.

The largest increase in the quantities of heroin and morphine seized in Europe in 2019 was reported in South-Eastern Europe, which also accounted for the bulk (66 per cent) of all such amounts seized in Europe in 2019, followed by Western and Central Europe (close to 28 per cent) and Eastern Europe (6.5 per cent). The largest quantities of heroin and morphine seized in Europe were reported in South-Eastern Europe by Turkey (62 per cent of the European total), followed by Bulgaria, reflecting the ongoing use of the Balkan route; the largest quantities seized in Western and Central Europe were reported by Belgium, followed by the Netherlands, France, Germany, the United Kingdom, Slovenia and Italy; and the largest quantities seized in Eastern Europe were reported by Ukraine, followed by Belarus and the Russian Federation. In all the subregions of Europe, more countries reported increases than decreases in the quantities of heroin and morphine seized in 2019.

### Quantities of opiates seized stabilized in the Americas in 2019

The quantities of heroin and morphine seized in the Americas remained stable in 2019, although they were more than double those seized a decade earlier. Opiate trafficking remained concentrated in North America, with the quantities of heroin and morphine seized in the subregion accounting for 92 per cent of the total quantity seized in the Americas in 2019. Seizures made in the United States alone accounted for 83 per cent of the total quantity seized in the region that year. This was followed, in descending order of quantities seized, by Mexico (the country where most opium is produced in the region), Ecuador, Colombia, Canada and Guatemala.

### Quantities of opiates intercepted in Africa are not large but have increased in recent years

At close to 4 tons in 2019, the quantities of heroin and morphine intercepted in Africa accounted for about 3 per cent of the global quantities of heroin and morphine seized. This was double the quantities seized a year earlier and represented a sevenfold increase over those seized in 2009; more than 99 per cent was in the form of heroin.

The vast majority of the heroin and morphine seized in Africa in 2019 was reported in North Africa (91 per cent of the total quantity seized in the region), most notably in Egypt, which accounted for 83 per cent of all heroin and morphine seized in Africa in 2019, followed by Southern Africa (6 per cent of the regional total, most notably Mozambique). The largest quantity of heroin seized in East Africa (1 per cent of the regional total) was reported by Kenya.

Over the period 2009–2019, the largest quantities of heroin and morphine seized in Africa were seized in North Africa (52 per cent of the total, most notably in Egypt), followed by East Africa (37 per cent of the total, most notably in Kenya, followed by the United Republic of

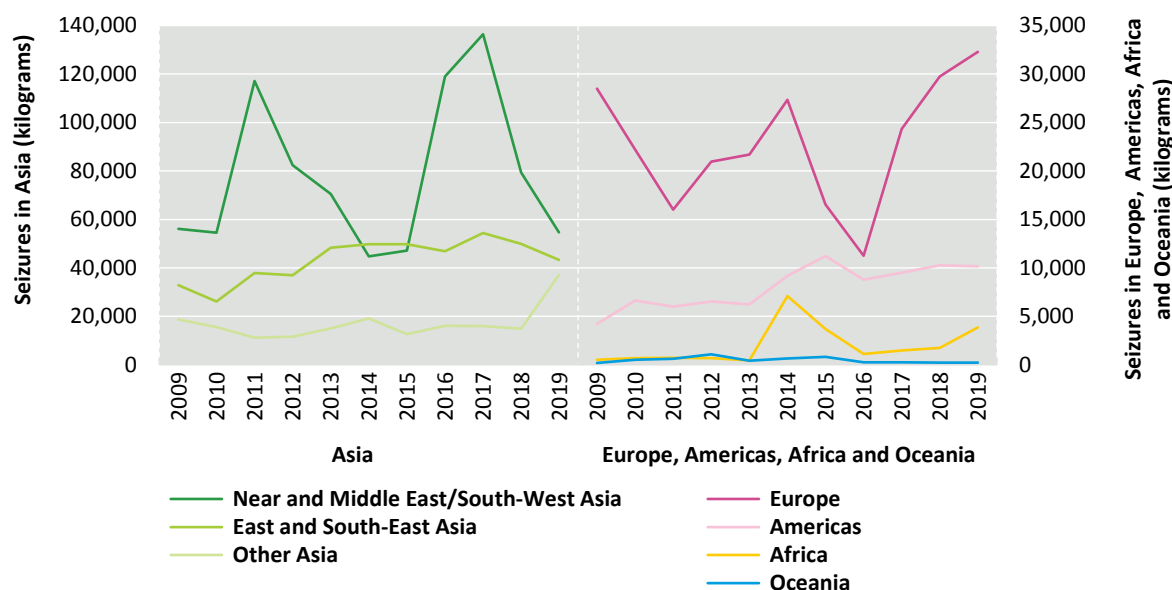
Tanzania). The largest quantities of heroin and morphine seized in West Africa (7 per cent of the African total) were reported by Nigeria, followed by Benin.

Despite the onset of the COVID-19 pandemic, trafficking continued in 2020, and large quantities of heroin were reported seized by the United Republic of Tanzania, including a seizure of 270 kg of heroin from traffickers from Nigeria and the United Republic of Tanzania in Dar es Salaam in April 2020, and 342 kg of heroin from a truck that had travelled from Mozambique to South Africa in September 2020.<sup>263</sup> Seizures of smaller amounts were reported by other countries in sub-Saharan Africa (Benin, Côte d'Ivoire, Ghana, Kenya, Liberia, Malawi, Nigeria and Uganda) and in North Africa (Egypt, Morocco and Tunisia).<sup>264</sup>

### Continuous decline in quantities of opiates seized in Oceania

In 2019, the quantities of heroin and morphine seized in Oceania decreased for the fourth year in a row and reached their lowest level since 2009. Australia accounts for more than 99 per cent of all the heroin and morphine intercepted in the region.

FIG. 73 Quantities of heroin and morphine seized, by region, 2009–2019



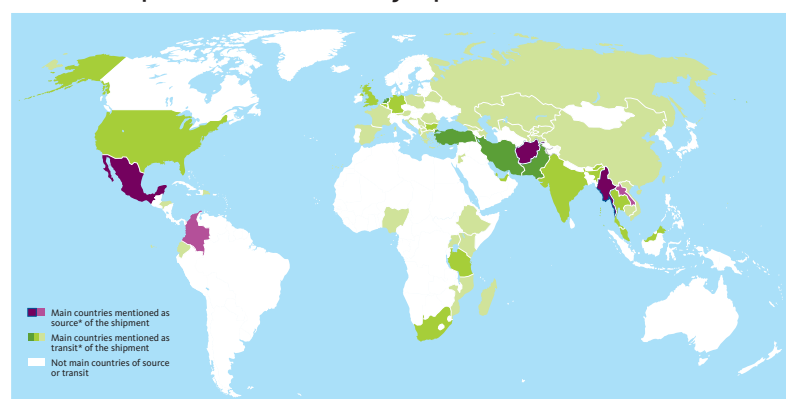
Source: UNODC, responses to the annual report questionnaire.

<sup>263</sup> UNODC, Drugs Monitoring Platform.

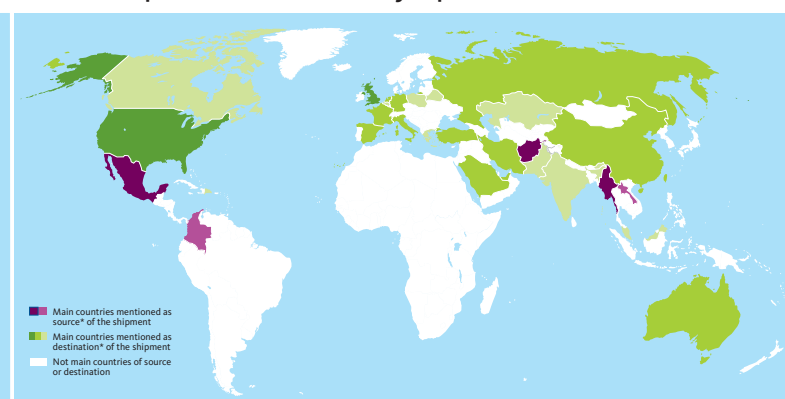
<sup>264</sup> UNODC, Drugs Monitoring Platform; and information provided by the UNODC Regional Office for West and Central Africa.

**MAP 2 Main opiate trafficking flows, 2015–2019**

The size of the route is based on the total amount seized on that route, according to the information on trafficking routes provided by Member States in the annual report questionnaire, individual drug seizures and other official documents, over the 2015–2019 period. The routes are determined on the basis of reported country of departure/transit and destination in these sources. As such, they need to be considered as broadly indicative of existing trafficking routes while several secondary routes may not be reflected. Route arrows represent the direction of trafficking: origins of the arrows indicate either the area of departure or the one of last provenance, end points of arrows indicate either the area of consumption or the one of next destination of trafficking. Therefore, the trafficking origin may not reflect the country in which the substance was produced.

**MAP 3 Main countries identified as source and transit of heroin shipments, as described by reported seizures, 2015–2019**

\* A darker shade indicates a larger amount of heroin being seized with the country as source/destination of the shipment, according to the information on trafficking routes provided by Member States in the annual report questionnaire, individual drug seizures and other official documents, over the 2015–2019 period. The source may not reflect the country in which the substance was produced. The main countries mentioned as source or transit were identified on the basis of both the number of times they were identified by other Member States as departure/transit of seizures, and the annual average amount that these seizures represent during the 2015–2019 period.

**MAP 4 Main countries identified as source and destination of heroin shipments, as described by reported seizures, 2015–2019**

\* A darker shade indicates a larger amount of heroin being seized with the country as source/destination of the shipment, according to the information on trafficking routes provided by Member States in the annual report questionnaire, individual drug seizures and other official documents, over the 2015–2019 period. The source may not reflect the country in which the substance was produced. The main countries mentioned as source or destination were identified on the basis of both the number of times they were identified by other Member States as departure/transit or destination of seizures, and the annual average amount that these seizures represent during the 2015–2019 period.

Source: UNODC elaboration.

Note: See the online methodological annex to the present report for more details.

The boundaries and names shown and the designations used on these maps do not imply official endorsement or acceptance by the United Nations. A dispute exists between the Governments of Argentina and the United Kingdom of Great Britain and Northern Ireland concerning sovereignty over the Falkland Islands (Malvinas). The dotted line represents approximately the Line of Control in Jammu and Kashmir agreed upon by India and Pakistan. The final status of Jammu and Kashmir has not yet been agreed upon by the parties.



## Opiate trafficking routes

### Opiate trafficking continues to be dominated by opiates originating in Afghanistan

The main opiate trafficking flows continue to depart from Afghanistan, the country where the vast majority of global opiate production takes place. These flows supply markets in neighbouring countries, most notably Iran (Islamic Republic of), Pakistan, countries in Central Asia and India, as well as countries in Europe, the Near and Middle East, South Asia and Africa. Small proportions are smuggled to South-East Asia and Oceania. Some 83 per cent of the total global quantities of heroin and morphine seized in 2019 were related to opiates produced in Afghanistan.

### Most opiates are trafficked along the Balkan route and its various branches

The world's single largest heroin trafficking route continues to be the Balkan route, along which opiates are smuggled from Afghanistan to the Islamic Republic of Iran, Turkey, the Balkan countries and various destinations in Western and Central Europe. Excluding seizures made in Afghanistan, countries along the Balkan route accounted for 50 per cent of the total global quantities of heroin and morphine seized in 2019, with a further 7 per cent reported by countries in Western and Central Europe, of which a significant proportion was trafficked along the Balkan route. Based on mentions of countries of origin, departure and transit by countries in Western and Central Europe, more than 70 per cent of the heroin in Western and Central Europe seems to have transited the Balkan route over the period 2015–2019, some 18 per cent transited the southern route and 7 per cent the northern route, while 3 per cent may have originated in South-East Asia.<sup>265, 266</sup>

In 2019, the largest quantities of heroin and morphine intercepted along the Balkan route were, as in previous years, reported by the Islamic Republic of Iran (36 tons). Turkey reported seizing 20 tons and the Balkan countries

a total of 1 ton. By comparison, countries in Western and Central Europe seized a total of 9 tons in 2019.

According to the authorities of the Islamic Republic of Iran, most of the heroin and morphine trafficked from Afghanistan transits Pakistan before reaching the Islamic Republic of Iran. In 2018, 90 per cent of the morphine and 85 per cent of heroin seized in the Islamic Republic of Iran had transited Pakistan and only a small proportion had been smuggled directly from Afghanistan. Heroin is mostly trafficked by land into and out of the Islamic Republic of Iran (95 and 97 per cent, respectively, in 2019). Typically, heroin is then smuggled to Turkey or to countries in the Caucasus (75 per cent of all heroin seized in the Islamic Republic of Iran in 2018) and, to a far lesser extent, to Gulf countries (5 per cent of seizures in 2018). The remainder is used domestically (20 per cent in 2018). These patterns seem to have remained the same in 2019 and 2020.<sup>267</sup>

In Turkey, heroin is mainly trafficked from the east to the west of the country.<sup>268</sup> On the basis of preliminary data on individual drug seizures, it appears that, in addition to ongoing heroin seizures in the east of the country, around Istanbul and near the border with Bulgaria, some significant seizures of heroin were also made near the border with the Syrian Arab Republic in 2020,<sup>269</sup> suggesting that some heroin is also trafficked through that country in order to avoid controls along the border between the Islamic Republic of Iran and Turkey.

From Turkey, heroin is then typically trafficked along the Balkan route to Western and Central Europe, either along the western branch of the route via Bulgaria to various western Balkan countries and then to markets in Western and Central Europe or, to a lesser extent, along the eastern branch of the route, which goes via Bulgaria and then to Romania, Hungary and other markets in Western and Central Europe.

### Heroin trafficking across the Caucasus gained in importance prior to 2019

Heroin and morphine seized in the three Caucasus countries rose from 0.3 tons in 2017 to 1.9 tons in 2019, with most of it reported by Azerbaijan, close to the country's borders with the Islamic Republic of Iran. From

265 UNODC, responses to the annual report questionnaire.

266 This finding should be treated with caution as some countries report the occurrence of "white heroin", which they assume must have originated in South-East Asia, although there is evidence that in the past two decades "white heroin" has also been manufactured in Afghanistan for export purposes. Sources: U. Zerell, B. Ahrens and P. Gerz, "Documentation of a heroin manufacturing process in Afghanistan", in *Bulletin on Narcotics*, vol. LVII, Nos. 1 and 2 (United Nations publication, 2005); and UNODC, responses to the annual report questionnaire.

267 UNODC, Drugs Monitoring Platform.

268 UNODC, responses to the annual report questionnaire.

269 UNODC, Drugs Monitoring Platform.

Azerbaijan, heroin is typically either trafficked to markets in the Russian Federation or to Georgia, and then across the Black Sea to markets in Western and Central Europe. Georgia reported that 70 per cent of the heroin that entered the country in 2018 had transited Azerbaijan and 20 per cent had transited Armenia. Georgia reported that 90 per cent of the heroin that entered the country in 2019 did so by land, and the rest by air.

A temporary increased importance of the Caucasus region as a trafficking route for supplying opiates to markets in the Russian Federation was identified in 2018, when 40 per cent of the heroin found on the Russian market was reported to have transited Azerbaijan, up from 30 per cent in the previous year.<sup>270</sup> In 2019, however, the Russian Federation no longer identified Azerbaijan among the three main departure countries of heroin found on its territory. Instead, those three countries were Afghanistan, Tajikistan and Kazakhstan. Moreover, the primary destination for heroin seized in Azerbaijan in both 2019 and 2020 was Ukraine, followed by Georgia and a number of countries in Western and Central Europe, not the Russian Federation.<sup>271</sup> Nonetheless, while the importance of the Caucasus route for supplying heroin to the Russian Federation may have declined, a number of heroin seizures made in 2019 and 2020 in the North Caucasian Federal District of the Russian Federation, in particular close to seaports, suggest that heroin continues to be trafficked through the Caucasus, albeit in small quantities, or is trafficked via either the Caspian Sea or the Black Sea to the Russian Federation.<sup>272</sup>

#### Trafficking in heroin along the northern route may have increased in 2019 while decreasing to final destinations in the Russian Federation

Trafficking in heroin along the northern route, which goes from Afghanistan, through Central Asia mainly to markets located in the Russian Federation, has decreased substantially compared with two decades ago, when the heroin and morphine seized in countries along the route amounted to more than 10 tons and represented more than 10 per cent of global seizures of those opiates trafficked from Afghanistan. The proportion was 4 per cent in 2019, up from just 1 per cent in 2018, reflecting an increase in the quantities of heroin seized along the northern

route in recent years, from 1 ton in 2017 and 1.9 tons in 2018 to 4.5 tons in 2019.<sup>273</sup>

That increase is linked mainly to the use of the northern route by trafficking groups from outside the subregion, who make use of citizens from various countries to traffic heroin on trucks via the Islamic Republic of Iran and countries in Central Asia, but also via the Russian Federation and Belarus, to final destinations in Western and Central Europe. Examples of this trafficking pattern include: 670 kg of heroin originating in Afghanistan, which was seized in May 2019 in Frankfurt an der Oder, Germany, on a truck on the way from Kyrgyzstan to Belgium driven by a Turkish national living in Kyrgyzstan; 1.1 tons of heroin seized in Kazakhstan on a truck that had departed the Islamic Republic of Iran for a final destination in Germany, which involved nationals from Germany, Iran (Islamic Republic of), the Netherlands, Poland, Serbia and Turkey; and the seizure of 550 kg of heroin in Minsk, Belarus, in November 2019 that had been trafficked via the northern route for onward trafficking to the European Union, again involving a number of foreign nationals.<sup>274</sup> Seizures along the northern route of large heroin shipments destined for Western and Central Europe were not reported in 2020, however.

#### Increasing quantities of opiates are being trafficked along the southern route, including to South Asia and Europe

The southern route includes an array of other trafficking routes running mostly south from Afghanistan. Opiates are mainly trafficked along the route via Pakistan and/or via the Islamic Republic of Iran to India, for domestic consumption and re-export to countries in the region, and to Africa, for local markets and re-export to Europe. Seizures of heroin and morphine reported by countries along the southern route (excluding Pakistan) rose from 2.7 tons in 2015 to 9.4 tons in 2019; their overall share of the global quantities of seized opiates that resulted from opium produced in Afghanistan rose from 3 per cent in 2015 to 8 per cent in 2019.

Some of this increase has been linked to an increase in opiate shipments from South-West Asia to South Asia. Data on the prevalence of the use of opiates suggest that South Asia (most notably India) may be home to the largest number of opiate users worldwide (17 million people,

270 UNODC, responses to the annual report questionnaire.

271 UNODC, Drugs Monitoring Platform.

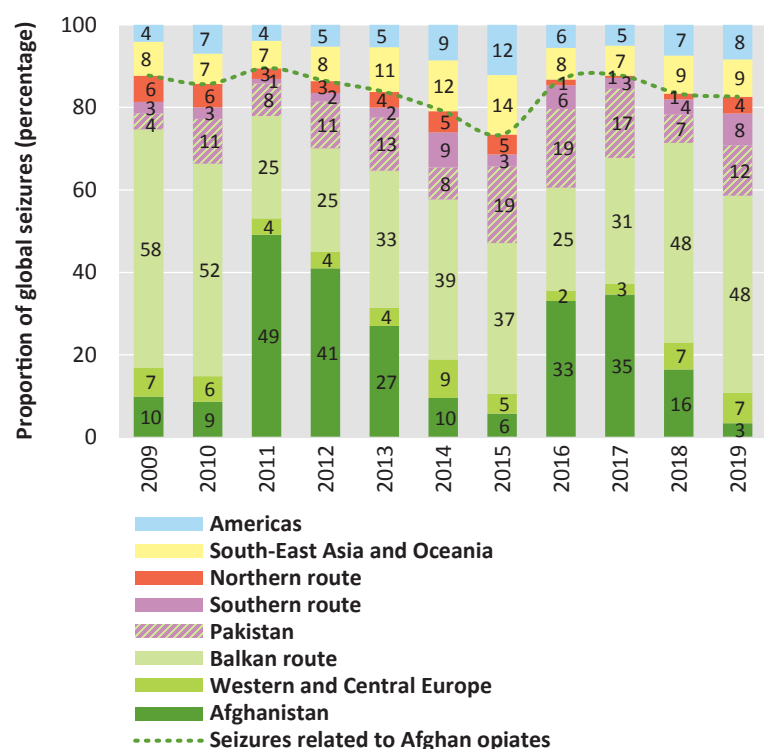
272 Ibid.

273 UNODC, responses to the annual report questionnaire.

274 UNODC, Drugs Monitoring Platform.



**FIG. 74** Distribution of quantities of heroin and morphine seized, by main trafficking routes, 2009–2019



Source: UNODC, responses to the annual report questionnaire.

Notes: The Balkan route includes: the Islamic Republic of Iran, half of Transcaucasia, South-Eastern Europe; the southern route includes: South Asia, Gulf countries and other countries in the Near and Middle East and Africa; and the northern route includes: Central Asia, Eastern Europe and half of Transcaucasia. Heroin seized in Transcaucasia was attributed partly to the Balkan route and partly to the northern route as it may supply both routes.

or 39 per cent of the global estimate in 2019, i.e., far more than in any other subregion) and may have experienced very strong increases in opiate use over the past two decades.<sup>275</sup> Significant quantities of the opiates needed to meet domestic demand in South Asia are likely to be smuggled from South-West Asia; for example, 40 per cent of the total quantity of heroin seized in India in 2019 came from South-West Asia.<sup>276</sup> In 2019, India reported a particularly strong increase (157 per cent) in heroin shipments from South-West Asia by sea.

<sup>275</sup> Opioid use among men in India was reported to have increased from a rate of 0.7 per cent in 2004 to 3.97 per cent in 2018; much of this increase resulted from an increase in the use of heroin (Source: Atul Ambekar and others, *Magnitude of Substance Use in India 2019* (New Delhi, Ministry of Social Justice and Empowerment, 2019)).

<sup>276</sup> UNODC, responses to the annual report questionnaire.

Although to a far lesser extent, South Asia continues to receive heroin shipments from neighbouring Myanmar (less than 1 per cent of total heroin seized in India and 5 per cent of the total heroin seized in Bangladesh in 2019 originated in Myanmar). However, while Bangladesh reported that 95 per cent of the heroin seized in the country in 2019 originated in India, the origin of significant amounts of heroin seized in India remains unknown. Some of the opiates seized in India may be of domestic origin, either from diversion from the country's licit opium production or from illicit opium poppy cultivation in the hilly and largely inaccessible areas in the north (Arunachal Pradesh, Bihar, Manipur, Uttarakhand, Jharkhand, Jammu and Kashmir and Himachal Pradesh), where the authorities eradicated more than 10,000 acres (slightly more than 4,000 ha) of opium poppy in 2019.<sup>277</sup>

Although countries in Western and Central Europe are mostly supplied by heroin trafficked via the Balkan route, the use of the southern route is not uncommon. Of all reported mentions of origin, departure and transit by countries in Western and Central Europe in relation to heroin, 18 per cent referred to trafficking along the southern route over the period 2015–2019, mainly via Southern and East Africa (notably South Africa, Ethiopia, Mozambique, Kenya, Uganda, Madagascar and United Republic of Tanzania), the Gulf countries (notably Qatar and United Arab Emirates) and India.

The two European countries reporting seizing the largest quantities of heroin that had been trafficked along the southern route in the period 2015–2019 were Belgium (via Burundi, Ethiopia, South Africa, Uganda, Kenya, Tanzania and Rwanda) and Italy (mostly by air via Pakistan, Qatar, the United Arab Emirates, South Africa, Ethiopia, Madagascar and Oman). In 2019, most (98 per cent) of the heroin seized in Belgium arrived by ship from the Islamic Republic of Iran. By contrast, most (84 per cent) of the heroin seized in Italy in 2019 arrived by air, mainly via Ethiopia, Oman, Pakistan, South Africa and the United Arab Emirates; this stands in contrast to the previous year, when most (60 per cent) of the heroin seized in Italy arrived by sea, mostly from the Islamic Republic of Iran.

The single largest seizure linked to trafficking along the southern route in 2020 appears to have been a shipment of 1.1 tons of heroin, found in a container on a ship docked at the port of Felixstowe, United Kingdom, in

<sup>277</sup> Ibid.

September 2020, which had been en route to Antwerp, Belgium, with the final destination being a warehouse in the Hague, the Netherlands.<sup>278</sup> A year prior to that, in September 2019, a similar seizure had also been made in Felixstowe, when 1.3 tons of heroin were discovered in a container on a ship from Pakistan that was destined for a warehouse in Rotterdam, the Netherlands.<sup>279</sup>

### Heroin trafficking is on the decline in East and South-East Asia, although the subregion still supplies Oceania

The main trafficking activities related to opiates from South-East Asia concern opiates produced within the subregion itself (mostly in Myanmar and, to a lesser extent, the Lao People's Democratic Republic), which are trafficked to other markets in East and South-East Asia (mostly China and Thailand) and Oceania (mostly Australia). The quantities of drugs reported seized by countries in East and South-East Asia and Oceania fell, from 13.3 tons in 2015 to 11 tons in 2019, pointing to a possible decline in heroin trafficking in that part of the world. That decline went in parallel with a reduction of more than 20 per cent in opium production in Myanmar over the period 2015–2019.<sup>280</sup>

The main embarkation point for heroin seized at the Australian border in the fiscal year 2018/19, measured by weight, was Malaysia, followed by (in descending order of the weight seized) Thailand, the Lao People's Democratic Republic, Singapore, Iraq, South Africa, Pakistan, Mozambique, Indonesia and India, pointing to South-East Asia as the origin of most of the heroin in Australia. This is in contrast to the situation a decade ago, when the proportion of heroin trafficked from South-East Asia was much smaller, accounting for 26 per cent of the total quantity seized at the Australian border in 2008. It has risen since then, to almost 100 per cent in 2018 and 92.5 per cent over the first two quarters of 2019 when, for the second time in the past decade, heroin from South America (7 per cent) was reported to have been seized at the Australian border.<sup>281</sup>

### Most of the heroin trafficked in the Americas continues to come from within the region

The main opiate trafficking flows in the Americas continue to start from key production areas in Latin America, principally Mexico and, to a far lesser extent, Colombia and Guatemala. Heroin originating in those countries accounts for most of the heroin supplied to the United States and also supplies the still-small heroin markets of South America. Canada, by contrast, continues to be supplied mainly by heroin from South-West Asia.<sup>282</sup>

Most heroin (and morphine) trafficking in the Americas takes place within North America, from Mexico to the United States and, to a far lesser extent, from Colombia and Guatemala, typically via Mexico, to the United States. Most of the samples of heroin analysed in the United States in 2018 originated in Mexico (93 per cent), while a small proportion originated in South America (2 per cent) or was classified as of “inconclusive South American” origin (4 per cent). There has thus been a substantial increase over the last decade in the share of the heroin samples in the United States originating in Mexico (38 per cent in 2008) at the expense of those originating in South America (59 per cent in 2008).<sup>283</sup>

On the basis of the quantities seized, heroin trafficking within the Americas, including in North America, remained stable in 2019 compared with the previous year, at about 10 tons, although that is more than double the quantity seized a decade earlier. Expressed as a percentage of the global quantities of heroin and morphine seized, the share seized in the Americas increased from 4 per cent in 2009 to 8 per cent in 2019.

278 National Crime Agency, “NCA investigation keeps 120-m Class A drugs haul off UK streets”, 18 September 2020.

279 BBC News, “Heroin worth £120m found at Felixstowe in ‘UK’s biggest haul’”, 4 September 2019.

280 UNODC, *Myanmar Opium Survey 2020: Cultivation, Production, and Implications*, and previous years.

281 Australian Criminal Intelligence Commission, *Illicit Drug Data Report 2018–19* (Canberra 2020), and previous years.

282 UNODC, Drugs Monitoring Platform.

283 United States, Drug Enforcement Administration and Office of Forensic Sciences, “The 2018 Heroin Signature Program”, Joint Intelligence Report (April 2020).

## Supply of other opioids

The majority of the opioids that are not opiates that end up on illegal drug markets continue to be licitly manufactured opioids that have been diverted from licit to illicit channels. Nowadays, diversions at the international level are limited, however.<sup>284</sup> The diversion of pharmaceutical opioids is more common at the national level; they are either sold on the street or are obtained through doctor shopping or falsified prescriptions for the acquisition of opioids from the legal supply chain, in particular from pharmacies. The pharmaceutical opioids reported to have been diverted most frequently over the period 2015–2019 were tramadol in Africa; codeine in Asia (mostly in the form of cough syrups), followed by tramadol; oxycodone in the Americas, followed by hydrocodone; buprenorphine in Europe, followed by methadone and tramadol; and morphine in Oceania, followed by oxycodone and codeine.<sup>285</sup>

Some opioids, such as fentanyl and its analogues, and also tramadol and methadone, are not only diverted from licit sources but also manufactured for the illicit drug market in semi-legal laboratories or fully clandestine laboratories. The largest numbers of clandestine synthetic opioid laboratories reported to have been dismantled over the period 2015–2019 were manufacturing fentanyl (20 laboratories, mostly in North America and, to a lesser extent in Europe and Oceania), methadone (7 laboratories, mostly in Eastern Europe) and carfentanil (3 laboratories, all in North America).<sup>286</sup>

## Global quantities of pharmaceutical opioids seized have reached a record high

The quantities of pharmaceutical opioids<sup>287</sup> seized have reached a peak in recent years, first in 2014 and again in 2019, when they tripled compared with the previous year. With a total amount of 228 tons of pharmaceutical opioids seized, an all-time high was reached in 2019, exceeding the quantities of opiates seized if converted into heroin equivalents: 96 tons of heroin, 26 tons of morphine and 73 tons of opium expressed in heroin equivalents.

In the past five years, tramadol, an opioid not under international control, has accounted for nearly two thirds of the global quantities of pharmaceutical opioids seized. Codeine accounted for a third and fentanyl for less than 2 per cent. In 2019, however, one year after India had put tramadol under national control, the largest quantities of pharmaceutical opioids seized worldwide were of codeine (65 per cent of the total), followed by tramadol (26 per cent) and fentanyl (2 per cent). A number of other opioids were seized in 2019, including methadone, various mixtures containing fentanyl, licit or pharmaceutical morphine, papaverine, pethidine, oxycodone, carfentanil, buprenorphine, hydromorphone, phenazocine, tapentadol, hydrocodone, diphenoxylate and pentazocine.

In 2019, increases in the quantities of pharmaceutical opioids seized compared with 2018 were reported not only for codeine but also for a number of other opioids, in particular fentanyl and several of its analogues (including carfentanil and furanylfentanyl), as well as methadone, morphine, pethidine, oxycodone, hydromorphone and hydrocodone. The quantities of tramadol, by contrast,

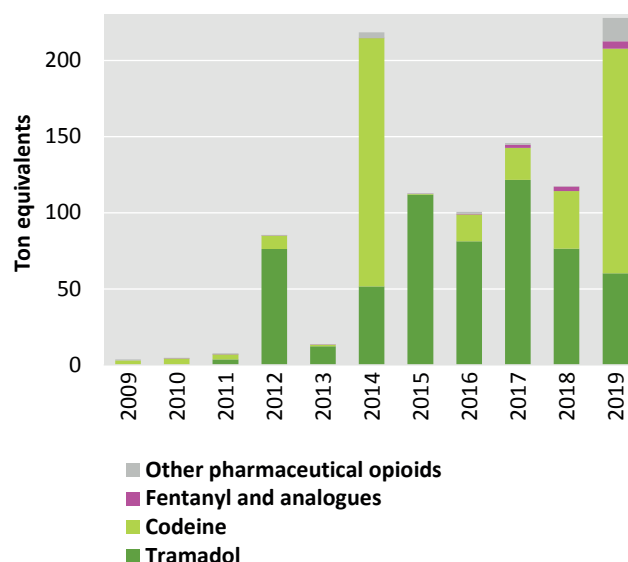
284 INCB, *Report of the International Narcotics Control Board for 2019* (E/INCB/2019/1).

285 UNODC, responses to the annual report questionnaire.

286 Ibid.

287 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, remifentanyl 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.

**FIG. 75** Global quantities of pharmaceutical opioids seized, 2009–2019



Source: UNODC, responses to the annual report questionnaire.

Notes: The data refer to seizures of opioids reported by Member States to UNODC in the 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, remifentanyl and sufentanil. One (carfentanil) is approved for veterinary use. Some Member States also report substances (such as furanyl fentanyl) that are, in general, not approved for medical use.

continued declining in 2019 and were less than half those seized in 2017.

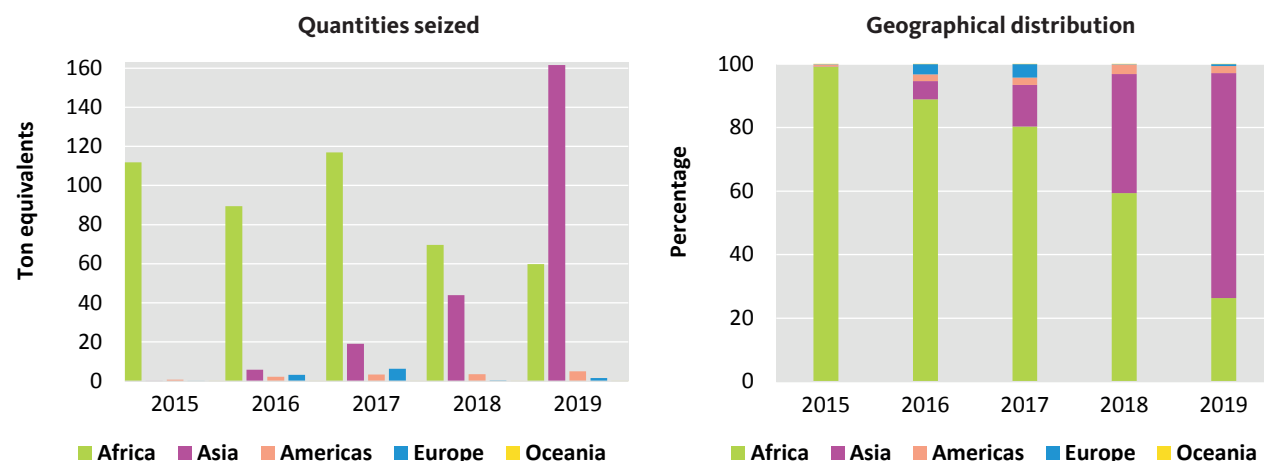
Analogues of fentanyl that were seized over the period 2009–2019 include carfentanil, acetyl- $\alpha$ -methylfentanyl, ocfentanil, furanyl fentanyl and sufentanil.

The category "other pharmaceutical opioids" included (ranked in terms of the quantities seized) in 2019: methadone, licit morphine, papaverine, pethidine, oxycodone, buprenorphine, hydromorphone, phenazocine, hydrocodone, diphenoxylate and pentazocine, in addition to a number of substances seized in previous years, including dextropropoxyphene, isomethadone, hydromorphone, trimeperidine, dihydrocodeine, apo-oxycodone, U-47700, nalbuphine, ethylmorphine and oxymorphone.

Data indicate the dominance of Africa and Asia in the global quantities of pharmaceutical opioids seized. Over the period 2015–2019, the proportion seized in Africa declined, in line with the decrease in the quantities of tramadol seized at the global level, while the proportion seized in Asia increased, in line with the increasing amounts of codeine seized.

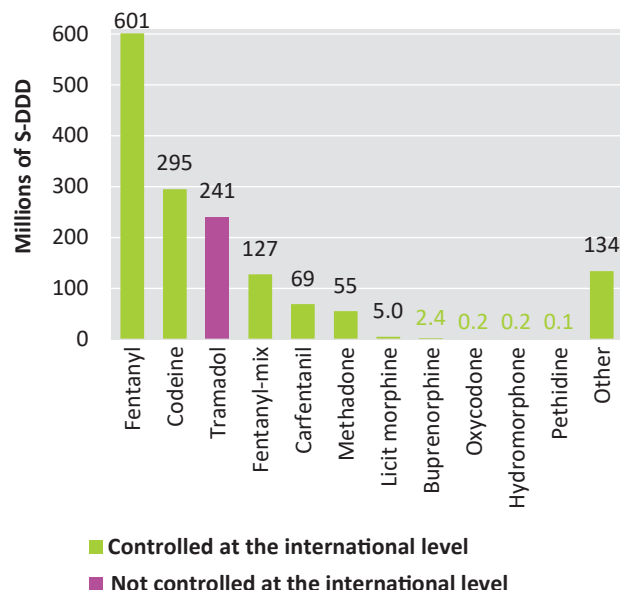
The breakdown of substances seized looks different, however, once the form of the substances (tablets versus syrups) and the typical purity of the quantities seized are considered and transformed into daily defined doses

**FIG. 76** Global quantities of pharmaceutical opioids seized and geographical distribution, 2015–2019



Source: UNODC, responses to the annual report questionnaire.

**FIG. 77** Global quantities of pharmaceutical opioids seized, adjusted for purity and expressed in S-DDDs, 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* (E/INCB/2019/3).

Note: S-DDDs refers to “defined daily doses for statistical purposes” as defined by INCB. They 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 the S-DDDs used for these calculations and of the purity adjustments made are provided in the methodological annex in the online version of the present report.

(S-DDDs).<sup>288</sup> This calculation suggests that fentanyl accounted for 39 per cent of pharmaceutical opioids seized in 2019, a figure that rises to 52 per cent when all the different fentanyl mixtures and analogues are included. In terms of the quantities of pharmaceutical opioids seized, adjusted for purity and transformed into S-DDDs, fentanyl and its analogues were followed by codeine (19 per cent of the total), tramadol (16 per cent) and methadone (4 per cent).

<sup>288</sup> S-DDDs refers to “defined daily doses for statistical purposes” as defined by INCB. They are technical units of measurement for the purposes of statistical analysis and are not recommended daily prescription doses. Details of the S-DDDs used for these calculations and of the purity adjustments made are provided in the methodological annex in the online version of the present report.

## Huge increase seen in trafficking in fentanyls

In recent years, the largest increases in the amounts of the various pharmaceutical opioids seized have been reported for fentanyl and its analogues. Compared with the previous year, the global quantities of fentanyls seized increased by more than 30 per cent in 2018 and more than 60 per cent in 2019. Moreover, the quantities of fentanyls seized in 2019 were almost 50 times larger than those seized in 2015 and more than 6,000 times larger than those seized in 2000. The largest quantities of fentanyl-type substances seized over the period 2010–2019 were reported for fentanyl as such, followed by various mixtures containing fentanyl, 3-methylfentanyl, carfentanil, acetyl-*alpha*-methylfentanyl, ocfentanil, furanylfentanyl and sufentanil.<sup>289</sup> In 2019, the largest quantities of fentanyls seized at the global level were of fentanyl, followed by mixtures of fentanyl and carfentanil, a substance that is 10,000 times more potent than morphine.<sup>290</sup> The vast majority of the fentanyls (98 per cent) seized over the period 2015–2019 were intercepted in the Americas, almost all of them in North America. The proportions seized in Europe (1.3 per cent, mostly in Eastern Europe) and Asia (0.4 per cent, mostly in East and South-East Asia) were comparatively very small. Although most of the increase in the amounts of fentanyls seized over the period 2010–2019 was reported in North America, the quantities of fentanyls seized in Europe and Asia also increased. In all regions, the quantities of fentanyl seized were larger than those of any fentanyl analogue. At the same time, the sizeable amounts of mixtures of fentanyl seized in 2019 suggest that the market may be increasingly diversifying in terms of fentanyl products.

## Most trafficking in fentanyl takes place from East and South-East Asia to North America, including via Mexico

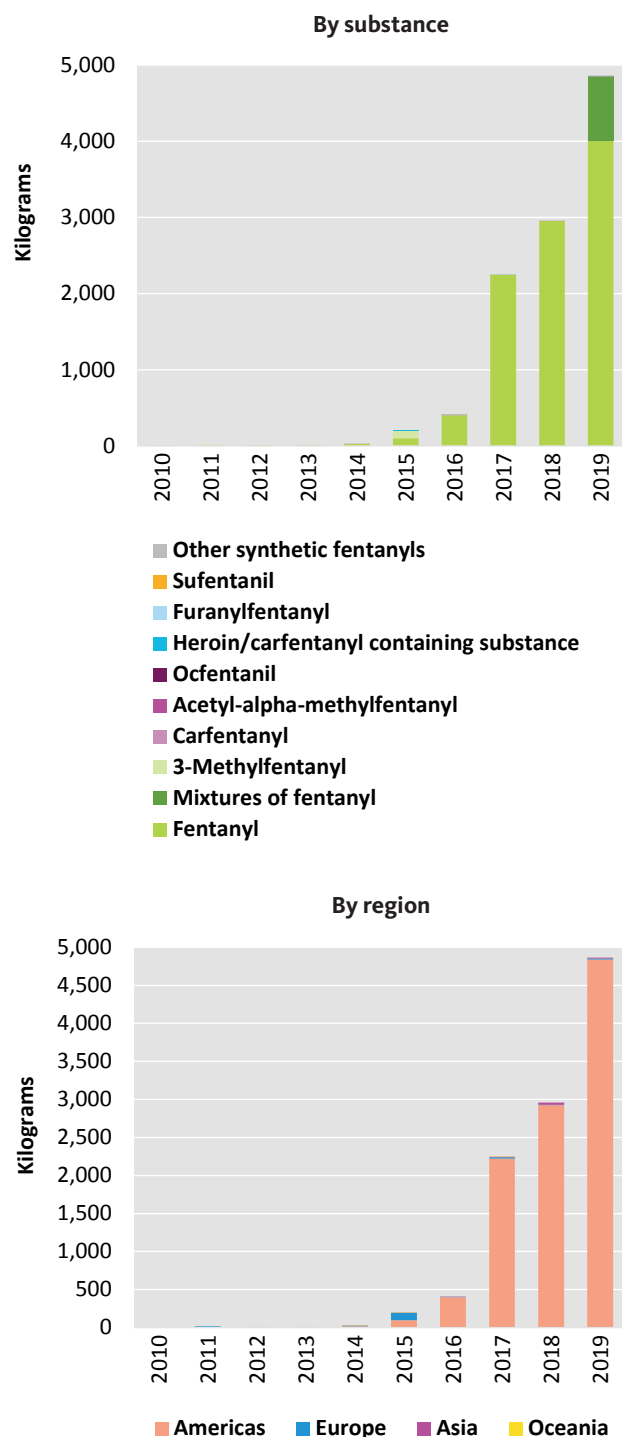
Given the predominance of seizures in North America and according to United States authorities, international trafficking in fentanyls over the period 2015–2019 took place mainly from East and South-East Asia (notably China) to North America, either directly, in small quantities, to the United States or to Mexico, in large quantities,

<sup>289</sup> The fentanyl analogues 3-methylfentanyl, acetyl-*alpha*-methylfentanyl, ocfentanil and furanylfentanyl are not pharmaceutical drugs.

<sup>290</sup> WHO, “Carfentanil: critical review report – agenda item 4.8”, Expert Committee on Drug Dependence, thirty-ninth meeting, 6–10 November 2017 (Geneva, 2017).



**FIG. 78** Global quantities of fentanyls seized, 2010–2019



Source: UNODC, responses to the annual report questionnaire.

and from there to the United States or to Canada for the domestic market and/or for onward shipment to the United States.<sup>291, 292, 293</sup>

These trafficking patterns seem to have changed, however, since the class scheduling of fentanyls in China in May 2019,<sup>294, 295</sup> which went hand in hand with a major crackdown on illicit fentanyl laboratories and sales sites in China, together with improved training for law enforcement officials and the installation of new screening equipment at postal facilities.<sup>296</sup> As a result, the amount of illicit fentanyl and fentanyl analogues shipped by mail from China to the United States, which used to be a major route for high-quality fentanyls arriving in the United States, appears to have decreased dramatically, according to United States authorities.<sup>297, 298</sup> In 2018, direct shipments of fentanyl analogues to the United States by mail declined, in terms of quantities seized, by more than 50 per cent<sup>299</sup> following the scheduling of a number of fentanyl analogues in China in 2017<sup>300, 301</sup> and 2018.<sup>302</sup>

Nonetheless, according to United States authorities, shipments of fentanyls from other countries (such as India) and/or of precursor chemicals for the clandestine manufacture of fentanyls from China and other countries to Mexico appear to have increased over the last two years.<sup>303</sup> In fact, there is a potential risk that criminal

291 UNODC, responses to the annual report questionnaire.

292 United States, Department of Justice, Drug Enforcement Administration, *2019 National Drug Threat Assessment* (December 2019), and previous years.

293 United States, Department of State, Bureau for International Narcotics and Law Enforcement Affairs, *2020 International Narcotics Control Strategy Report*, vols. I and II (March 2020).

294 UNODC, responses to the annual report questionnaire.

295 China, National Narcotics Control Commission, *Drug Situation in China 2019* (Beijing, 2020).

296 Ibid.

297 United States, Department of Justice, Drug Enforcement Administration, *2019 National Drug Threat Assessment* (and previous years).

298 United States, Department of State, Bureau for International Narcotics and Law Enforcement Affairs, *2020 International Narcotics Control Strategy Report*.

299 United States, Department of Justice, Drug Enforcement Administration, *2019 National Drug Threat Assessment*.

300 UNODC, Laboratory and Scientific Section Portals, "China: carfentanil, furanylfentanil, acrylfentanil and valerylentanil placed under national control", February 2017.

301 United States, Department of Justice, Drug Enforcement Administration, "China announces scheduling controls of new psychoactive substances/fentanyl-class substances" (19 June 2017).

302 UNODC, Laboratory and Scientific Section Portals, "China places additional 32 new psychoactive substances under national control", August 2018.

303 United States, Department of Justice, Drug Enforcement Administration, *2019 National Drug Threat Assessment*.

## First illicit fentanyl laboratory dismantled in India

According to authorities in the United States, in September 2018, the Directorate of Revenue Intelligence of India, in cooperation with the Drug Enforcement Agency of the United States, dismantled the first known illicit fentanyl laboratory in India and seized several kilograms of fentanyl.<sup>a</sup> A close partnership was identified between an Indian and a Chinese national who worked in concert to obtain fentanyl precursor chemicals and manufacture fentanyl.<sup>b</sup>

The operation had begun in China but later moved to India after the actors involved encountered difficulties obtaining precursor chemicals in China, possibly as a consequence of the previous announcement by China of the regulation of fentanyl precursors 4-anilino-*N*-phenethyl-4-piperidone (4-ANPP) and *N*-phenethyl-4-piperidone (NPP). Subsequent investigations also indicated that, in the meantime, chemists in India had developed the expertise to illicitly manufacture fentanyl without NPP and 4-ANPP.<sup>b</sup>

a United States, Department of State, Bureau for International Narcotics and Law Enforcement Affairs, *2020 International Narcotics Control Strategy Report*, vol. I (March 2020).

b United States, Department of Justice, Drug Enforcement Administration, *2019 National Drug Threat Assessment* (December 2019).

groups operating in countries with a large and thriving pharmaceutical sector may become more involved in the clandestine manufacture of fentanyls. In September 2018, the Indian authorities reported a relatively large seizure of fentanyl destined for organized crime groups in Mexico that involved the arrest of a Mexican citizen.<sup>304, 305,</sup>

<sup>306, 307</sup> Moreover, United States authorities have reported

304 India, Narcotics Control Bureau, "Drug situation report/significant event report for India for the month of September 2018" (New Delhi, September 2018).

305 United States, Department of Justice, Drug Enforcement Administration, *2019 National Drug Threat Assessment*.

306 United States, Department of State, Bureau for International Narcotics and Law Enforcement Affairs, *2019 International Narcotics Control Strategy Report*.

307 UNODC, Drugs Monitoring Platform.

the interception of mail shipments containing illicitly imported pharmaceutical drugs, including fentanyl and fentanyl analogues, originating in India.<sup>308</sup>

## Role of Mexican cartels in fentanyl trafficking to the United States

Despite these developments, most fentanyl trafficking to the United States continues to be in the hands of organized crime groups involved in trafficking the drugs from Mexico to the United States. The main drug trafficking organizations involved include the Jalisco New Generation Cartel,<sup>309</sup> which now operates in a close alliance with the Arellano Félix Organization (also known as the Tijuana Cartel) for such trafficking activities,<sup>310</sup> and the Sinaloa Cartel. The Sinaloa Cartel and the Jalisco New Generation Cartel have previously been identified as the primary groups involved in trafficking fentanyls into the United States across the country's south-western border<sup>311</sup> but, according to United States authorities, both cartels are also heavily involved in the smuggling of a number of other drugs into the United States.<sup>312</sup>

To enable the import of fentanyl and/or of fentanyl precursors from Asia into Mexico, the control of the country's Pacific ports is of key importance to traffickers. The Sinaloa Cartel is active in many of the country's northern Pacific ports, while the Jalisco New Generation Cartel is active in several of the country's southern Pacific ports.<sup>313</sup> This is of importance because Mexico continues to be a major transit country for fentanyls, as well as a source country for illicit fentanyl and fentanyl-laced counterfeit tablets destined for the United States market, according to United States authorities.<sup>314</sup>

In addition to seizures of fentanyl in territories under the control of the Sinaloa Cartel and the Jalisco New Generation Cartel, seizures of fentanyl are also concentrated

308 United States, Department of State, Bureau for International Narcotics and Law Enforcement Affairs, *2020 International Narcotics Control Strategy Report*.

309 Chris Dalby, "The fentanyl trade through Mexico, explained in 8 graphs", InSight Crime, 19 February 2019.

310 UNODC, annual report questionnaire.

311 United States, Department of Justice, Drug Enforcement Administration, *2018 National Drug Threat Assessment*. (October 2018).

312 United States, Department of Justice, Drug Enforcement Administration, *2017 National Drug Threat Assessment* (October 2017).

313 Scott Stewart, "Mexico's cartels find another game changer in fentanyl", Stratfor, 3 August 2017.

314 United States, Department of State, Bureau for International Narcotics and Law Enforcement Affairs, *2020 International Narcotics Control Strategy Report*, vol. I.



## The Sinaloa Cartel, a major player in illicit fentanyl manufacture in Mexico

According to authorities in the United States, most of the fentanyl synthesis and fentanyl tablet production operations dismantled in Mexico to date have occurred in territories controlled by the Sinaloa Cartel.<sup>a</sup>

For example, in November 2017, Mexican authorities seized a fentanyl laboratory in Culiacán, the state capital of Sinaloa and the home base of the Sinaloa Cartel.<sup>b</sup> In September 2018, counter-narcotics authorities of Mexico and the United States seized a laboratory in Baja California, Mexico, that was manufacturing fentanyl and carfentanil,<sup>c</sup> arresting two suspected associates of the Sinaloa Cartel. In September 2018, police in the border city of Mexicali raided a clandestine fentanyl laboratory and detained two suspects, including a Russian passport holder, underlining the international dimension of such activities.<sup>d</sup> In December 2018, the Office of the Attorney General of Mexico reported the dismantling of a clandestine fentanyl laboratory in Mexico City,<sup>e</sup> which was also equipped with an automated pill press.<sup>d</sup> Mexican law enforcement authorities also seized and dismantled clandestine fentanyl pill-milling operations in 2018, one of which was responsible for producing carfentanil-laced tablets. Another laboratory, dismantled in December 2018 by Mexican law enforcement agencies in Azcapotzalco, Mexico City, apparently produced fentanyl-laced oxycodone tablets.<sup>a</sup>

In April 2019, Mexican authorities reported the dismantling of a clandestine fentanyl laboratory in Culiacán,<sup>e</sup> seizing not only fentanyl tablets but also several containers that contained heroin.<sup>f</sup> In June 2019, authorities reported the dismantling of a clandestine laboratory in Nuevo León that had been used for the manufacture of chemical precursors of fentanyl and possibly also the manufacture of fentanyl itself.<sup>g</sup>

At the same time, significant quantities of fentanyl continue to be smuggled into Mexico for re-export to the United States.<sup>h</sup> In January 2019, the Ministry of Public Security reported the interception of shipments of fentanyl from China and Hong Kong, China, at Mexico City International Airport.<sup>i</sup> In August 2019, the Ministry of Naval Affairs announced a major seizure of powdered fentanyl, which had originated in Shanghai, China, and was headed to Culiacán, by the Mexican navy and customs enforcement personnel at the Lázaro Cárdenas seaport.<sup>j</sup> The latest significant seizure was in February 2021, when the Mexican military seized over 100,000 fentanyl tablets (together with over 2.5 tons of methamphetamine) from a vessel near the coast of the north-western state of Sinaloa.<sup>i</sup>

- a United States, Department of Justice, Drug Enforcement Administration, *2019 National Drug Threat Assessment* (December 2019).
- b Steven Dudley and others, "Mexico's role in the deadly rise of fentanyl" (Washington D.C., Wilson Center Mexico Institute and InSight Crime, 2019).
- c United States, Department of State, Bureau for International Narcotics and Law Enforcement Affairs, *2020 International Narcotics Control Strategy Report*, vol. I (March 2020).
- d AP News, "Mexico raids lab producing fentanyl in capital", 13 December 2018.
- e Mexico, Sinaloa, Ministry of Public Security, "Comunicación SSPE/141/2019: Policía Estatal Preventiva y Fuerzas Armadas aseguran presumiblemente el primer laboratorio de fentanilo a nivel nacional", 11 April 2019.
- f Mexico, Attorney General's Office, "Comunicado FGR 183/19: FGR asegura en Sinaloa más de 33 mil pastillas de fentanilo, heroína y ácido clorhídrico", 17 April 2019.
- g Mexico, Attorney General's Office, "Comunicado FGR 294/19: FGR asegura en Nuevo León laboratorio posiblemente utilizado para elaborar fentanilo", 16 June 2019.
- h Chris Dalby, "The fentanyl trade through Mexico, explained in 8 graphs", InSight Crime, 19 February 2019.
- i UNODC, Drugs Monitoring Platform.
- j Robert Arce, "Major fentanyl shipment from China seized in Mexico", ChinaGate, 25 August 2019.

along the border between Mexico and the United States, in particular along the stretch between Mexico and the states of California and Arizona that is controlled by the Sinaloa Cartel and the Arellano-Félix Organization, which has an alliance with the Jalisco New Generation Cartel, as well as on the east coast of the United States, most notably in the north-eastern states, around the Great Lakes and in some parts of the Midwest. The number of opioid-related deaths in the United States involving fentanyl

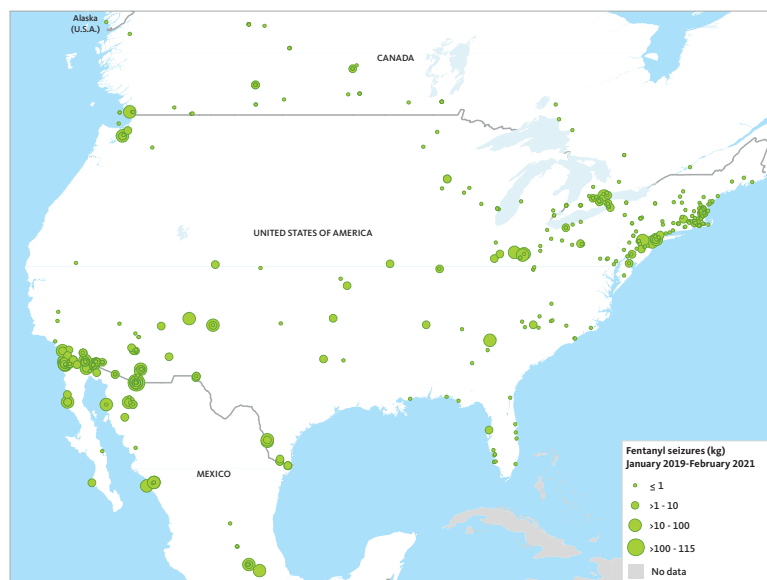
is also highest around the Great Lakes, the north-east and parts of the Midwest.<sup>315</sup>

### Role of domestic groups in the trafficking of fentanyl within the United States

While Mexican organized crime groups serve as suppliers of wholesale quantities of fentanyl to domestic

<sup>315</sup> United States, Department of Justice, Drug Enforcement Administration, *2019 National Drug Threat Assessment*.

**MAP 5** Individual seizures of fentanyl and its analogues in North America, January 2019–February 2021



Source: UNODC, Drugs Monitoring Platform.

*Note: The figure is based on information from individual seizures, which constitutes an opportunistically determined subset of all relevant seizures.*

organized crime groups across the United States, smaller, independent trafficking organizations in the United States purchase fentanyl on the clear web directly from China and sell it in the United States over the darknet. In addition, Dominican organized crime groups based in the United States, which typically source fentanyl from Mexican organized crime groups, are heavily involved in fentanyl trafficking in the country's north-eastern states.<sup>316</sup>

A comparison of fentanyl seizures made at the south-western border of the United States with those made in other parts of the country revealed that, despite the identification of some fentanyl pill mill laboratories in Mexico, most fentanyl contained in wholesale-level shipments does not contain mixtures of other drugs, suggesting that most of the mixing of fentanyl with heroin and other illicit drugs continues to take place in the United States, not Mexico.<sup>317</sup>

In 2018, 94 per cent of the fentanyl seized and analysed in the United States had been synthesized using the more

sophisticated “Janssen method” and 6 per cent using the less sophisticated “Siegfried method”, suggesting that the manufacture of fentanyl, at least until 2018, was done by highly trained and qualified chemists.<sup>318</sup>

### Trafficking in tramadol appears to have declined in 2019 and trafficking in the drug remains concentrated in Africa

Tramadol, an opioid medication used to treat moderate to (moderately) severe pain,<sup>319</sup> is not under international control but is under national control in a number of countries in all regions. Given its dual properties as an opioid analgesic with energy- and mood-enhancement properties,<sup>320</sup> the non-medical use of tramadol has spread in various subregions, in particular North Africa, West Africa and the Middle East.<sup>321</sup>

Overall, 43 countries reported tramadol seizures over the period 2015–2019, including 23 countries in 2019, an increase from 14 countries in 2015 and 3 countries in 2010.

Reports from Member States reveal a total of 44 countries identified as countries of origin, departure and transit of tramadol over the period 2015–2019,<sup>322</sup> with India being the most frequently mentioned, followed by Nigeria, Egypt and the Russian Federation; among the 27 countries identified as countries of origin, the most frequently mentioned was India, followed by China. Reported destination countries included countries in Africa (mostly in West, Central and North Africa), Asia (mostly in the Near and Middle East), Europe and the Americas.

Over the period 2015–2019, the largest quantities of tramadol seized were reported in West and Central Africa, which accounted for 88 per cent of the global total. The predominance of West and Central Africa in the global quantities of tramadol seized increased to 98 per cent in 2019. The largest quantities seized in 2019 were reported in Benin, followed by Egypt and India, although the latter

<sup>318</sup> Ibid.

<sup>319</sup> WHO, “Tramadol: update review report – agenda item 6.1”, Expert Committee on Drug Dependence, thirty-sixth meeting, 16–20 June 2014 (Geneva, 2014).

<sup>320</sup> WHO, Expert Committee on Drug Dependence, “Annex 1: extract from the report of the forty-first Expert Committee on Drug Dependence – cannabis and cannabis-related substances” (January 2019).

<sup>321</sup> For more details on the demand for tramadol, see the chapter “Demand for opioids” in the present booklet.

<sup>322</sup> UNODC, responses to the annual report questionnaire.

<sup>316</sup> Ibid.

<sup>317</sup> Ibid.

reported major decreases in 2019 compared with the previous year, while Egypt reported major decreases compared with 2017 and 2016.

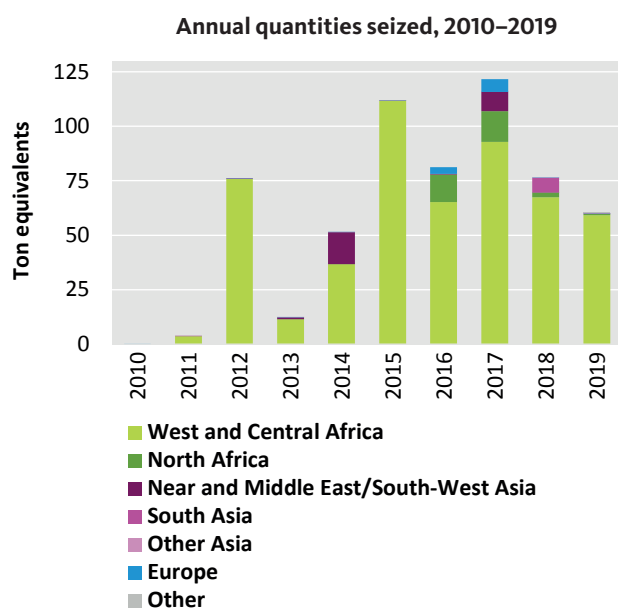
The global quantities of tramadol seized have increased markedly over the last decade, from less than 1 kg per year prior to 2010 and 7 kg in 2010 to a peak of 122 tons in 2017, with most of the quantities seized in that year being reported (in descending order of the amount seized) by Nigeria, Egypt and the United Arab Emirates. In 2018, the year that India put tramadol under national control,

the quantities of the drug seized declined in all subregions other than South Asia to a global total of 76 tons. In parallel, the number of countries reporting India as the main source country for tramadol also declined in 2018.

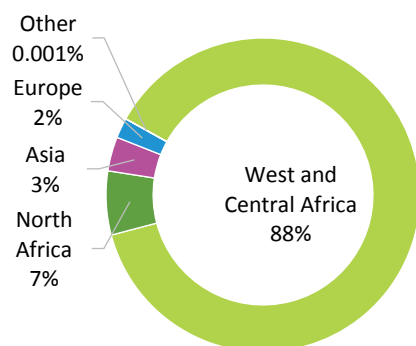
In 2019, the amount of tramadol seized globally continued declining and reached a total of some 60 tons; that was only because some 59 tons were reported to have been seized by authorities in Benin during the first five months of that year.<sup>323</sup> According to United States authorities, most of the tramadol imported into Benin in recent years originated in India and was used for re-export to other countries in West Africa and for domestic use.<sup>324</sup> In three tramadol seizure cases in February 2019 (273 kg, 330 kg and 105 kg) effected by authorities in Cotonou, the ship carrying the tramadol had departed from Singapore (although it is unlikely that the tramadol originated there) and the final destination of the container holding the tramadol was the Niger.<sup>325</sup> In two subsequent tramadol seizures from containers at the seaport in Cotonou, made in February 2019 (3,750 kg and 8,904 kg), the ship had departed Singapore, with the origin identified as India and the final destination as Nigeria.<sup>326</sup>

Trafficking in tramadol also continued in Africa in 2020, although there may have been some changes regarding its country of origin and the routes used. For example, in August 2020, three containers loaded with a total of 15 million tramadol tablets were intercepted by the seaport police in Lagos, Nigeria. The tablets had allegedly been produced in Pakistan and had transited Germany, before reaching Nigeria as the final destination, according to the Nigerian authorities.<sup>327</sup> Trafficking in pharmaceutical products, including tramadol, was also increasingly detected by West African joint airport interdiction task forces in 2020, including in the case of a Nigerian national arriving in Abuja on a flight from Istanbul, Turkey.<sup>328</sup>

**FIG. 79** Global quantities of tramadol seized, by region, 2010–2019



**Average quantities seized over 2015–2019**



Source: UNODC, responses to the annual report questionnaire.

323 Conference room paper entitled “Country report: Benin” (UNODC/HONLAF/29/CRP.3), submitted to the Twenty-ninth Meeting of Heads of National Drug Law Enforcement Agencies, Africa.

324 United States, Department of Justice, Drug Enforcement Administration, 2019 *National Drug Threat Assessment*.

325 UNODC, Drugs Monitoring Platform.

326 Individual drug seizures reported to UNODC by Member States.

327 Information made available to the National Drug Law Enforcement Agencies, Africa, at its meetings during the extraordinary sessions of the subsidiary bodies of the Commission on Narcotic Drugs, held online on 1 and 2 October.

328 Regional Office of West and Central Africa.

**TABLE 4** 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
<b>Africa</b>	<b>46,950</b>	<b>28,150</b>	<b>64,080</b>	<b>6.41</b>	<b>3.85</b>	<b>8.75</b>	<b>9,050</b>	<b>6,360</b>	<b>12,140</b>	<b>1.24</b>	<b>0.87</b>	<b>1.66</b>	<b>3,580</b>	<b>1,430</b>	<b>7,910</b>	<b>0.49</b>	<b>0.20</b>	<b>1.08</b>
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
<b>Americas</b>	<b>59,130</b>	<b>57,510</b>	<b>62,220</b>	<b>8.77</b>	<b>8.53</b>	<b>9.23</b>	<b>12,580</b>	<b>11,310</b>	<b>13,730</b>	<b>1.86</b>	<b>1.68</b>	<b>2.04</b>	<b>2,550</b>	<b>1,850</b>	<b>3,270</b>	<b>0.38</b>	<b>0.27</b>	<b>0.49</b>
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
<b>Asia</b>	<b>61,460</b>	<b>24,340</b>	<b>95,170</b>	<b>2.01</b>	<b>0.80</b>	<b>3.11</b>	<b>35,750</b>	<b>15,250</b>	<b>47,850</b>	<b>1.17</b>	<b>0.50</b>	<b>1.56</b>	<b>21,540</b>	<b>9,170</b>	<b>29,550</b>	<b>0.70</b>	<b>0.30</b>	<b>0.97</b>
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
<b>Europe</b>	<b>29,610</b>	<b>28,260</b>	<b>31,590</b>	<b>5.45</b>	<b>5.20</b>	<b>5.82</b>	<b>3,610</b>	<b>3,430</b>	<b>3,800</b>	<b>0.66</b>	<b>0.63</b>	<b>0.70</b>	<b>3,080</b>	<b>2,900</b>	<b>3,270</b>	<b>0.57</b>	<b>0.53</b>	<b>0.60</b>
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
<b>Oceania</b>	<b>3,220</b>	<b>3,170</b>	<b>3,340</b>	<b>12.00</b>	<b>11.78</b>	<b>12.42</b>	<b>660</b>	<b>580</b>	<b>740</b>	<b>2.47</b>	<b>2.17</b>	<b>2.76</b>	<b>30</b>	<b>20</b>	<b>30</b>	<b>0.11</b>	<b>0.08</b>	<b>0.12</b>
Australia and New Zealand	2,360	2,360	2,360	12.14	12.14	12.14	-	-	-	-	-	-	-	-	-	-	-	-
Melanesia	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Micronesia	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Polynesia	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
<b>GLOBAL ESTIMATE</b>	<b>200,380</b>	<b>141,430</b>	<b>256,400</b>	<b>3.98</b>	<b>2.81</b>	<b>5.09</b>	<b>61,650</b>	<b>36,940</b>	<b>78,260</b>	<b>1.22</b>	<b>0.73</b>	<b>1.55</b>	<b>30,780</b>	<b>15,370</b>	<b>44,040</b>	<b>0.61</b>	<b>0.31</b>	<b>0.87</b>

Sources: UNODC estimates based on annual report questionnaire data and other official sources.

**TABLE 5 Illicit cultivation of opium poppy, 2009–2020 (hectares)**

	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
<b>SOUTH-WEST ASIA</b>												
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 <sup>a</sup>	102,000	104,000	109,000	125,000	173,000	196,000	163,000	182,000	301,000	242,000	149,000	202,000
upper bound <sup>a</sup>	137,000	145,000	155,000	189,000	238,000	247,000	202,000	221,000	355,000	283,000	178,000	246,000
<b>SOUTH-EAST ASIA</b>												
Lao People's Democratic Republic (best estimate) <sup>b, g</sup>	1,900	3,000	4,100	6,800	3,900	6,200	5,700	5,395	5,327	4,925	4,624	..
lower bound <sup>a</sup>	1,100	1,900	2,500	3,100	1,900	3,500	3,900					
upper bound <sup>a</sup>	2,700	4,000	6,000	11,500	5,800	9,000	7,600					
Myanmar (best estimate) <sup>b, c</sup>	31,700	38,100	43,600	51,000	57,800	57,600	55,500	..	41,000	37,300	33,100	29,500
lower bound <sup>a</sup>	20,500	17,300	29,700	38,249	45,710	41,400	42,800		30,200	29,700	25,800	21,000
upper bound <sup>a</sup>	42,800	58,100	59,600	64,357	69,918	87,300	69,600		51,900	47,200	42,800	50,400
<b>SOUTH AND CENTRAL AMERICA</b>												
Colombia (best estimate)	356	341	338	313	298	387	595	462	282	663	..	..
Mexico (best estimate) <sup>d, e, f</sup>	19,500	14,000	12,000	10,500	11,000	17,000	26,100	25,200	30,600	28,000	21,500	..
lower bound <sup>a</sup>							21,800	20,400	22,800	21,200	15,500	
upper bound <sup>a</sup>							30,400	30,000	38,400	34,800	27,500	
<b>OTHER</b>												
<b>Other countries <sup>e</sup></b>	<b>9,479</b>	<b>12,221</b>	<b>16,390</b>	<b>12,282</b>	<b>13,293</b>	<b>11,585</b>	<b>8,549</b>	<b>54,641</b>	<b>8,792</b>	<b>11,815</b>	<b>14,656</b>	<b>40,855</b>
<b>TOTAL (best estimate)</b>	<b>185,935</b>	<b>190,662</b>	<b>207,428</b>	<b>234,895</b>	<b>295,291</b>	<b>316,772</b>	<b>279,444</b>	<b>286,698</b>	<b>414,001</b>	<b>345,703</b>	<b>236,880</b>	<b>294,355</b>
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
<b>TOTAL (best estimate, rounded)</b>	<b>185,930</b>	<b>190,660</b>	<b>207,430</b>	<b>234,900</b>	<b>295,290</b>	<b>316,770</b>	<b>279,440</b>	<b>286,700</b>	<b>414,000</b>	<b>345,700</b>	<b>236,880</b>	<b>294,350</b>

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 6** Potential production of oven-dry opium, 2009–2020 (tons)

	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
<b>SOUTH-WEST ASIA</b>												
Afghanistan (best estimate) <sup>j</sup>	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 <sup>a</sup>		3,000	4,800	2,800	4,500	5,100	2,700	4,000	8,000	5,600	5,600	5,400
upper bound <sup>a</sup>		4,200	6,800	4,200	6,500	7,800	3,900	5,600	10,000	7,200	7,100	7,200
<b>SOUTH-EAST ASIA</b>												
Lao People's Democratic Republic (best estimate) <sup>b, f</sup>	11	18	25	41	23	92	..	48	48	44	41	..
lower bound <sup>g</sup>	7	11	15	18	11	51	84					
upper bound <sup>g</sup>	16	24	36	69	35	133	176					
Myanmar (best estimate) <sup>b, h</sup>	330	580	610	690	870	670	647 <sup>h</sup>	..	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
<b>SOUTH AND CENTRAL AMERICA</b>												
Colombia (best estimate) <sup>k</sup>	9	8	8	8	11	12	17	13	7	18	..	..
Mexico (best estimate) <sup>c, e, i</sup>	425	300	250	220	225	360	419	404	492	450	440	..
lower bound <sup>a</sup>							265	251	288	267	286	
upper bound <sup>a</sup>							572	557	695	633	595	
<b>Other countries (best estimate) <sup>d</sup></b>	<b>178</b>	<b>224</b>	<b>290</b>	<b>172</b>	<b>182</b>	<b>201</b>	<b>147</b>	<b>711</b>	<b>143</b>	<b>168</b>	<b>227</b>	<b>708</b>
<b>TOTAL (best estimate)</b>	<b>4,953</b>	<b>4,730</b>	<b>6,983</b>	<b>4,831</b>	<b>6,810</b>	<b>7,735</b>	<b>4,659</b>	<b>5,976</b>	<b>10,239</b>	<b>7,600</b>	<b>7,616</b>	<b>7,413</b>
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
<b>TOTAL best estimate (rounded)</b>	<b>4,950</b>	<b>4,730</b>	<b>6,980</b>	<b>4,830</b>	<b>6,810</b>	<b>7,740</b>	<b>4,660</b>	<b>5,980</b>	<b>10,240</b>	<b>7,600</b>	<b>7,620</b>	<b>7,410</b>

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 from 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 7** Global manufacture of heroin from global illicit opium production, 2009–2020 (tons)

	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
<b>Total potential opium production</b>	<b>4,953</b>	<b>4,730</b>	<b>6,983</b>	<b>4,831</b>	<b>6,810</b>	<b>7,735</b>	<b>4,659</b>	<b>5,976</b>	<b>10,270</b>	<b>7,618</b>	<b>7,616</b>	<b>7,413</b>
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
<b>Total potential heroin manufacture</b>	<b>427</b>	<b>383</b>	<b>467</b>	<b>377</b>	<b>555</b>	<b>544</b>	<b>319</b>	<b>368</b>	<b>677–1,027</b>	<b>468–718</b>	<b>474–724</b>	<b>454–694</b>

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 8** 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 <sup>a</sup>	0.50	0.00		757	20
2017	Armenia	herb	outdoors	0.50 <sup>a</sup>	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 <sup>a</sup>	1.00	0.00		31,431	948
2018	Australia	herb	indoors					38,492	542
2018	Australia	herb	outdoors	0.80 <sup>a</sup>	0.80	0.00		19,981	1,120
2015	Austria	herb	outdoors	3.00 <sup>a</sup>	3.00	0.00			
2013	Azerbaijan	herb	outdoors	23.95 <sup>a</sup>	23.95	0.00	263.96	8,469	151
2014	Azerbaijan	herb	outdoors	17.50 <sup>a</sup>	17.50	0.00		14,889	195
2017	Azerbaijan	herb	outdoors	0.25 <sup>a</sup>		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	outdoors		123.80				1,945
2017	Belarus	herb	indoors						32
2017	Belarus	herb	outdoors		125.90				2,283
2018	Belarus	herb	indoors						42
2018	Belarus	herb	outdoors		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 <sup>a</sup>	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 <sup>a</sup>	0.02	0.00		539	53
2018	Bosnia and Herzegovina	herb	indoors	0.02 <sup>a</sup>	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 <sup>a</sup>	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 <sup>a</sup>	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 <sup>a</sup>	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	outdoors					39,151	
2017	Greece	herb	indoors					19,498	
2017	Greece	herb	outdoors					27,409	
2018	Greece	herb	indoors					6,913	
2018	Greece	herb	outdoors					43,684	
2016	Guatemala	herb	outdoors		9.00			3,138,298	427
2017	Guatemala	herb	outdoors	3.50 <sup>a</sup>	3.81		1.61	6,033,345	150
2018	Guatemala	herb	outdoors	129.00 <sup>a</sup>	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	outdoors					24,253	19
2017	Honduras	herb	outdoors	59.58 <sup>a</sup>	59.59	0.00			
2018	Honduras	herb	outdoors					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 <sup>a</sup>	482.00	0.00			
2017	Indonesia	herb	outdoors	89.00 <sup>a</sup>	89.00	0.00		738,020	14
2018	Indonesia	herb	outdoors	76.23 <sup>a</sup>	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 <sup>a</sup>	18.00	0.00		170,000	202
2017	Kazakhstan	herb	outdoors	12.30 <sup>a</sup>	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 <sup>a</sup>	0.50	0.00		5	3
2013	Panama	herb	indoors	0.50 <sup>a</sup>	0.50	0.00		37	2
2013	Panama	herb	outdoors	10.50 <sup>a</sup>	10.50	0.00		78,633	2
2016	Paraguay	herb	outdoors				1,298.50		
2016	Paraguay	plant	outdoors	1,298.50 <sup>a</sup>	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 <sup>a</sup>	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 <sup>a</sup>	0.50	0.00		757	20
2017	Armenia	herb	outdoors	0.50 <sup>a</sup>	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 <sup>a</sup>	1.00	0.00		31,431	948
2018	Australia	herb	indoors					38,492	542
2018	Australia	herb	outdoors	0.80 <sup>a</sup>	0.80	0.00		19,981	1,120
2019	Australia	herb	indoors		1.72			50,837	86
2019	Australia	herb	outdoors	0.04 <sup>a</sup>	0.04	0.00		4,755	1
2015	Austria	herb	outdoors	3.00 <sup>a</sup>	3.00	0.00			
2013	Azerbaijan	herb	outdoors	23.95 <sup>a</sup>	23.95	0.00	263.96	8,469	151
2014	Azerbaijan	herb	outdoors	17.50 <sup>a</sup>	17.50	0.00		14,889	195
2017	Azerbaijan	herb	outdoors	0.25 <sup>a</sup>		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 <sup>a</sup>	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 <sup>a</sup>	0.02	0.00		539	53
2018	Bosnia and Herzegovina	herb	indoors	0.02 <sup>a</sup>	0.02	0.00			6
2018	Bosnia and Herzegovina	herb	outdoors	0.02 <sup>a</sup>	0.02	0.00		1,580	12
2019	Bosnia and Herzegovina	herb	outdoors	30.00 <sup>a</sup>					
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 <sup>a</sup>	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 <sup>a</sup>	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 <sup>a</sup>	3.81		1.61	6,033,345	150
2018	Guatemala	herb	outdoors	129.00 <sup>a</sup>	129.00	0.00		5,189,422	368
2019	Guatemala	herb	outdoors	150.00 <sup>a</sup>	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 <sup>a</sup>	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 <sup>a</sup>	482.00	0.00			
2017	Indonesia	herb	outdoors	89.00 <sup>a</sup>	89.00	0.00		738,020	14
2018	Indonesia	herb	outdoors	76.23 <sup>a</sup>	76.23	0.00		1,455,390	13
2019	Indonesia	herb	outdoors	103.20 <sup>a</sup>	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 <sup>a</sup>	18.00	0.00		170,000	202
2017	Kazakhstan	herb	outdoors	12.30 <sup>a</sup>	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 <sup>a</sup>	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 <sup>a</sup>	0.50	0.00		5	3
2013	Panama	herb	indoors	0.50 <sup>a</sup>	0.50	0.00		37	2
2013	Panama	herb	outdoors	10.50 <sup>a</sup>	10.50	0.00		78,633	2
2016	Paraguay	herb	outdoors				1,298.50		
2016	Paraguay	plant	outdoors	1,298.50 <sup>a</sup>	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 <sup>a</sup>	7.61	0.00	68.64		1,143
2017	Russian Federation	herb	indoors		0.87				1,990
2017	Russian Federation	herb	outdoors	159.00 <sup>a</sup>	159.00	0.00	30.07		5,379
2018	Russian Federation	herb	indoors		1.87				
2018	Russian Federation	herb	outdoors	9.34 <sup>a</sup>	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 <sup>a</sup>	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 <sup>a</sup>	8.00	0.00	345.00		
2017	Sudan	herb	outdoors	1,250.00 <sup>a</sup>	1,250.00	0.00	205.00		100
2018	Sudan	herb	outdoors	7,744.00 <sup>a</sup>	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 <sup>a</sup>	1.00	0.00	7.50		1
2019	Thailand	herb	outdoors	1.50 <sup>a</sup>	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 <sup>a</sup>	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 <sup>a</sup>	0.20	0.00			586
2017	Uzbekistan	herb	outdoors	0.20 <sup>a</sup>	0.20	0.00			618
2018	Uzbekistan	herb	indoors	0.13 <sup>a</sup>	0.13	0.00			519
2019	Uzbekistan	herb	outdoors	0.11 <sup>a</sup>	0.11	0.00			417
2018	Venezuela	herb	outdoors					13,891	4
2015	Viet Nam	herb	outdoors		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<sup>1</sup>

<sup>1</sup> 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



# UNODC

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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](http://www.unodc.org/unodc/en/data-and-analysis/wdr2021.html)

