European Monitoring Centre
for Drugs and Drug Addiction

EUROPOL

EU Drug Market: Methamphetamine

‘EU Drug Market: Methamphetamine’ describes the European methamphetamine market from production and trafficking, to distribution and use. It details the processes, materials and players involved at different stages and levels of the market. The module takes a threat assessment approach, identifying the key issues and defining recommendations for action at EU and Member State level.

This resource is a module of EU Drug Markets: In-depth analysis, the fourth comprehensive overview of illicit drug markets in the European Union by the EMCDDA and Europol.

Note: This PDF document was created on the basis of the online module ‘EU Drug Market: Methamphetamine. Cross-links within the document will lead to the resources available online even if you may find the referred sections or figures within this document. The most up-to-date version as well as all source data and related resources can be found at https://www.emcdda.europa.eu/publications/eu-drug-markets/methamphetamine_en. Last update: 6 May 2022

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Introduction

Methamphetamine plays a relatively small role in European stimulant drug markets when compared with the global situation. However, at the end of 2019, an EMCDDA-Europol joint threat assessment concluded that after a period of relative stability, the threat posed by methamphetamine appeared to be increasing as the drug spread to new markets elsewhere in Europe. Despite the unprecedented disruption caused by the COVID-19 pandemic, over the past two years, the methamphetamine situation in the European Union (EU) has continued to evolve. As well as producing methamphetamine to supply European markets, Europe is a source of the drug for external markets. In addition, Europe is a destination and transit zone for methamphetamine produced in other production hubs, such as Iran, Nigeria and, more recently, Mexico. Meanwhile, the development of methamphetamine production capacity in Afghanistan, the main source of Europe's heroin supply, poses a potential threat to the EU, given the long-established trafficking routes that exist for Afghan opioids.

In most European countries, methamphetamine is much less commonly used than amphetamine or cocaine. Historically, consumption has been concentrated in central Europe, mainly Czechia and Slovakia. However, recent years have seen increases in use in other countries and regions. In some Member States and consequently in EU-level datasets, it is not possible to distinguish between amphetamine and methamphetamine, presenting challenges for constructing an accurate picture; in these cases, the generic term 'amphetamines' is often used.

Forms of methamphetamine on European drug markets

When using the term 'methamphetamine', we are really referring to methamphetamine hydrochloride, a crystalline solid that is soluble in water. In methamphetamine powder, finely ground crystals of methamphetamine hydrochloride are mixed with other ingredients, such as lactose, dextrose or caffeine. The powder may be ingested, snorted or less commonly dissolved and injected. Large white or translucent crystals of methamphetamine hydrochloride suitable for smoking, known as 'ice' or 'crystal meth', are also available. While the crystal form of the drug and the route of its administration is not commonly reported by surveys of users in Europe, it is important that practitioners and policymakers actively monitor this phenomenon as it can be linked to important health and social consequences.

For an historical background of methamphetamine, see the 'Historical background' section in the EMCDDA-Europol threat assessment report 'Methamphetamine in Europe' (EMCDDA and Europol, 2019).

Key findings and threat assessment

- **Europe's user market is relatively small but may be growing:** Europe's methamphetamine market is relatively small by global standards, but the prevalence of use and the size of the market could be underestimated since the consumption of methamphetamine powder may be reported as amphetamine in user surveys. In the context of the COVID-19 pandemic, experts working in harm-reduction services in some EU Member States have suggested that the use of methamphetamine may have become more popular in some user groups.
- **Increasing methamphetamine seizures:** Seizures of methamphetamine in the EU have increased significantly in the last few years, both in terms of the number of reported seizures and the amounts seized. This may be explained by an increased output of methamphetamine laboratories based in the EU and an increase in methamphetamine from production facilities located outside the EU, e.g. Iran, Mexico or Nigeria, most likely transiting Europe.
- **Mexican involvement in methamphetamine trafficking to Europe:** On several occasions, multi-tonne quantities of methamphetamine originating in Mexico have been seized in the EU. This implies a level of distribution and logistics collaboration between European and Mexican criminal networks. While these volumes appeared to be destined for export to other global markets, there is a risk that demand may be driven by increased levels of accessibility in some EU Member States. Furthermore, smaller amounts of methamphetamine are regularly intercepted in postal packages sent from Mexico, some of which may be linked to online supply.
- **Industrial-scale production in Europe:** While smaller-scale methamphetamine production continues in Czechia and neighbouring countries, methamphetamine production now occurs in industrial-scale laboratories in the Netherlands and to a lesser extent Belgium, in addition to the amphetamine and MDMA that are also produced there. The knowledge, chemicals and equipment required for the three drugs overlap considerably.
- **Dutch and Mexican collaboration and shared expertise drive large-scale methamphetamine production in Europe:** Recognising the profitability of methamphetamine in comparison to amphetamine and MDMA, European synthetic drug producers are collaborating with Mexican producers to develop production processes, while exploiting the infrastructure already in place in Europe for producing large quantities of synthetic drugs. Since 2019, the production facilities detected in the Netherlands and Belgium have increased in size, sophistication and output.

- **Challenges in controlling the availability of precursors:** The importation of precursors and auxiliary chemicals that support methamphetamine production in the EU is a critical element that is not well understood, particularly concerning the role of source countries. Criminal networks adapt to legislation and measures implemented for the control of precursors, exploiting the time lag between the identification of new precursors and their control. Further, the wide array of substances found in production facilities raise a concern that criminal networks active in the EU are involved in processing multiple drug types.
- **Crime as a service — providing essential logistics support for methamphetamine production:** Some EU-based criminal networks have specialised in and deal exclusively with logistics supply services for synthetic drug producers. This includes delivering precursors or pre-precursors and other auxiliary chemicals, equipment and expertise in setting up production facilities. These networks are part of an ecosystem where crime is strongly connected with the legitimate business environment, facilitated by the use of corruption.
- **Health, safety and environmental risks linked to methamphetamine production:** Fatalities related to fires, explosions or suffocation from carbon monoxide or other toxic fumes caused by the production process have occurred. Production on a large scale also generates huge quantities of chemical waste that is often dumped, creating risks to human health, harming the environment and generating costs for local municipalities.

Anticipating future threats

- **Further spread in Europe to a diverse user group:** Methamphetamine is a drug that appeals to diverse user groups, depending on the context and the form of the drug used. The way methamphetamine is used is an important determinant of harm, with injecting and smoking particularly linked to more problematic patterns of use. Injecting may involve risky practices, such as reusing or sharing syringes, and contributes to the transmission of blood-borne diseases.
- **Crystal methamphetamine — an unwelcome addition to the EU drug market:** The potential spread of the smokable crystal form of methamphetamine, due to increased amounts present in the EU, is a concern in terms of health consequences including acute toxicity, psychotic episodes, polydrug use and death. In the longer term, there is the potential for an additional burden to be placed on hospitals and specialised treatment services. In addition to the harms to individuals, there are risks to public safety including criminality, violence or dangerous behaviours such as driving while under the influence of drugs.

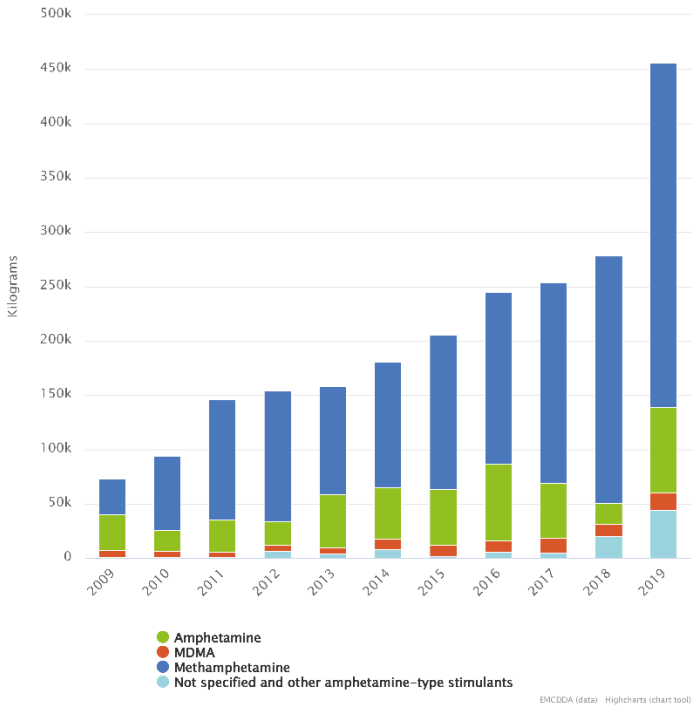
- **Serious violence:** The high profitability of the drug business can lead to intense competition and rivalries between criminal groups that may spill over into EU society. At present, the cooperation between Mexican and EU criminal networks appears to be focused on trade and profit. In the long term, there may be a risk of violent confrontations. As such, the emerging signs of Mexican criminal networks gaining a foothold in Europe are a warning signal, which may have long-term implications for the security environment in the EU, and increased efforts are needed to prevent further expansion.
- **Potential for production of fentanyl in the EU:** In addition to producing methamphetamine, it is known that Mexican criminal networks produce fentanyl for the US market. Therefore, there is a threat that cooperation between Mexican and European criminal networks could result in the spread of fentanyl production to the EU.
- **Expansion of organised crime, corruption and money laundering:** The growth of large-scale production of methamphetamine in Europe has the potential to create further criminal collaborations and drive more corruption along the supply chain, creating a parallel economy. Money laundering exposes institutions to business risk, and investigations can be complex and time-consuming.
- **Developments in Afghanistan:** The production of methamphetamine in Afghanistan using ephedrine from plant sources has been emerging since 2016. Although evidence of trafficking to Europe is limited, the low cost of Afghan methamphetamine may present an economic incentive to import from this source. The existing trafficking routes and infrastructure for Afghan heroin may also present an opportunity for criminal networks and a threat for the EU. Recent increases in methamphetamine use and seizures in Turkey (also of methamphetamine in liquid form) may be an early indicator of activity on the Balkan route. It will be important to be prepared, both operationally and strategically, for a supply-side push from this direction.

The methamphetamine market: global context

Methamphetamine is reported to be the most widely consumed synthetic stimulant drug in the world (UNODC, 2021). However, Europe is a relatively small market compared to Asia and North America, where there are indications that use is increasing, and to Australia (UNODC, 2021). In those regions, more than a quarter of people in drug treatment are being treated for amphetamine-type stimulant use disorder; in some countries in Asia, the proportion is more than three quarters. Those in treatment tend to be younger (in their mid-20s) than those in treatment for cocaine or opioid use (UNODC, 2021). In the United States, the injecting of methamphetamine has been linked to the opioid crisis in recent years (Jones et al., 2020) and contributed to the rise in hepatitis C infections, which quadrupled between 2009 and 2018 (UNODC, 2021).

According to the latest data reported by the United Nations Office on Drugs and Crime (UNODC), in 2019, 325 tonnes of methamphetamine was seized globally (more than 70 % of all amphetamines seized), mainly in China, Mexico, Myanmar, Thailand and the United States. Following the trend of most drugs, the global quantities of methamphetamine seized have been increasing over the last five years, with amounts doubling in that period (see Figure 'Global quantities of amphetamine-type stimulants seized'). Between 2017 and 2019, methamphetamine accounted for 13 % of all drug seizure cases reported globally (UNODC, 2021).

Global quantities of amphetamine-type stimulants seized, 2009-2019



Source: Responses to the annual report questionnaire (UNODC, 2021). Source data for this graphic is available in the source table on this page.

Almost all (95 %) of the 24 000 illicit synthetic drug laboratories reported to the UNODC between 2015 and 2019 were related to methamphetamine, with 43 countries reporting such facilities (UNODC, 2021). The trends show that while seizures have been increasing, the number of laboratories dismantled has been decreasing, suggesting that fewer laboratories with higher production capacity may now be more common. The manufacturing process has become increasingly complex due to changes in chemical techniques used, requiring additional novel chemicals, in part due to precursor availability.

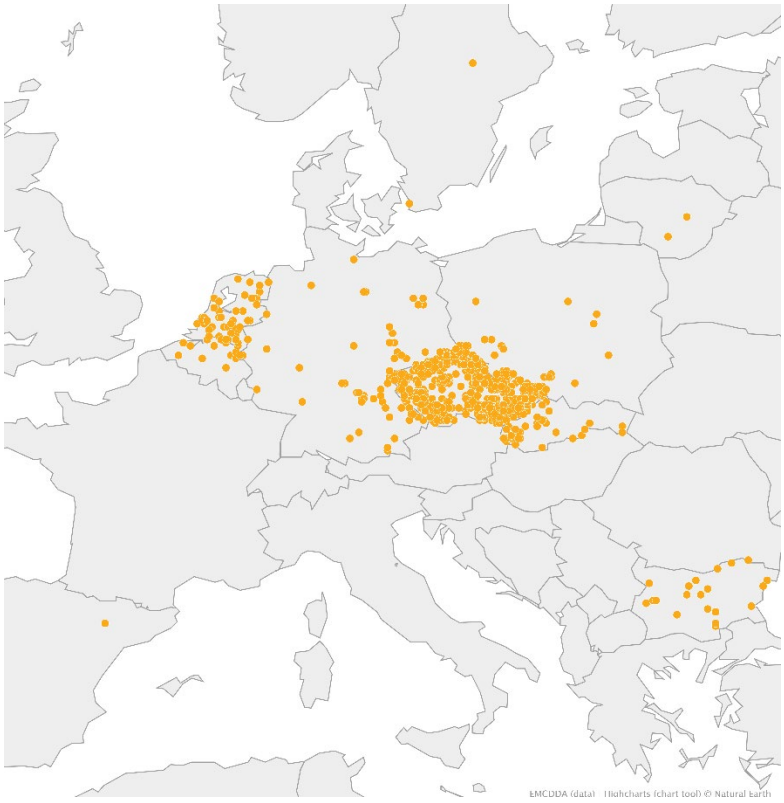
The illicit manufacture of methamphetamine in east and south-east Asia for consumers in Asia and Oceania is concentrated in Myanmar and other countries of the Lower Mekong Basin (Cambodia, Laos, Thailand and Vietnam), while the large North American market is served by large-scale industrial production in Mexico, or through small-scale so-called ‘kitchen laboratories’ in Canada and the United States (UNODC, 2021). Overdose deaths in the United States involving methamphetamine continue to rise as methamphetamine purity and potency remain high while prices remain relatively low (US DEA, 2021). Methamphetamine produced in Mexico is also exported globally. Other manufacturing zones exist and include Afghanistan, Iran and Nigeria. Of note, the production of ephedrine from ephedra plants re-emerged in China in 2019 (INCB, 2021).

Europe’s emergence as a globally important producer of methamphetamine

Methamphetamine production facilities dismantled in the EU

The main methamphetamine production sites in the EU are located in the Netherlands, Belgium, and Czechia and neighbouring countries (see Figure ‘Location of sites related to methamphetamine production in the EU, 2018-2020’). Overall, nine EU Member States reported the dismantling of 215 methamphetamine laboratories in 2020. This included large-scale facilities in Belgium (5) and the Netherlands (32), sometimes involving suspects from Latin America (including Mexicans), pointing to an injection of external expertise in EU-based methamphetamine production. In Czechia, where the laboratories dismantled are on a smaller scale, 160 illicit methamphetamine laboratories were detected in 2020 (compared with 234 in 2019), around two thirds of which had a production capacity of up to 50 grams. The reduction in the number of laboratories detected in Czechia in 2020 is thought to be driven by COVID-19-related shortages of medicines containing pseudoephedrine and other substances necessary for production in some regions.

Location of sites related to methamphetamine production in the EU, 2018-2020



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Seizures: long-term trend points to creeping market expansion

From 2010 to 2020, the number of methamphetamine seizures reported in the EU increased by almost 107 % and the quantities seized increased by 477 % ([1]) (see Figures Number and quantity of methamphetamine seizures). In 2019, EU Member States reported 6 500 seizures of methamphetamine amounting to 3.5 tonnes, up from 0.5 tonnes in 2018. In 2020, there was a reduction of both individual seizures (totalling 6 200) and the overall quantity seized (2.2 tonnes). Interpreting seizure data is complicated by the various sources of methamphetamine that exist, including production in Europe (mainly Czechia or Belgium and the Netherlands) and importation from abroad. In addition, the collection of seizure data for most drugs was disrupted in 2020 due to the COVID-19 pandemic. Among the EU Member States seizing methamphetamine in 2020, Slovakia reported the largest amount (including a seizure of 1.5 tonnes originating in Mexico) (EMCDDA, 2021a; see Box Operation PONTON), followed by Poland (300 kilograms), Lithuania (90 kilograms), Spain (78 kilograms) and Italy (44 kilograms). Recent seizures also suggest that European countries, particularly Spain, may be used as onward distribution points for methamphetamine produced in Mexico, likely for transport to Asia and Oceania, potentially via other EU Member States.

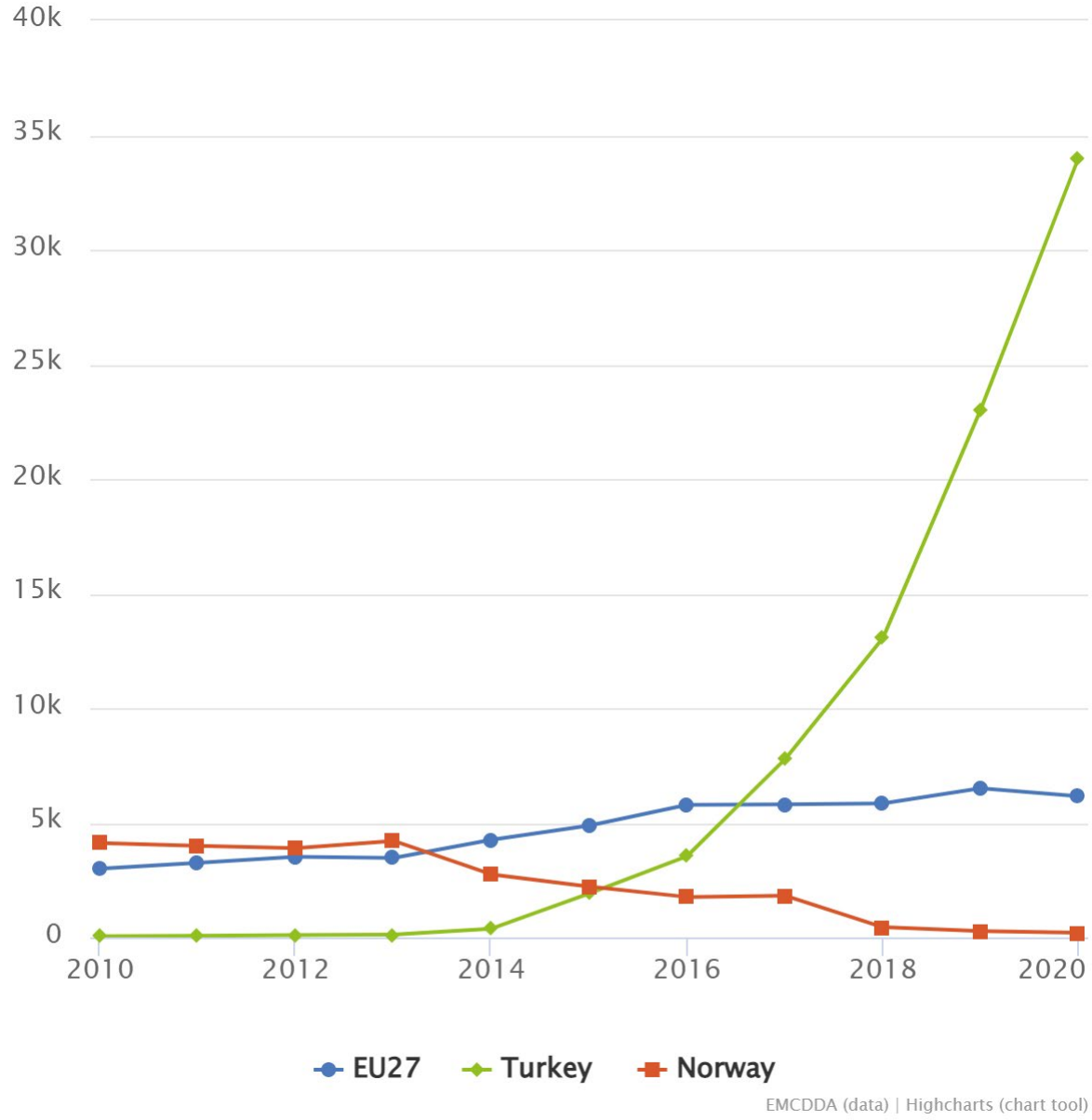
Standardised data on methamphetamine seizures in the Netherlands are not available, however, Dutch law enforcement reported to Europol seizures of 90 kilograms in 2020 and 650 kilograms in 2021 (not linked to production), as well as 8 200 kilograms/litres in 2020 and 3 300 kilograms/litres in 2021 seized at illicit production laboratories. In addition, partial information is available from reports of dismantled laboratories and from open sources. For example, in 2019, over 2.5 tonnes of crystal methamphetamine was found in a storage site in Rotterdam (Associated Press, 2019), in 2020 a quantity estimated at ‘hundreds of kilograms’ was confiscated after a laboratory was dismantled in Westdorpe (NOS, 2020), and in 2021, at Eemnes, 2.5 tonnes of methamphetamine was recovered when an active laboratory was dismantled (see Box Illicit laboratory inventory highlights Mexican and Dutch capabilities for methamphetamine production and highlights dangers).

Meanwhile, Turkey witnessed a significant increase in the amount of methamphetamine seized in 2020, reaching almost 4.2 tonnes (up from a little over 1 tonne in 2019). Most methamphetamine seized in Turkey enters the east of the

([1]) It should be noted that these figures do not show the full picture, since seizure data were not reported to the EMCDDA by the Netherlands.

country via the Iranian border, where smuggling of the drug in liquid form has been noted (Turkish National Focal Point, 2021).

Number of methamphetamine seizures, EU27, Norway and Turkey, 2010-2020



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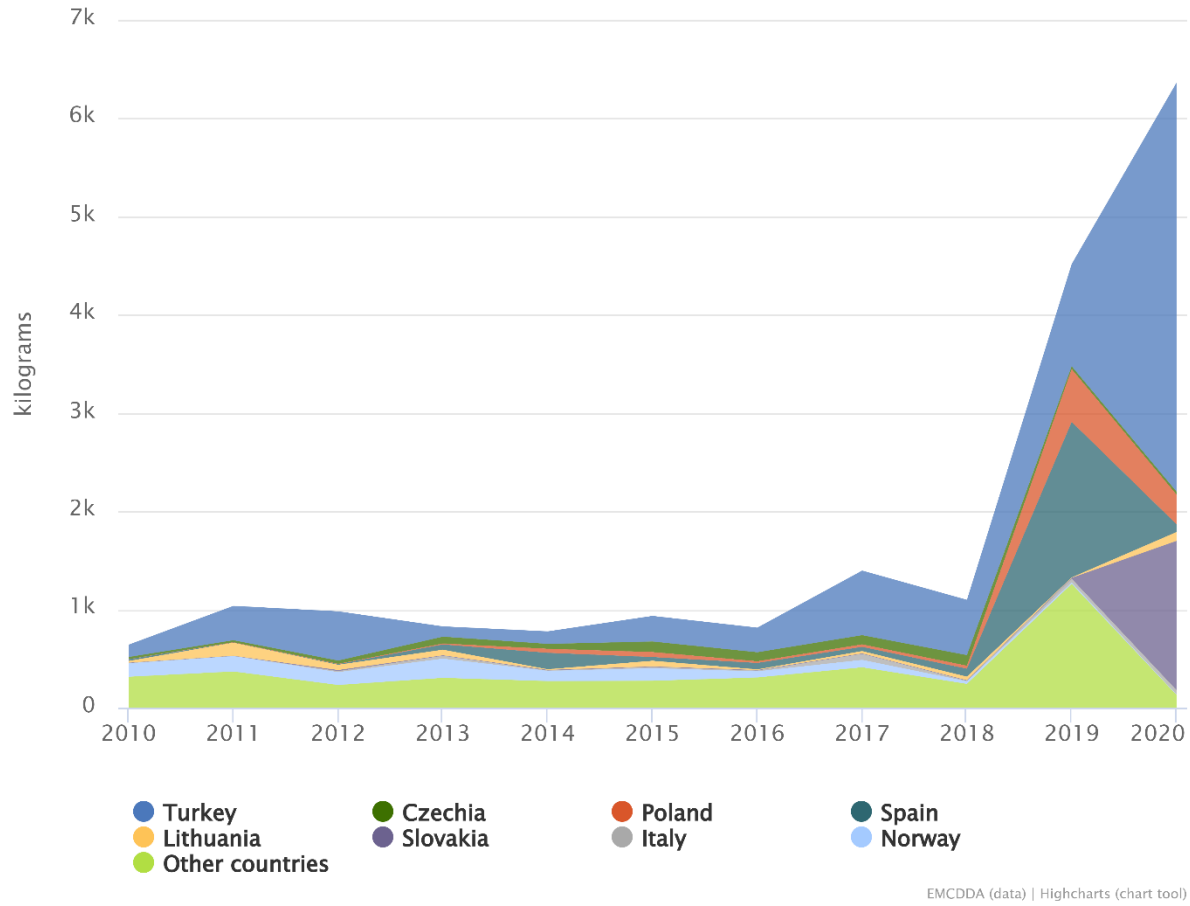
Quantity of methamphetamine seized, EU27, Norway and Turkey, 2010-2020

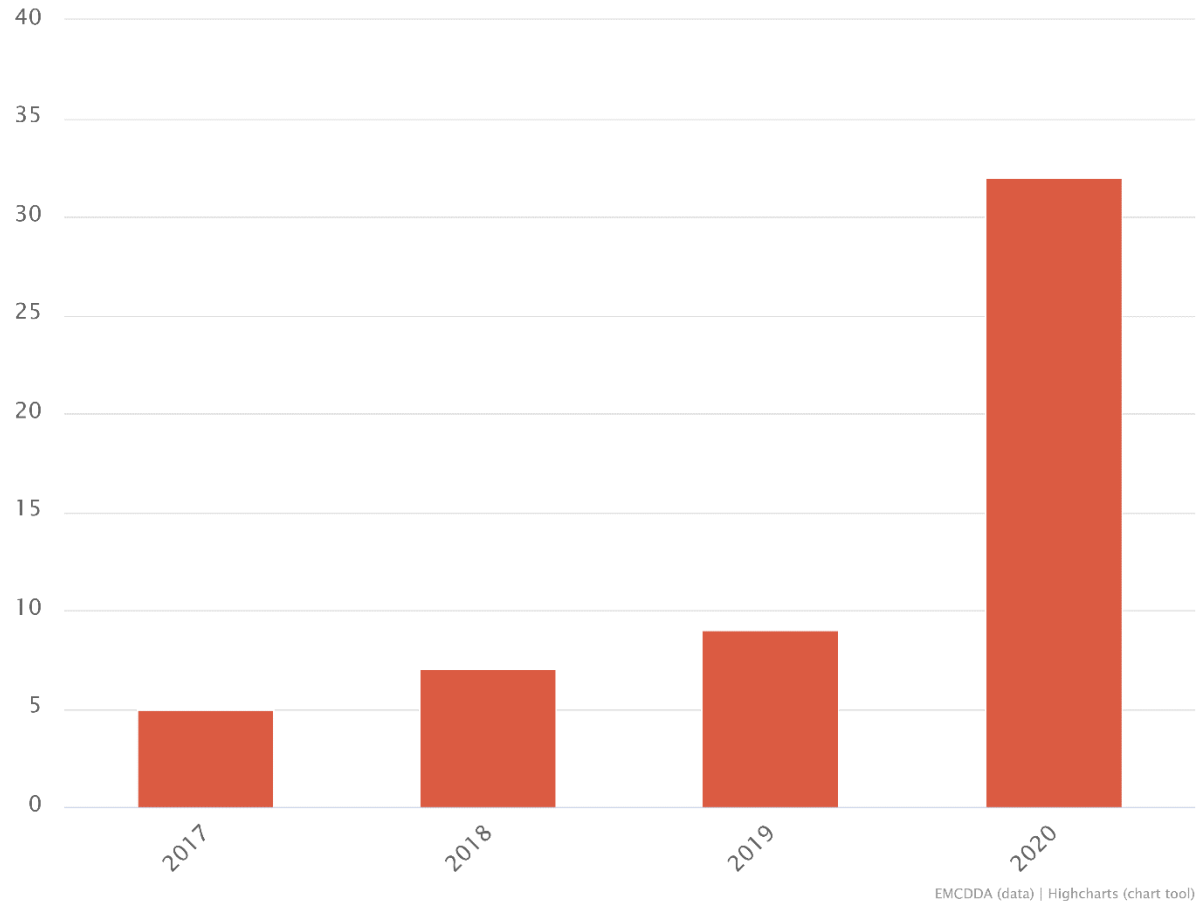


Source: The source data for this graphic is available in the source table on this page.

Dutch and Mexican collaboration: sharing expertise drives production to industrial scale

The production of methamphetamine in the Netherlands appears to have increased sharply in recent years, with the number of large-scale production facilities dismantled rising from 5 in 2017 to 32 in 2020, according to the Dutch police (see Figure ‘Methamphetamine laboratories dismantled in the Netherlands’).

Methamphetamine laboratories dismantled in the Netherlands, 2017-2020



Source: Dutch National Police. The source data for this graphic is available in the source table on this page.

There is evidence indicating that Dutch criminal networks are switching to the production of methamphetamine because profits are higher than for amphetamine and MDMA. For example, the wholesale price per kilogram of amphetamine paste and MDMA was EUR 740 and EUR 1 350, respectively in 2019, while methamphetamine commanded EUR 12 700 per kilogram (Politie, 2021a), although this price dropped significantly in 2020 (to approximately EUR 7 675 per kilogram) (Politie, 2021b).

While mostly Dutch nationals are encountered in the illicit drug laboratories dismantled in the Netherlands, in the methamphetamine facilities, Mexican and other Latin American 'cooks' (people who make synthetic drugs in illicit laboratories) have also been arrested since 2019. The Dutch police reported to the EMCDDA that Mexicans or other Latin Americans were arrested in connection with three methamphetamine production laboratories in 2019, while Mexican involvement is suspected in two other cases that year. In several such laboratories, the production methods are very specific and, according to Dutch law enforcement, the imported methods present new hazards compared with the other illicit synthetic drug laboratories dismantled in the Netherlands (see Main production methods used in Europe). In 2020, Mexican and other Latin American cooks were reported to be

involved in nine dismantled illicit methamphetamine production facilities. Other Latin American nationals arrested in connection with methamphetamine production in the Netherlands include Colombians and Dominicans (Aalbers, 2020; Cerberus, 2019; Meuleman, 2020; Voskuil, 2019; see video by Politie Landelijke Eenheid).

In June 2019, Belgian federal police confirmed that three Mexicans and a Colombian national were arrested in connection with the country's first-ever crystal methamphetamine production facility in Wuustwezel, a town close to the Dutch border (Braal and Verheijen, 2019).

The Dutch-Mexican partnerships are reported to be mutually profitable. The Dutch ensure, under the guidance of the Mexicans, that a suitable production facility is set up, with adequate supplies of drug precursors and other chemicals, hardware and waste disposal, while the Mexicans supply the cooks. The end product is then either shared between the Dutch and Mexican criminal networks or the Mexicans are paid per kilogram of end product. In addition, Dutch and Mexican criminal networks are reported to be collaborating in order to establish methamphetamine smuggling routes from Mexico to Europe. In such cases, methamphetamine made in Mexico is trafficked to European ports, from where it may be moved overland before being distributed to destinations in Asia and Oceania, with some potentially being kept for an expanding European market (see Box Operation PONTON).

Illicit laboratory inventory highlights Mexican and Dutch capabilities for methamphetamine production and highlights dangers

An illicit laboratory that was dismantled in the Netherlands in February 2020 illustrates the innovative methods and scale of operations when Mexican production expertise is combined with Dutch synthetic drug production logistics.

On the day the farmhouse facility was raided by police, more than 3 tonnes of methamphetamine products were found, including almost 2.4 tonnes of methamphetamine hydrochloride powder, 496 litres of base oil and 141 kilograms in finished crystals. In addition, large quantities of special chemicals for processing the high-potency isomer of methamphetamine were found, characteristic of these particular laboratories. This included half a tonne of tartaric acid, 40 kilograms of AIBN and 25 kilograms of methyl thioglycolate. Chemical reagents were also found in abundance: more than 1 200 litres of hydrochloric acid; 173 kilograms of sodium hydroxide; and 270 litres of solvents. In addition, 8 kilograms of mercuric chloride was recovered, a key chemical needed for the method favoured by Mexican cooks (the reductive amination via aluminium amalgam method). This method presents particular dangers to those involved in production and to first responders who may be exposed to mercury vapours.

Source: National Police, the Netherlands, 2021

In addition to the implications described above (impact on production methods and importation of methamphetamine into the EU), the collaboration may be concerning from other perspectives. Mexican synthetic drug producers are focused on

methamphetamine and fentanyl for the US market. Any signals in this direction in Europe must be carefully monitored, and indeed some have already been noted (see Box 'Signals of fentanyl production detected in the Netherlands and Belgium'). Despite these recent developments, there is no indication that Mexican cartels are setting up a base in the EU with the intention of competing for control of drug markets.

Signals of fentanyl production detected in the Netherlands and Belgium

In May 2019, 1 litre of 4-piperidone was seized in Belgium en route to the Netherlands. This substance is not under international control, but has emerged in recent years as an alternative precursor used in the synthesis of fentanyl. Other seizures of this substance have been confirmed in Canada and Mexico (INCB, 2022).

Then, in February 2020, more than 1 kilogram of fentanyl was seized in Eindhoven in the Netherlands. This was found to be pure fentanyl when analysed at the Netherlands Forensic Institute. The suspect in the case was also suspected of preparatory acts for the production of synthetic drugs in Germany. During the search, police also recovered expensive watches, thousands of euro in cash, weapons and ammunition (Openbaar Ministerie, 2020).

In October the same year, a chemical storage facility was found in Breda in the Netherlands. It was reported that almost 2 000 litres of chemicals 'that can be used to produce fentanyl' were found at the site (Janssen, 2020). According to data later reported to the European Commission, 800 litres of propionyl chloride, 600 litres of (2-bromoethyl)benzene and 400 litres of aniline were recovered. This combination of chemicals suggests they were intended for the production of fentanyl or its derivatives (INCB, 2022).

Other signals of the involvement of Mexican groups in European methamphetamine trade

Additional insight into Mexican involvement in methamphetamine production and trafficking in Europe can be gained from the seizures in Europe. In 2019, Spain reported seizing 1.6 tonnes originating in Mexico (see Box 'Mexican Beltrán Leyva cartel caught trafficking methamphetamine to Europe'), and in 2020 Slovakia reported seizing 1.5 tonnes originating in Mexico (see Box Operation PONTON). Such cases suggest that European countries may be used as onward distribution points for methamphetamine produced in Mexico.

Mexican Beltrán Leyva cartel caught trafficking methamphetamine to Europe

In December 2021, a joint operation involving Spanish authorities and Europol disrupted an international criminal organisation based in Spain and the Netherlands that is linked to the Mexican Beltrán Leyva cartel. The three-year operation resulted in the arrest of 16 people and the seizure of 2 549 kilograms of methamphetamine, as well as 1 370 kilograms of cocaine. The investigation suggested that Mexican cartels were attempting to generate demand for 'crystal meth' in the European drug market. During the operation, the Dutch

police seized 2 537 kilograms of methamphetamine in a warehouse in Rotterdam (see video by Reuters) and this led to the raid on a warehouse in Utrecht, where 17 000 litres of chemicals for the production of illicit drugs was being stored. These substances came from a company based in Spain, which was in charge of bringing the drugs into the country on behalf of the Mexican cartel.

The operation proved there had been numerous high-value bank transactions to and from Mexico that were received by or sent from members of the Beltrán Leyva cartel. The money laundering investigation revealed that large amounts of money from Hong Kong and the United Arab Emirates were transferred to Mexico using the bank accounts of Spanish companies. These funds, assessed as the proceeds of drug trafficking, as no legitimate commercial origin could be established, were paid into the bank accounts of the companies under investigation and introduced into the Spanish financial system with Mexico as their destination.

Source: Agencia Tributaria (Spanish Tax Authority), December 2021

Analysis of darknet markets also provides evidence of connections to Mexican methamphetamine in Europe. Such connections are typically captured in the drug listing, and this can be a direct claim of a link describing Mexican methamphetamine or quality comparisons. References to Mexican methamphetamine began to appear in the second half of 2017 and were evident across a number of darknet markets, though particularly prominent on Dream, the dominant market at that time, which hosted about two thirds (525) of all listings where a link could be identified (813). In 2017, the number of links was limited (5); however, there was proliferation in 2018 when around 50 % (564 listings) of all methamphetamine listings in that year (1 146) could be linked to Mexican production in some way. Over 90 % of these listings appeared to belong to 10 vendors operating on Dream market purporting to ship from Germany. The activity in 2019 was greatly reduced (24), probably due to disruption of the darknet market ecosystem, including the shutdown of Dream in April 2019. It remained relatively low in 2020 at just over 100 relevant listings, but 110 listings pointing to links were identified in the first six months of 2021.

Methamphetamine from Afghanistan: a credible threat?

An important development has been noted in Afghanistan, where since around 2016 methamphetamine production has been increasing, initially as a result of the relocation of some Iranian producers to Afghan territory, perhaps driven by a lack of access to precursors. In Afghanistan, the method used was initially based on the extraction of ephedrine and pseudoephedrine from medicines. However, since 2019, a new method has emerged, with producers using ephedrine extracted from ephedra plants that grow wild in mountainous regions of the country (Mansfield and Soderholm, 2019). The rapid development of the production of what appears to be a comparatively cheap form of pure methamphetamine in Afghanistan is a cause for concern, particularly as the country is the origin of most of the heroin on the

European market. As such, there is a risk that the drug could enter the European drug market via existing trafficking routes for heroin (EMCDDA, 2020).

Since 2019, record amounts of methamphetamine believed to be of Afghan origin have been seized along the Balkan and southern trafficking routes for heroin. This includes a large number of seizures made in Iran and Pakistan. Also, seizures have been made as far away as Sri Lanka, Indonesia and Australia. In Australia, chemical profiling of several seizures has confirmed that the methamphetamine was produced from ephedrine obtained from plants (which may suggest they originated from Afghanistan or perhaps China). Of concern for Europe, Turkey has seen a large increase in the quantity of methamphetamine seized in recent years, exceeding 4 tonnes in 2020 (up from 1 tonne in 2019). These seizures often involve Iranian nationals operating on the Balkan trafficking route, take place in the Turkish provinces bordering Iran, and sometimes also include heroin. In one incident in December 2021, a seizure of 462.5 kilograms of liquid methamphetamine was made at the Gürbulak border crossing with Iran (personal communication, Turkish National Focal Point, 2021).

It is unknown whether any of the methamphetamine seized in Turkey was destined for the European market, and without forensic confirmation, the origin remains undetermined. There is, however, a risk that Afghan methamphetamine may in the future be trafficked to the EU using the Balkan and southern routes. Notably, large methamphetamine and heroin seizures have also been reported along the southern route, particularly in operations undertaken by the Combined Maritime Force (CMF) around the Arabian Gulf and the Indian Ocean. By the beginning of December 2021, the CMF had already seized more methamphetamine in these areas (4 052 kilograms) than in any previous year (CMF, 2021).

The developments in Afghan methamphetamine production are particularly threatening for the EU given the transnational nature of the Afghan drugs trade and its potential impact on transit and destination countries (EMCDDA, 2021b). Should traffickers along the Balkan and southern routes seek to move Afghan methamphetamine into Europe, either for consumption or in transit to other global markets, this may lead to tensions or collaboration with European drug producers and distribution networks. As Europe’s methamphetamine market is small and dynamic, a potential supply-side push caused by comparatively cheap Afghan methamphetamine may result in increased availability and use of the drug (see Box ‘Crystal methanomics’: why would importing from Afghanistan make sense?’).

‘Crystal methanomics’: why would importing from Afghanistan make sense?

At first glance, it may seem improbable that methamphetamine would be trafficked to the EU from Afghanistan, given the large capacity for methamphetamine production that already exists in Europe. However, an examination of wholesale price data suggests that for purely economic reasons, it may be a viable proposition for criminal networks with access to established heroin trafficking routes.

Production costs in Afghanistan are extremely low due to meagre labour and raw ingredient costs. Research in 2020 showed that the price of 1 kilogram of methamphetamine was EUR 260 near the point of production, rising to almost EUR 300 at the border with Iran and between EUR 280 and EUR 1 400 within Iran (with lower prices at the border with Afghanistan and higher prices in Tehran and western provinces closer to Turkey). At the end of 2021, the price of 1 kilogram of methamphetamine had decreased to EUR 170 in Afghanistan. A ban on harvesting ephedra was announced, by the Taliban in December 2021, driving the price to EUR 482 per kilogram at the beginning of 2022.

The wholesale (per kilogram) price of methamphetamine in Czechia ranges from EUR 18 900 to EUR 21 200 for local product and from EUR 15 000 to EUR 17 000 for imported Dutch product (Police of the Czech Republic, 2021). In 2020, the price in the Netherlands dropped to EUR 7 675 per kilogram from EUR 12 750 in 2019 (Politie, 2021a, 2021b), for unknown reasons, perhaps related to market competition.

Source: Mansfield, 2022

Main methamphetamine production methods used in Europe

There are many ways to make methamphetamine, and each has its own risks and advantages. In Europe, two main methods exist, classified according to the chemicals used as starting materials, known as precursors. One method is based on ephedrine or pseudoephedrine which can be imported in bulk powder or extracted from medicinal products or even from ephedra plants. This method is hazardous and difficult to scale up; in Europe, it is mostly used in small- to medium-scale 'kitchen' laboratories in and around Czechia, where precursors extracted from medicines are typically used. This method produces the potent d-isomer form of methamphetamine (d-methamphetamine ([2])). The other method uses BMK (also called benzyl methyl ketone, or phenyl-2-propanone, 'P-2-P'), an oil that can be imported to the EU or made in Europe from chemicals known as designer precursors (also called pre-precursors). This method is more amenable to scaling up and is therefore suitable for use in industrial-scale laboratories, as has been observed in the Netherlands and Belgium. Its main disadvantage is that the resulting product is a 50:50 mixture of the d- and l-isomers, the l-methamphetamine being a less desirable product. This means an additional step is needed at the end of the synthesis to separate and purify the potent (hence preferred) illicit product: d-methamphetamine. Techniques to perform this separation have been used in illicit production laboratories in Mexico since at least 2009 (INCB, 2017) and more recently in the Netherlands and Belgium. Recent data also shows that European BMK-based laboratories have further increased the efficiency and output of production by recycling the unwanted l-methamphetamine to obtain more d-methamphetamine for each litre of BMK used (see Section Recycling unwanted by-product: a game-changer in methamphetamine production).

BMK methods, typically found in the Netherlands and Belgium

BMK has limited legitimate uses; in Europe it is mostly used to produce amphetamine, and increasingly, for the production of methamphetamine. BMK may be imported to the EU but it is more often produced locally from pre-precursors.

BMK methods typically involve the catalytic reduction (reductive amination) of an intermediate formed between BMK and methylamine. In Europe, there are two main techniques: (1) reductive amination uses the 'aluminium amalgam method'; (2) the 'high pressure method' is the same technique used to produce MDMA in Europe, the

([2]) *d*-methamphetamine is also known as (*S*)-(+)-methamphetamine, whereas *l*-methamphetamine is also known as (*R*)-(–)-methamphetamine.

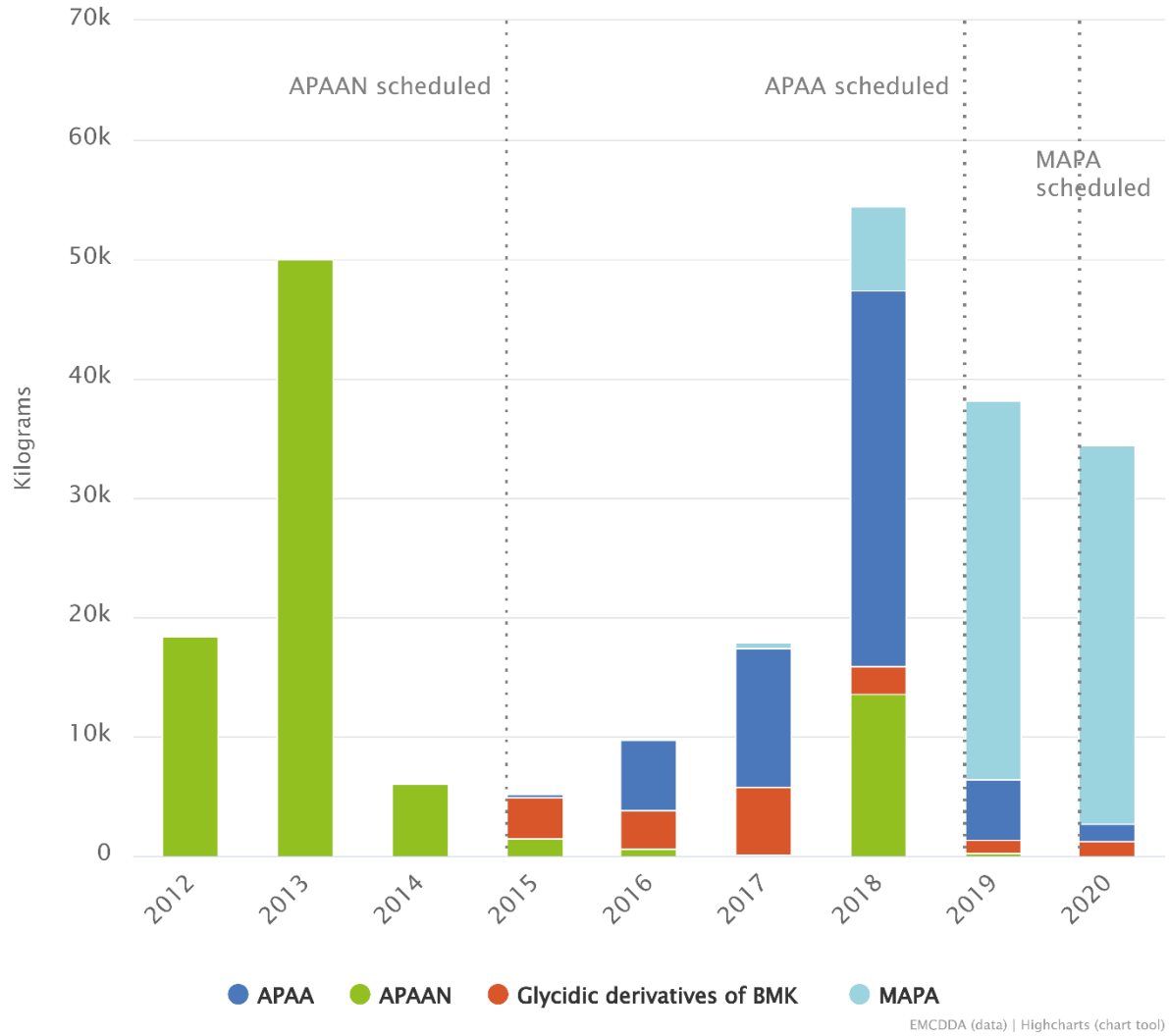
only difference being the starting material (the precursor), where BMK yields methamphetamine and PMK (piperonal methyl ketone, also known as methylenedioxyphenyl-2-propanone, ‘MDP-2-P’) yields MDMA.

In 2020, seven EU Member States seized close to 5 600 litres of BMK, most of which (75 %) was reported by the Netherlands (4 200 litres). These are globally relevant amounts, with only Mexico reporting larger seizures in 2020 (11 000 litres seized), according to the INCB (2020).

Importantly, these values need to be considered in the context of the close to 35 tonnes of various pre-precursor chemicals seized in the EU in 2020, which could be used to produce significant additional amounts of BMK, often in dedicated ‘conversion’ laboratories. These pre-precursors include APAAN, glycidic derivatives of BMK, APAA and MAPA, all of which were successively introduced in the market as soon as legal controls were applied to their predecessors (see Figure’ Quantity of designer precursors for the synthesis of BMK seized in Europe’). In 2020, five Member States reported combined pre-precursor seizures of over 1 tonne. These were Belgium (12 tonnes), Germany (almost 8 tonnes), Hungary (7 tonnes), the Netherlands (less than 7 tonnes) and France (1 tonne). Whenever the origin of the seizures was outside the EU (68 % of the quantity seized), the consignments originated in China (including Hong Kong) and were typically misdeclared as chemical industrial products or other commercial goods.

In Europe, the rapid replacement of pre-precursors has been particularly evident since 2011, when information exchange between international authorities was enhanced, leading to more effective precursor diversion control worldwide (EMCDDA, 2019a). To avoid disruptions to the steady supply of precursors for illicit laboratories, producers quickly changed from the scheduled precursor BMK to APAAN, which then became one of the most seized pre-precursors from 2012 to 2014. The scheduling of APAAN in 2014 led to the appearance of glycidic derivatives of BMK, quickly followed by APAA which took the lead in seizures from 2016 to 2018. APAA was scheduled in 2019, leading to the emergence and prevalence of MAPA in seizures during 2019 and 2020. MAPA was then scheduled in late 2020, and in that same year, EAPA (the ethyl analogue of MAPA) was seized for the first time in Europe. These data illustrate the ingenuity and adaptability of synthetic drug producers: the declining seizures of one pre-precursor are accompanied by the concomitant rise of another (see Figure ‘Quantity of designer precursors for the synthesis of BMK seized in Europe’).

Quantity of designer precursors for the synthesis of BMK seized in Europe, 2012-2020



Source: European Commission. The source data for this graphic is available in the source table on this page.

The availability of BMK and BMK precursor alternatives in Europe, although important, only provides an indication of the overall capacity to produce amphetamine-based stimulants. However, the manufacture of methamphetamine requires additional production steps, the chemicals required for which can provide more information on the trends and scale of methamphetamine production in Europe.

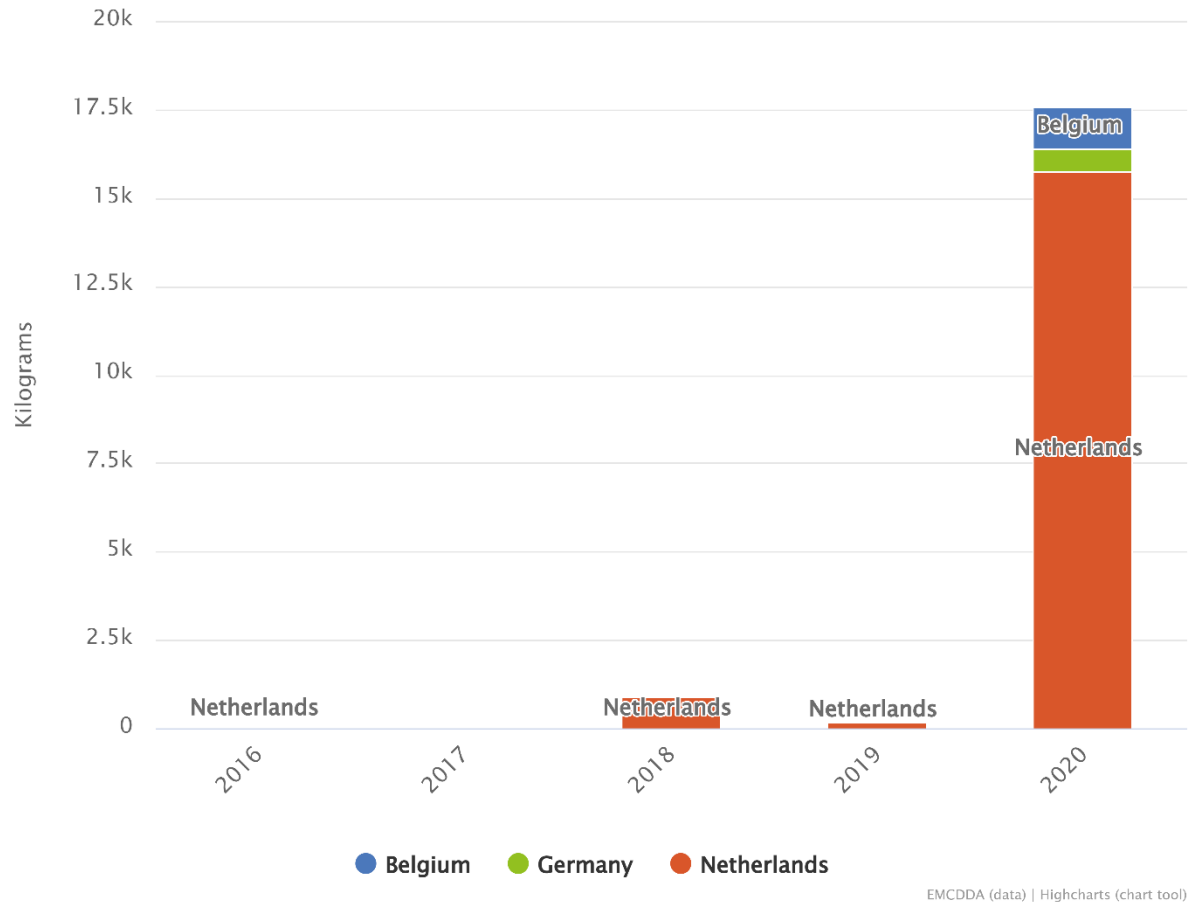
BMK methods produce 50:50 mixtures of d- and l-isomers of methamphetamine (a racemic mixture) (Maxwell and Brecht, 2011). To extract d-methamphetamine from the mixture, it can be treated with an ‘optically pure’ substance, and typically tartaric acid is used. This process is called ‘resolution’ and reduces the overall yields of the synthesis to 50 %. This type of separation process is well known to Mexican synthetic drug producers, and tartaric acid has been seized in association with drug production in Mexico since at least 2009 (INCB, 2019).

In 2020, almost 18 tonnes of tartaric acid was seized in Europe, (see Figure ‘Quantity of tartaric acid seized in Europe’). Theoretically, this would be enough to separate up to 36 tonnes of a racemic mixture of methamphetamine, resulting in a potential yield of up to 18 tonnes of d-methamphetamine.

These data confirm what has been found in illicit laboratories: that large quantities of methamphetamine are being produced in Europe in industrial-scale laboratories, using methods associated with Mexican methamphetamine producers.

Large seizures in 2020 of the methamphetamine-specific adulterant, methylsulfonylmethane, provide additional evidence of an increase in the processing of the drug in Europe that year. Methylsulfonylmethane (also known as methyl sulphone or dimethyl sulphone) is ideally suited to adulterate crystal methamphetamine because, during processing as the mixture recrystallises, it resembles pure crystal methamphetamine (EMCDDA and Europol, 2016). Seizures of methylsulphfonylmethane were rarely reported in the European database of precursors until 2020, when the Netherlands reported four seizures totalling more than 2 tonnes; the large majority of which appears to have been made in a single seizure at an illicit laboratory.

Quantity of tartaric acid seized in Europe, 2016–2020



Source: European Commission. The source data for this graphic is available in the source table on this page.

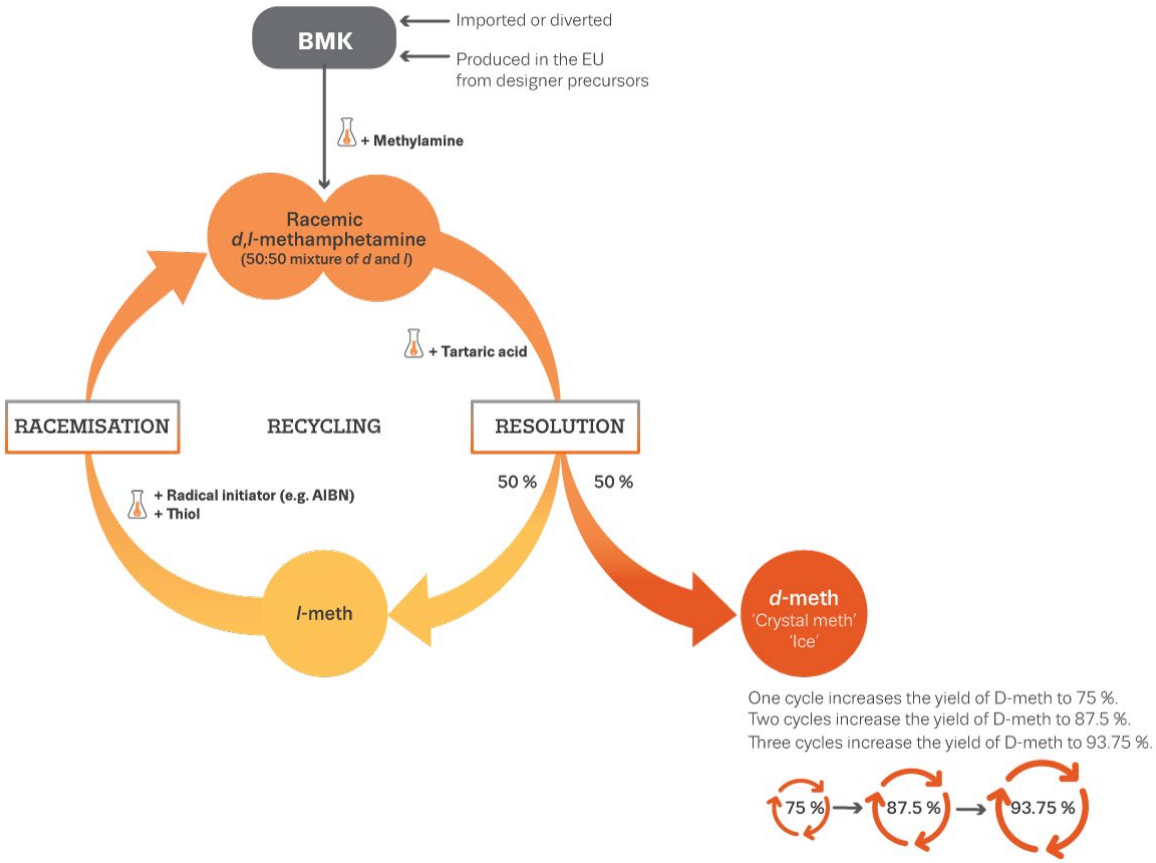
Recycling unwanted by-product: a game-changer in methamphetamine production

Previously, when the d-methamphetamine was separated using tartaric acid, the leftover material containing the l-isomer was regarded as an unwanted by-product to be discarded. Illustrating the continuous drive to improve efficiency and profits, illicit drug producers in Europe have introduced new methods to reconvert these discarded solutions back to a racemic 50:50 mixture of d- and l-methamphetamine, from which the d-methamphetamine can be separated using tartaric acid. These recycling procedures explain the record quantities of tartaric acid seized in Europe (see Figure Quantity of tartaric acid seized in Europe).

This process can be repeated several times: each time a fraction with the unwanted l-methamphetamine is produced, it can be reconverted ('racemised') back to a mixture and the d-isomer separated until the waste cannot be further recycled. The process, called 'RRR' (resolution-racemisation-recycling) (see Figure 'Processing of methamphetamine: resolution-racemisation-recycling'), is a standard technique used in the pharmaceutical industry to increase production yields of medicines where only one isomer is pharmaceutically active (Astleford and Weigel, 1997). The RRR technique increases the yield of d-methamphetamine from BMK from 50 % to 75 % after one iteration, up to 87.5 % on the second iteration and 93.75 % by the third. The racemisation of the discarded solutions of l-methamphetamine is triggered using small amounts of a chemical such as AIBN (or another radical initiator) and a source of thiyl radicals (for example methyl thioglycolate, thioglycolic acid or dimyristyl peroxydicarbonate) (Escoubet et al., 2006; Yerande et al., 2014). AIBN has a low decomposition temperature, can easily ignite and its use presents a risk of explosion (National Center for Biotechnology Information, 2022).

Data reported to the European Commission indicates that in 2020, 327 kilograms of AIBN, 525 kilograms of methyl thioglycolate, 248 kilograms of dimyristyl peroxydicarbonate and 2.5 litres of thioglycolic acid were seized in Europe. Partial data available for 2021 indicate seizures of 19 kilograms of AIBN, 90 kilograms of methyl thioglycolate, 139 kilograms of dimyristyl peroxydicarbonate and 20 litres of thioglycolic acid. All seizures occurred in the Netherlands and some were seized during the dismantling of illicit laboratories. Information reported by Dutch police to the EMCDDA indicates that at least one shipment of 13 kilograms of AIBN in 2021 originated in Mexico. As well as indicating the level of sophistication involved, bearing in mind that these reagents are required in small amounts (relative to the quantity of methamphetamine being treated), the quantities seized provide further evidence of the scale of methamphetamine production using BMK methods in Europe. They also show that combining the expertise of Mexican and Dutch drug producers and applying techniques from the pharmaceutical industry has maximised production efficiency.

Processing of methamphetamine: resolution-racemisation-recycling



Ephedrine/pseudoephedrine methods, typically used in Czechia

Until the advent of methamphetamine production based on BMK in the Netherlands and Belgium, European production of methamphetamine was mostly based on ephedrine or pseudoephedrine precursors; this is still the method typically found in small- to medium-sized laboratories in Czechia and neighbouring countries (most often using the ‘Nagai method’) and also involves the use of iodine and red phosphorous. When in powder form, these precursors are regulated at international and EU level, but they can also be obtained from over-the-counter medicinal products, which takes them out of the scope of precursor legislation (Council of the European Union, 2013), and presents challenges for enforcement. Restrictions have been put in place to tackle multiple purchases of the medicines at national level in Czechia and more recently Germany and Poland, but the lack of a harmonised approach at EU level often results in trafficking from countries with less stringent regulations to those where production occurs (or from outside the EU).

Ephedrine and pseudoephedrine can be chemically reduced using a variety of agents ([3]). Starting from ephedrine or pseudoephedrine has the advantage that the product obtained is d-methamphetamine, so there is no need to go through the RRR process. However, there are several factors that make this method difficult to scale up, including challenges in obtaining the bulk precursor or the strictly controlled medicines; extracting sufficient quantities of precursor from the medicines; safely controlling the chemical reactions to avoid explosions; and obtaining good enough yields after the purification and crystallisation processes. Hence, production via this method in Europe usually operates at capacities less than 50 grams (see Section Methamphetamine production facilities dismantled in the EU).

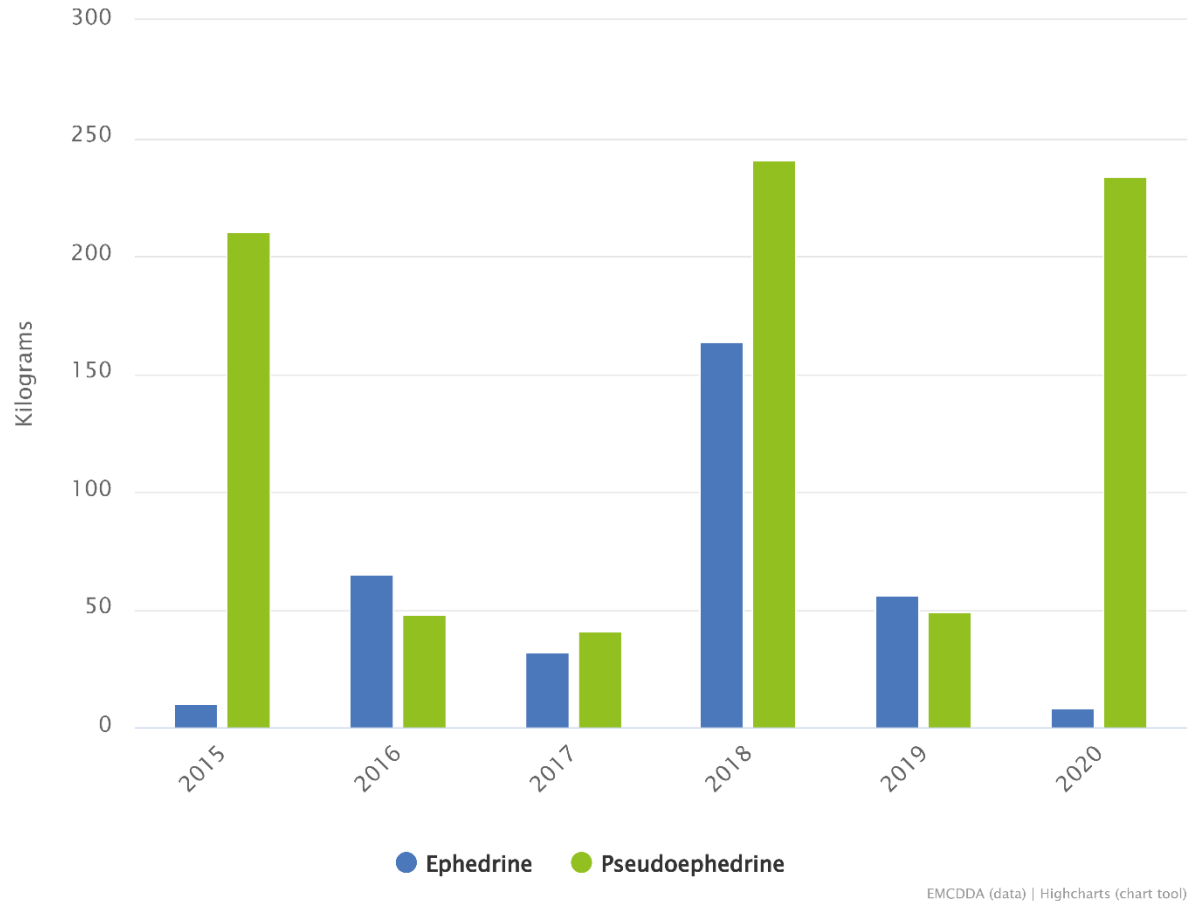
In 2020, 38 seizures amounting to 8 kilograms of ephedrine and 107 seizures amounting to 234 kilograms of pseudoephedrine were reported by 12 Member States. Poland seized close to 70 % of the EU total, which included pseudoephedrine preparations, i.e. medicines (mostly shipped from the United Kingdom) and pseudoephedrine raw material, i.e. powder (reported as intra-EU trade). In 2019, two thefts of pseudoephedrine (raw material and hydrochloride) amounting to 536 kilograms were reported by Germany, indicating that attempts to obtain pseudoephedrine for methamphetamine production go beyond trafficking and diversion.

In 2020, seizures of other chemicals associated with the production of methamphetamine from ephedrine and pseudoephedrine, including red phosphorus, iodine, hydriodic acid, hypophosphorous acid and phosphorous acid, were typically modest and made at local level. Action to prevent the diversion of red phosphorus for methamphetamine production was taken in 2020, when it was added to the EU regulations governing drug precursors (Council of the European Union, 2020). In some incidents, seizures were made in small methamphetamine laboratories in Czechia, but also in Germany, Italy, the Netherlands, Austria and Slovakia.

The available data on the number of seizures and the quantities of ephedrine, pseudoephedrine and associated chemicals seized in Europe did not change significantly from 2015 to 2020, beyond the expected natural fluctuations (see Figure ‘Quantities of ephedrine and pseudoephedrine seized in Europe’), despite the large increases in seizures of methamphetamine in Europe. This supports the view that the current ‘creeping’ market expansion is not related to the ephedrine/pseudoephedrine method, but rather the BMK methods.

([3]) These typically include non-metal reductions using hydriodic acid and red phosphorus, metal reductions such as the ‘Birch’ reduction, or reductions using palladium or platinum heterogeneous catalysis (‘Emde method’). Additional reduction methods exist but are rarely encountered (UNODC, 2006).

Quantities of ephedrine and pseudoephedrine seized in Europe, 2015-2020



Source: European Commission. The source data for this graphic is available in the source table on this page.

Drug waste: environmental damage, risks and costs

Synthetic drug production poses a number of possible hazards. In the last few years, a number of fatalities have been recorded in synthetic drug production laboratories in the Netherlands and Belgium due to fires or explosions (van den Berg, 2021) or suffocation from carbon monoxide or other toxic fumes caused by the production process (Steenberghe, 2020). A scientific review of cases of exposure to chemicals in illicit drug laboratories linked the exposure not only to mild or moderate respiratory, ocular and dermal effects, but also to severe symptoms and fatalities (Koppen et al., 2022). As with all synthetic drug production, the manufacture of methamphetamine does not just pose hazards to those involved in production; it also leads to the generation of chemical waste products, which are typically dumped away from the production site (but within a reasonable radius). Given the location of many laboratories, this can mean in a neighbouring country, such as Belgium, Germany or the Netherlands. Europol information also suggests that people that supply clean chemicals to illicit laboratories may collect the waste for disposal at locations far from the production zone. Such techniques can frustrate efforts to

identify production sites and present collateral risks for the environment and people involved.

One kilogram of methamphetamine produced using the red phosphorus method generates 5-6 kilograms of waste (Europol, 2019). Waste is also produced when methamphetamine is produced from BMK, and when BMK is produced from designer precursors. This results in environmental damage, health risks and high clean-up costs. A variety of methods are used to dispose of the large quantities of chemical waste created during synthetic drug production. For example, the waste may be simply poured down the sink or toilet, although this is likely to be rare, as the waste can be corrosive or so viscous that it would block the drains. If chemical waste is disposed of in this way, it may affect the quality of drinking water or adversely affect municipal wastewater treatment plants (Schoenmakers et al., 2016). More commonly, members of the public report containers of waste dumped in the countryside, and there have also been instances where waste has been found buried underground. Waste can also be left in abandoned property or loaded into stolen vans or lorry trailers, which may then be set on fire to conceal forensic evidence. More elaborate methods have been found, including the use of modified vans that pump waste onto road surfaces. Six dumping sites specifically related to methamphetamine were reported in 2020 two in Belgium, related to dumping of equipment, and four in the Netherlands. Since methamphetamine in those countries is mainly produced using BMK, it is not always possible to determine whether the dump sites are related to amphetamine or methamphetamine production.

Knowledge of the mechanisms and extent of environmental damage related to synthetic drug production is fragmented and this is an under-researched area. While there are stand-alone studies on specific impacts, a more comprehensive and complete assessment of the environmental impact of synthetic drug production has not yet been done. Researchers in Czechia found that the presence of methamphetamine in wastewater leads to indications of dependence and behavioural changes among fish, disturbing mating habits and potentially impacting the aquatic ecosystem (Horký et al., 2021). A better understanding is needed of the impact of methamphetamine production waste and methamphetamine residues on biodiversity and the environment.

Methamphetamine and criminal networks in Europe — flexible, adaptable and resilient

Criminal networks active in methamphetamine production and trafficking in the EU rapidly adapt to regulatory changes aimed at curbing the methamphetamine trade. This includes circumventing legislative controls and adapting to the availability of precursors or pre-precursors, making it difficult for law enforcement to intervene in and disrupt methamphetamine production.

The high degree of adaptability of these criminal networks is reflected by the fluid and business-oriented nature of relationships established between actors engaged in various stages of the methamphetamine trade. The trade is fragmented and reliant on services of brokers facilitating connections between logistics suppliers, methamphetamine producers, transporters or distributors. Specialisation and outsourcing of tasks to brokers allows criminals more flexibility to engage in more business ventures.

Large-scale production of methamphetamine in the EU is furthered by a web of international connections providing access to logistical and transport infrastructure. European methamphetamine producers are increasingly outsourcing services such as the procurement of precursors and equipment, the disposing of waste generated during production, the transportation and distribution of methamphetamine across the globe, and the collection and laundering of drugs money. On occasion, the networks used by methamphetamine producers deliver end-to-end services or cover more than one step in the drug trafficking cycle.

Logistics: a parallel business supporting methamphetamine production

Drug precursors and related chemicals used in large-scale production of methamphetamine in western Europe are largely brought into the EU from China. While some long-standing networks in methamphetamine production are reported to largely manage their own precursor supply, other criminal networks appear to have taken on the role of independent logistics suppliers for synthetic drug producers in the EU. Some criminal groups have become specialised in providing methamphetamine producers all over the EU with precursors, related chemicals and equipment necessary for the production of the drug. Bulgarian and Polish networks operating across the EU are examples of this business fragmentation, as they service several different networks dealing specifically with methamphetamine production. Occasionally, such parallel networks deliver the full package (chemicals,

equipment and expertise) needed to set up and operate methamphetamine production facilities.

Medicines containing ephedrine or pseudoephedrine used for methamphetamine production in central Europe often appear to be sourced in large quantities from outside the EU, with Turkey, the United Kingdom and the Western Balkan region indicated as transit or source locations. On a smaller scale, these medicines are also sourced from within the EU. In some cases, precursors are partially processed in transit countries and then moved further for the final stages of methamphetamine production, which take place in Czechia, Poland or Slovakia.

Modi operandi

Criminal networks active in drugs trafficking often deal with several drugs, particularly at the middle-market and retail level, and use the same techniques to move illicit substances, including legal business structures, corrupt officials or port workers.

Methamphetamine shipments seized in the EU arrive through a number of different methods of transportation, such as via couriers by plane, in passenger cars or trucks, by train or ferry, or by parcel and post services, the latter often connected to methamphetamine sold online. Larger quantities of methamphetamine have been moved into the EU in maritime shipping containers (see Box ‘Operation PONTON’) or air cargo.

Operation PONTON

In May 2020, Slovakian police seized 1.5 tonnes of crystal methamphetamine concealed in two pontoons. The huge haul had been imported from Mexico and had transited the Port of Rijeka in Croatia. Had it not been intercepted, the shipment would have been sent first to Poland and then to its final destination, Australia. The meticulous international investigation that followed revealed a complex operation involving a front company set up in Slovakia using a Hungarian national to conceal the identities of the Dutch criminals behind the scheme. The pontoons, specifically designed so the drugs would not be detected during border inspections, had been custom-made in the Netherlands and stored in Greece before being sent to Mexico using an intermediary company based in Bulgaria. The perpetrators used various encrypted applications to communicate with each other throughout.

The organisers of the importation have been arrested and an international investigation involving Europol, Interpol and the US Drug Enforcement Administration is ongoing.

Source: Ministry of Interior of the Slovak Republic

Use of postal systems and parcel services

Postal systems and parcel delivery services are exploited by criminals engaged in the international trafficking of methamphetamine. Owing to the extremely high volume of post and parcel shipments dispatched on a daily basis, small consignments are not likely to be detected. Contactless payments for illicit drugs have been increasing, with the COVID-19 pandemic likely further accelerating the volumes of illicit commodities distributed via post and parcel services (Europol, 2021). In 2020, methamphetamine was one of the drugs most often seized in postal consignments (Pompidou Group, Council of Europe and WCO, 2021).

The use of postal systems and parcel services for the distribution of methamphetamine is reported in several EU Member States that were either destination or transit countries for the packages containing drugs. Similar to other types of drugs, methamphetamine remains available to consumers on the darknet; purchases made there are generally facilitated by mail courier and shipping services, with the drug packages often sent to anonymous office boxes for self-service collection (UNODC, 2021).

Concealment methods

Comprehensive information regarding the different concealment methods used for the wholesale trafficking of methamphetamine into the EU is not available. However, case-level information suggests that criminals display a high degree of creativity when hiding drugs. The large-scale smuggling of methamphetamine from Mexico to the EU (most likely in transit to non-EU markets) is believed to be largely based on concealment in legitimate goods transported in maritime shipping containers (see Box Operation PONTON). Several cases have demonstrated the lengths to which criminal networks will go to smuggle large quantities of methamphetamine. For example, in 2020, Spanish law enforcement agencies, recovered 752 kilograms of methamphetamine from two large blocks of marble imported from Mexico (see video by Novelda digital). The drug had been placed in plastic pipes inserted in cylindrical cavities made in the 25-tonne marble blocks, 28 of which were imported, 26 without drug concealments (Guardia Civil, 2020). Establishing legal business structures is a key factor for enabling the concealment of drugs in such legitimate loads.

Methamphetamine prices and purities

Retail prices and purities highlight product diversity

Given the relatively low prevalence of methamphetamine on European drug markets, not all countries report retail prices, and for the countries with data, there is a considerable range: from EUR 13.50 per gram in Hungary to EUR 113 per gram in Cyprus (in 2020). Some of that price disparity is related to the type of methamphetamine on offer, with the powder product generally being cheaper and of lower purity and the crystal methamphetamine usually being more expensive and of higher purity.

Analysis of darknet market data on methamphetamine sourced in Europe in 2020 reveals that when purchased by the gram, the typical price is EUR 55 (n = 143, range EUR 10 to EUR 100). However, when between 5 and 100 grams are purchased in a single transaction, the typical price per gram falls to EUR 20, regardless of whether the purchase quantity is 5 grams (n = 108), 10 grams (n = 105), 50 grams (n = 88) or 100 grams (n = 95).

Wholesale prices indicate the efficiencies of large-scale production

Data on wholesale (per kilogram) prices from non-darknet sources are also limited. In Czechia, 1 kilogram of locally produced methamphetamine costs between EUR 18 900 and EUR 21 200, while methamphetamine imported from the Netherlands commands a price of between EUR 15 100 and EUR 17 000 when sold on the Czech drug market (Police of the Czech Republic, 2021), indicating that the local product, typically made from extracted medicines, is more desirable. Dutch law enforcement reports that the wholesale price of methamphetamine dropped by almost 40 %, from an average of EUR 12 750 in 2019 to EUR 7 675 per kilogram in 2020 (Politie, 2021a, 2021b).

The price of methamphetamine on some international markets such as Australia, Japan and New Zealand is considerably higher than in Europe, making these destinations an attractive proposition for European producers. For example, in Australia in 2020, the average price of 1 kilogram of methamphetamine was between EUR 175 000 and EUR 217 000 (AUD 290 000 and 360 000). In New Zealand, the typical wholesale price was EUR 102 000 (NZD 180 000), with an upper price of EUR 171 000 (NZD 300 000). Although the wholesale price was not available for Japan in 2020, the retail price of 1 gram of methamphetamine was approximately EUR 492 (JPY 60 000).

On darknet markets in 2020, 32 listings were identified, purporting to ship from Europe, that offered 1 kilogram or more, and the typical price per kilogram was EUR 14 000 (range EUR 7 250 to EUR 24 250).

Interpreting methamphetamine purity data is challenging because it is not always reported whether the samples are of powder or crystal methamphetamine. In some cases, clear differences can be noted between the markets in different countries. In countries where powder methamphetamine is the main product on the market, the average purities are generally quite low and the converse is true in countries where crystal methamphetamine predominates. For example, in Estonia and Latvia, the average reported methamphetamine purity is generally low, between 16 % and 26 % in 2020, reflecting that methamphetamine powder is the main product in those countries. Czechia, France and the Netherlands reported purities between 65 % and 85 % in 2020, indicating a market dominated by crystal methamphetamine.

Signals of spreading methamphetamine use in Europe

Methamphetamine use in Europe is much lower than in other regions of the world, and is generally concentrated in Czechia and Slovakia. Three EU Member States have recent estimates of high-risk methamphetamine use, ranging from 0.55 per 1 000 population (330 high-risk users) in Cyprus to 5.04 per 1 000 (34 600 high-risk users) in Czechia (EMCDDA, 2021a). According to estimates by the Czech authorities, 6.5 tonnes of methamphetamine is produced annually in Czechia, with this quantity, excluding amounts seized by law enforcement, believed to be consumed by users in and around Czechia.

Monitoring the methamphetamine situation is complicated by the different forms of the drug available and patterns of use. Methamphetamine powder is a mixture of finely ground methamphetamine hydrochloride and other ingredients, such as lactose, dextrose or caffeine, that is taken orally or nasally, or less commonly injected. Large crystals of highly pure methamphetamine hydrochloride, known as ‘ice’ or ‘crystal meth’ suitable for smoking, are also available, although this is a less commonly reported route of administration. Most harms are associated with intensive, high-dose or long-term consumption, and injection and smoking present particular challenges. Some men who have sex with men (MSM) engage in ‘chemsex’, which may involve injecting methamphetamine to enhance sexual pleasure and, while apparently uncommon, this practice has been reported in a number of major European cities. Hence, methamphetamine may be used in a recreational or functional context, but also in a high-risk manner.

Although methamphetamine remains much less commonly used than amphetamine and cocaine in Europe, there are signs of increasing use in some countries. Information from drug consumption rooms in Barcelona and Oslo has signalled an increase in the use of methamphetamine (smoking and injecting) among their clients ([4]). In Athens, there have also been reports of a growing problem of ‘sisa’ (crystal methamphetamine) use. Overall, there have been concerns over recent years that methamphetamine use may be spreading to other parts of Europe where it has been less common.

Work to assess the impact of COVID-19 on methamphetamine use has suggested that it may have also become more popular in some user groups. This includes some groups of people who inject drugs in Ireland and Spain, and among those involved in the chemsex scene in Portugal (Chone et al., 2021). Methamphetamine does not figure prominently in data from 10 sentinel hospitals providing data on drug-

([4]) Information from EMCDDA focus groups with drug consumption room staff, January 2021.

related hospital emergency presentations. A slight drop was seen in acute drug toxicity presentations of methamphetamine in 2020 compared with 2019, but the overall low number of methamphetamine reports makes this observation difficult to generalise (EMCDDA, 2021d).

Methamphetamine presents a unique set of effects and harms

Methamphetamine use is associated with a range of physical and mental health problems, and the form of the drug and choice of route of administration strongly influences the harms experienced by the user. Methamphetamine causes hypertension and tachycardia and creates feelings of increased confidence, sociability and energy. It suppresses appetite and fatigue and leads to insomnia. Following oral use, the effects usually start within 30 minutes and last for many hours. As the effects wear off, users may feel irritable, restless, anxious, depressed and lethargic.

Fatalities directly attributed to methamphetamine are rare, but acute intoxication causes serious cardiovascular disturbances as well as behavioural problems that include agitation, confusion, paranoia, impulsivity and violence. Chronic use of methamphetamine causes neurochemical and neuroanatomical changes. Dependence — as shown by increased tolerance — results in deficits in memory, decision-making and verbal reasoning, and some of the symptoms resemble those of paranoid schizophrenia. These effects may outlast drug use, although often they eventually resolve themselves.

Methamphetamine has a higher potency than amphetamine, but the effects are almost indistinguishable when orally ingested, since methamphetamine is converted to amphetamine in the body.

When methamphetamine is smoked it reaches the brain much more quickly than by oral or nasal administration. Routes of administration that result in rapid bio-availability of a drug, such as smoking or injection, tend to be associated with greater risk of developing dependence or other health problems. Injection of methamphetamine carries the same viral infection hazards (e.g. HIV and viral hepatitis infection) as other injectable drugs such as heroin. Injection also delivers the drug quickly to the brain, though not as quickly as smoking, and also leads to dependence (EMCDDA, no date).

Injection is the most common route of administration used by high-risk users in Czechia and Slovakia, presenting an increased risk of transmission of viral infections such as hepatitis C and HIV. Methamphetamine smoking is associated with particular problems for users' health, including respiratory damage and dental

corrosion. In some drug markets, Norway for example, methamphetamine is present alongside amphetamine and users may be unaware which of the two substances they are using. Methamphetamine is used in recreational settings in some countries.

Methamphetamine may be used to increase self-esteem and feelings of acceptance and attractiveness (Haltikis et al., 2001); it is also used for its disinhibitory qualities and ability to prolong sexual pleasure and activity and to enhance the perceived quality of sex (Weatherburn et al., 2017). Use of the drug on its own or in association with other substances in a sexual context may increase high-risk sexual behaviours like having unprotected sex, multiple sexual partners and rougher sexual activities. The injection of stimulant drugs in a sexual context, known as ‘slamming’, may involve additional risky practices, such as reusing or sharing syringes, that contribute to the transmission of blood-borne viruses (OFDT, 2017).

A study published in 2022 about a survey conducted in Germany between August 2016 and January 2017 among MSM with drug experiences (N = 597) showed that 13.8 % used methamphetamine during the past 12 months (6.6 % during the past 30 days). Moreover, according to the answers on the substances used and the context of use, the authors distinguished four different patterns of use: ‘poppers only’, ‘club-druggers’, ‘chemsex-users’ and ‘polyvalent users’. Following this categorisation, methamphetamine use in a sexual context was reported by 53 % of ‘chemsex-users’ and 56 % of ‘polyvalent users’ (Scholz-Hehn et al., 2022).

Methamphetamine possession and use offences

Looking into the reported offences of methamphetamine possession or use by all EMCDDA reporting countries (EU Member States, Norway and Turkey), a steep increase in cases was observed between 2015 and 2020. This increase is linked to a twentyfold increase reported by Turkey in this time interval (from 1 375 cases in 2015 to 28 089 cases in 2020). It has been reported that in Turkey, the use of MDMA, cocaine and cannabis significantly decreased during the COVID-19 lockdown while the use of methamphetamine increased significantly and continued afterwards. The researchers linked this to accessibility and low prices (Öztürk et al., 2022). Looking at the data from the EU Member States alone, this increasing trend is less pronounced, with an increased number of cases reported by Czechia, Germany and Austria. The number of reported methamphetamine possession or use cases dropped in most other EU Member States in 2020. However, data on drug law offences may reflect priorities, efforts and focus of law enforcement activities on certain phenomena in a given timeframe, which might explain this trend, particularly in light of the COVID-19 pandemic.

Methamphetamine market size estimate

It is difficult to estimate the size of the EU retail methamphetamine market because in some countries, it is not possible to separate methamphetamine from amphetamine in the relevant datasets. In addition, methamphetamine does not seem to have a significant user base in many EU countries. Even when data are available, making such estimates is notoriously difficult and involves making a number of assumptions. Different approaches can be taken, resulting in a wide range of estimates. Due to the prominent position of methamphetamine on the drug market in Czechia, sufficient data are available to allow estimates to be constructed; however, EU-wide estimates are not possible at present.

Demand estimate

Using the methodology established by the EMCDDA (2019b), an estimate of the retail market size is possible based on the number of users and their use patterns, the amount they use per year and the average price paid at retail level. Such estimates are, however, prone to underestimation due to misreporting and under-reporting of use (Udrisard et al., 2022). The number of problematic methamphetamine users in Czechia is available from standard data reporting (33 100). Based on general population surveys it is estimated that a further 13 486 adults use the drug frequently and 20 775 infrequently. In addition, a proportion of high-risk opioid users also use methamphetamine, accounting for a further 5 384 frequent users. The amount used annually and the average price per gram is taken from the European Web Survey on Drugs (EWSD) (60.44 gram/year for frequent users; 1.9 gram/year for infrequent users; retail price EUR 57.5 per gram):

- Problematic users: 33 100 users x 60.4 grams/user = 2 000 434 grams x EUR 57.5/gram = EUR 115.03 million (range EUR 77.79 million to EUR 146.20 million)

- Infrequent users: 20 775 users x 1.9 grams/user = 39 532 grams x EUR 57.5/gram = EUR 2.27 million

- Frequent users: 13 486 users x 60.4 grams/user = 815 013 grams x EUR 57.5/gram= EUR 46.86 million

- Opioid co-users: 5 384 users x 60.4 grams/user = 325 362 grams x EUR 57.5 = EUR 18.71 million

- Overall estimated retail market size: EUR 180.60 million in total (range EUR 122.60 million to EUR 228.90 million).

National market size estimate

According to the latest estimates from the national authorities, 6.5 tonnes of methamphetamine are produced annually in Czechia. Some of that production output will be exported to markets in neighbouring countries, but it is thought that a large proportion will remain for the domestic market. Using recent price data, if 50 % to 75 % of the product is sold at retail level, the annual retail market value would be estimated to be between EUR 166 million and EUR 332 million.

Based on data from an older study (Vopravil and Rossi, 2012), the estimated amount of methamphetamine consumed by high-risk users in Czechia was 183.6 grams per year. This

is considerably (three times) higher than that found in the EWSD. Applying that figure to the estimated 33 100 high-risk users implies a total quantity consumed by those users to be approximately 6 tonnes, with a retail value of approximately EUR 307 million.

Wastewater-based approach

Drug residue measurements in wastewater show some promise as a method to estimate city-level drug consumption (Van Nuijs et al., 2011), since the amount found in waste is directly related to the amount of drug consumed by the population served by the wastewater treatment plant. Considering the data for 2020, it is apparent that methamphetamine residues in Czechia are the highest recorded in any EU Member State, confirming data about consumption from other sources. Using wastewater is an attractive option, because it is an objective method underpinned by direct measurement of a marker related to consumption. However, it is not without its difficulties. Knowledge of several parameters is necessary: the stability of the analyte during transport to the wastewater treatment plant; the flow rate of the wastewater stream is needed to transform concentrations into mass loads; a correction factor to back-calculate from mass loads into an amount of used illicit drug (in mg/day), dependent on the relative amount of an illicit drug dose excreted as parent compound and/or metabolite; and the number of inhabitants that are served by the wastewater treatment plant.

In a study commissioned for this analysis (Udrisard et al., 2022), wastewater estimates were found to give different results, either higher or lower, than demand estimates, depending on the drug concerned. Estimates based on wastewater for amphetamine were noted to be 'very problematic', producing estimates far lower than the demand-based estimate. It was considered that the same issue would apply to methamphetamine; however, a comparison was not possible due to the absence of a demand-side estimate.

Interestingly, wastewater measurements from Germany, collected from 10 sites, suggest that methamphetamine use in Germany may be higher than previously thought. More research is needed to explore wastewater data more carefully and assess the utility of this information source for assisting the estimation of market size.

Treatment service data point to a slowly expanding market

The overall number of first-time treatment entrants for methamphetamine problems remains low in most EU Member States; however, a gradual increase has been observed since 2015 in most countries with available data. A total of 637 first-time entrants were reported in 2015 in 14 countries with available data, which increased to 797 entrants in 2020 (25 % increase) among these 14 countries. Czech data between 2016 and 2020 confirm high and increasing numbers of methamphetamine clients (599 entrants in 2016 and 1 287 in 2020). Slovakia remains the country with the second highest number of methamphetamine entrants (534 entrants in 2015 and 551 in 2020). The remaining 13 countries with available data between 2015 and 2020 show a gradual increase from 103 clients in 2015 to 246 in 2020, representing

a doubling during the period. Almost 80 % of these clients were reported by Austria, Belgium, Cyprus, Italy and Spain.

Overall, about 9 400 clients entering specialised drug treatment in Europe in 2020 reported methamphetamine as their primary drug, of whom about 4 200 were first-time clients. Four European countries account for more than 90 % of the treatment clients reporting methamphetamine as their main problem drug in 2020, namely Czechia, Germany, Slovakia and Turkey. Injecting is reported as the main route of administration by 33 % of first-time methamphetamine clients entering treatment; however, this figure is disproportionately influenced by Czechia (n=774) and Slovakia (n=146), which account for more than 95 % of first-time methamphetamine clients injecting the drug in Europe (EMCDDA, 2021a).

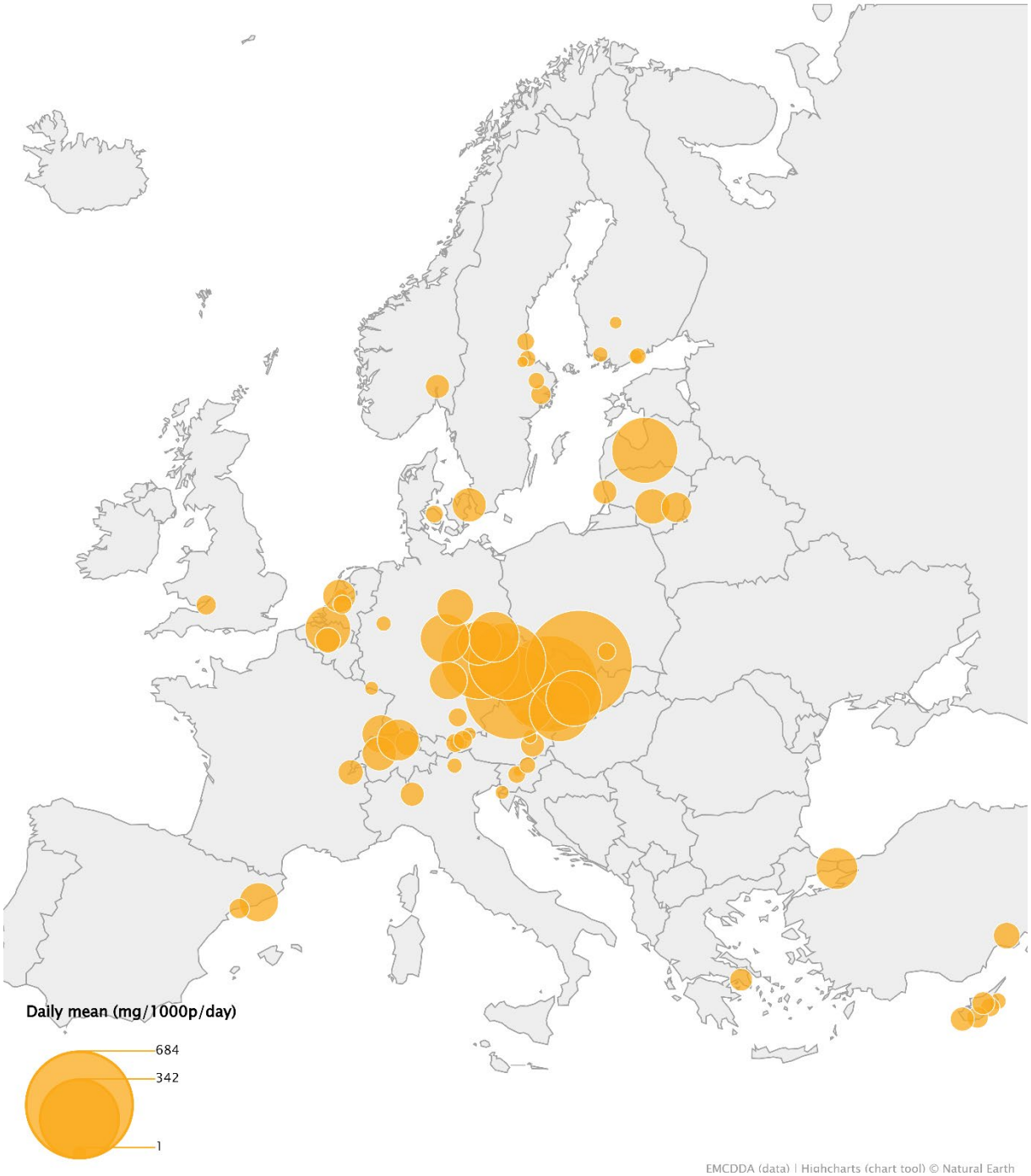
Latest treatment demand data on methamphetamine >>

Further insights about the role of methamphetamine in European consumer markets

Wastewater monitoring

Data from wastewater analyses conducted in European cities are useful to visualise the pattern of methamphetamine consumption across the continent; however, the coverage is not uniform across the EU (see Figure ‘Relative geographical distribution of methamphetamine metabolite as detected in European cities’). The latest data confirm that methamphetamine use is still concentrated in Czechia and Slovakia, but is also established in Belgium, Cyprus, the east of Germany, Spain, Turkey and also in northern Europe (Denmark, Finland, Latvia, Lithuania and Norway). In 2021, methamphetamine use was found to be distributed more evenly over the whole week, possibly reflecting the drug being associated with more regular consumption by a cohort of high-risk users (EMCDDA, 2021c). While the use of methamphetamine in Europe is relatively low, based on wastewater measurements, the consumer market may be larger than indicated by the prevalence and treatment demand data (See Box Methamphetamine market size estimate). Of the 58 cities with data on methamphetamine residues in municipal wastewater for 2020 and 2021, 27 reported an increase, 9 a stable situation and 22 a decrease. The 5 cities with the highest loads are all situated in Czechia, followed by cities in Latvia, Slovakia, Germany, the Netherlands, Belgium, Turkey, Estonia and Lithuania.

Relative geographical distribution of methamphetamine metabolite as detected in European cities, 2021 (daily mean)



The source data for this graphic is available in the source table on this page.

Latest wastewater data on methamphetamine >>

Syringe residue data

Data from a study on the analysis of drug residues in used syringes collected in needle and syringe exchange programmes in a small group of European cities (ESCAPE project) show that methamphetamine has been detected in used syringes in Amsterdam, Helsinki, Oslo, Paris, Prague, Riga and Vilnius (see Table 'Positivity rate of methamphetamine detected in syringes'). Data from Prague confirm information from treatment services that injection is a common route of administration. Only Paris and Helsinki have data available to enable analysis of trends in methamphetamine use. In Helsinki, a decrease in detection of methamphetamine in the syringes was noted; in Paris, a slight increase was noted between 2017 and 2019, followed by a slight decrease in 2020. However, additional data collected in Paris from sites not participating in the ESCAPE project suggest an increased presence of methamphetamine in the total number of syringes tested, probably related to injecting in a sexual context, especially among MSM. Likewise, in Amsterdam, the relatively high positivity rate in 2019 is due in part to the sampling campaign, which included collecting syringes from MSM, a group known to be more likely to use methamphetamine than other people who use drugs.

Latest data on syringe residue analysis >>

Positivity rate of methamphetamine detected in syringes (% syringes), 2017-2020

City	2017	2018	2019	2020
Amsterdam	0	0	68.38	–
Helsinki	47.89	24.81	9.79	8.33
Oslo	–	–	4.46	4.76
Paris	1.16	0	12.42	7.25
Prague	–	–	–	72.22
Riga	–	–	–	15.03
Vilnius	–	–	2.27	0

European Web Survey on Drugs (EWSD)

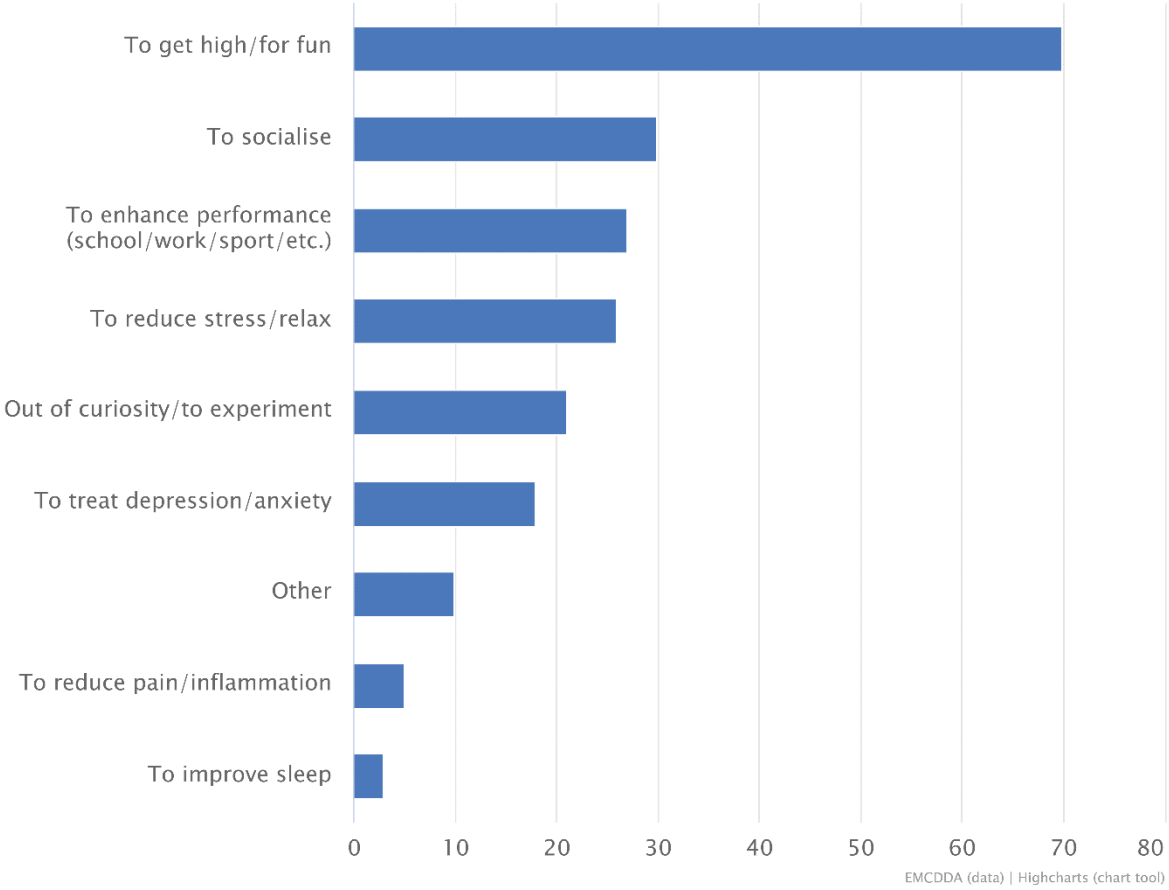
Web-based surveys can be a useful tool for collecting information on drug-related issues. They are quick and cheap to set up and can directly reach large numbers of people who use drugs. This means that they can paint a detailed and timely picture of drug use and drug markets and are a useful complement to traditional data-collection methods.

Across the 21 EU countries and Switzerland that were covered in the 2021 EWSD, 48 469 respondents reported having used drugs in the past 12 months. Of these, 4 488 reported the use of methamphetamine. The responses of this group provide insights into the retail market and consumption patterns in Europe for this drug.

A smaller subset of these respondents answered the question related to the form of methamphetamine used (N = 1 751). Most of those (92 %) reported that they consumed the drug in powder or crystal form, and 10 % reported the use of methamphetamine in tablet form. On average, respondents (N = 1 478) reported using 0.5 grams of the drug on a typical day of use.

The most common motivation for use of the drug was 'to get high/for fun', reported by 70 % of methamphetamine users (N = 1 751), followed by 'to socialise' (30 %) and 'to enhance performance (school/work/sport/etc.)' (27 %) (see Figure 'Motivations for methamphetamine use').

Motivations for methamphetamine use: In the last 12 months, why did you use methamphetamine? (2021)

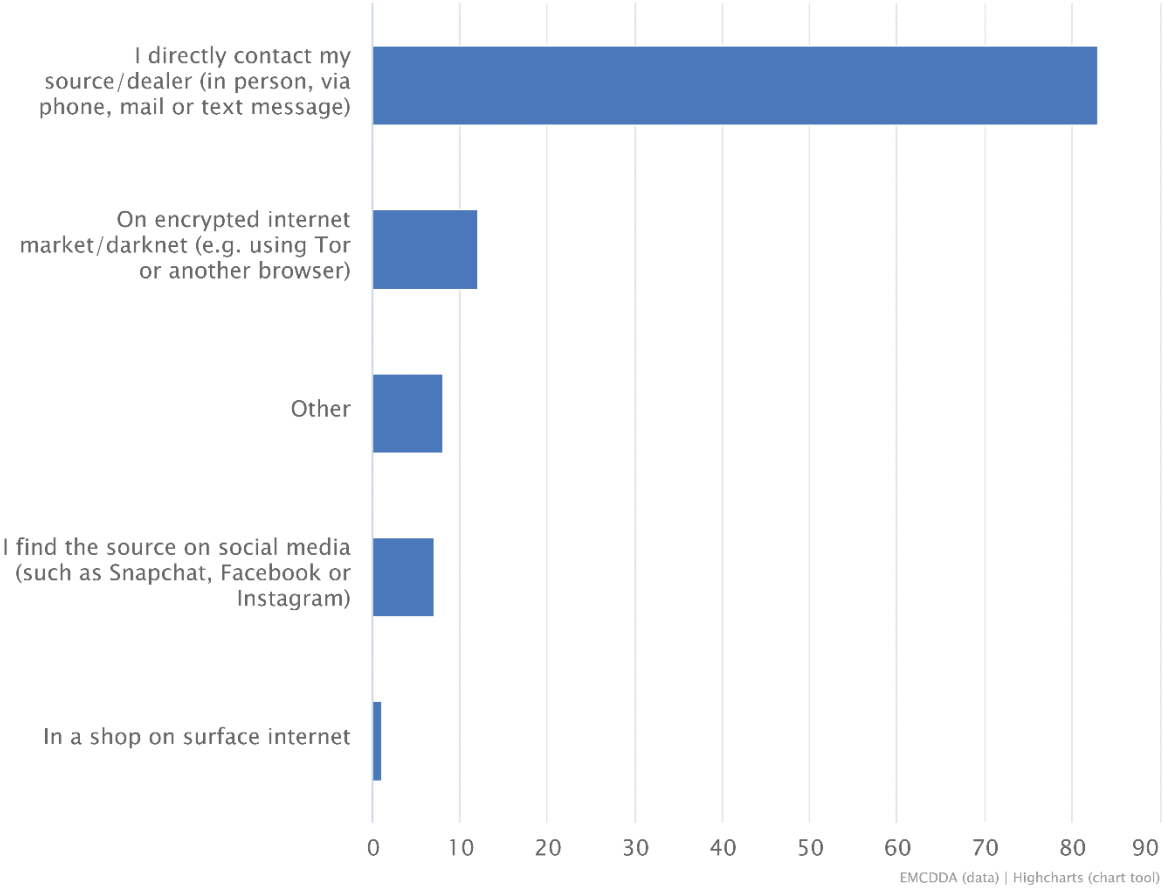


Source: European Web Survey on Drugs, 2021, n = 1 751, 21 EU countries and Switzerland ([5]). The source data for this graphic is available in the source table on this page.

A smaller number of respondents (1 088) also answered how they usually bought the drug and how it was usually delivered to them. The majority usually bought the drug

from a dealer (83 %), although some also reported using the darknet (12 %) and social media (7 %) as their sources (see Figure ‘Sources of acquiring methamphetamine’). The majority reported meeting their dealer as the usual delivery method (80 %), with the drug being delivered to their home in-person the second most common option (23 %) (see ‘Means of delivery of methamphetamine’). It was more common for respondents to report that the methamphetamine was delivered to a drop-off location without any contact (8 %) than receiving the drug through the regular postal service (4 %).

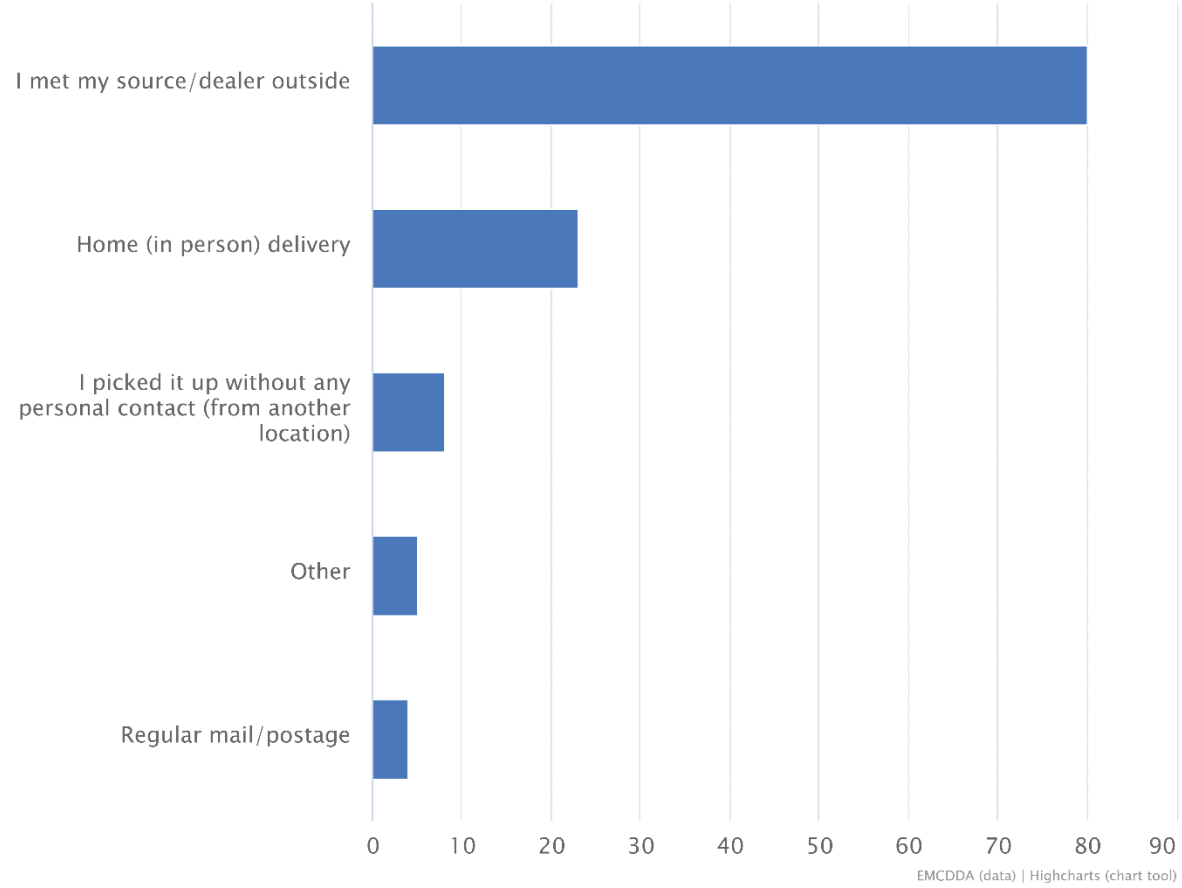
Sources of acquiring methamphetamine: In the last 12 months, how did you usually buy methamphetamine? (2021)



Source: European Web Survey on Drugs, 2021, *n* = 1 088, 21 EU countries and Switzerland ([5]). The source data for this graphic is available in the source table on this page.

([5]) '21 EU countries and Switzerland' includes: Austria, Bulgaria, Cyprus, Czechia, Estonia, Finland, Germany, Greece, Hungary, Ireland, Italy, Latvia, Lithuania, Luxembourg, Poland, Portugal, Romania, Slovakia, Slovenia, Spain and Sweden.

Means of delivery of methamphetamine: In the last 12 months, how is the methamphetamine usually delivered to you? (2021)



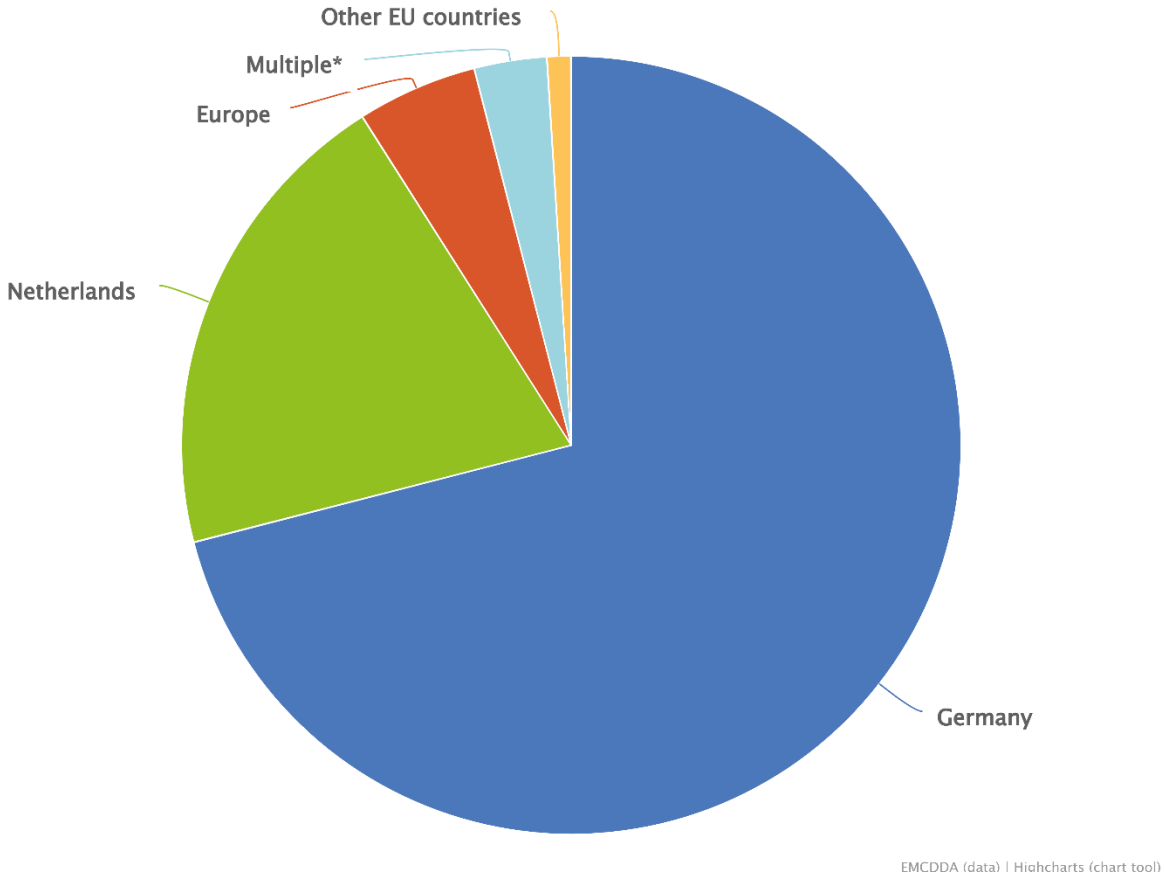
Source: European Web Survey on Drugs, 2021, *n* = 1 088, 21 EU countries and Switzerland ([5]). The source data for this graphic is available in the source table on this page.

Retail availability on darknet markets

European consumers can access methamphetamine on darknet markets. In 2020, analysis of several major darknet markets (6) identified 1 362 listings of methamphetamine reported as being shipped from an EU country. The available data suggest that most of those listings were for small quantities (between 0.5 and 10 grams) and originated from Germany (72 %) and the Netherlands (20 %) (Figure 'Reported EU shipping countries for methamphetamine listings on major darknet markets').

([6]) White House Market (*n* = 539), DarkMarket (*n* = 376), Versus Market (*n* = 251), DarkBay (*n* = 113), Square Market (*n* = 49), BitBazaar (*n* = 13), Empire Market (*n* = 10), Cypher Market (*n* = 8) and Yellow Brick Market (*n* = 3).

Reported EU shipping countries for methamphetamine listings on major darknet markets, 2020



Notes: * Multiple denotes where several EU countries are mentioned as shipping origin. Source: EMCDDA analysis based on Web-IQ data. The source data for this graphic is available in the source table on this page.

Darknet markets are just one digital outlet, and social media and legitimate e-commerce platforms are being increasingly misused for drug sales. Factors such as convenience of use for both vendors and buyers are driving the increasing popularity of these channels.

Actions to address current threats and increase preparedness

The global developments related to the production and trafficking of methamphetamine pose the threat that the substance becomes more available in Europe, bringing with it a complex set of health and security problems.

At the strategic level, four priority areas emerge.

- The rapid identification of trends in methamphetamine production, trafficking and use, in order to effectively address the associated health and social problems, including criminality.
- The reduction of methamphetamine production in the EU, its distribution in the EU and export to global markets.
- The disruption of methamphetamine flows into the EU and the transit of the drug to other markets.
- The strengthening of public health and policy responses.

To respond to the current and future threats, the following actions are required.

Improve the intelligence picture; monitoring and detection

- **Enhance the exchange of intelligence and operational information.** This requires strengthening the exchange of information between border guards, customs, and police at Member State level to enhance joint risk analysis. This includes information on seizures, illicit laboratories and production methods, including precursors, other chemicals and equipment. At EU-level such information should also be shared through the existing platforms, such as EMPACT.
- **Increase efforts to identify, map and profile criminal networks active in methamphetamine production, trafficking and distribution.** This will improve the tactical intelligence picture, facilitate the identification of high-risk criminal networks and high-value targets and support the prioritisation of operational resources.
- **Systematically monitor methamphetamine market-related violence and corruption,** which negatively impact the security of European citizens. To improve operational and strategic responses, it is important to understand better how criminal networks use corruption and violence to facilitate methamphetamine production, trafficking and distribution in the EU.
- **Invest in innovative approaches to support operational responses.** New technologies have the potential to improve our understanding of the methamphetamine market and support more effective operational responses.

Useful approaches include chemical profiling, satellite imagery and artificial intelligence.

- **Better understand methamphetamine flows** within the EU and Europe's role as a destination and transit zone for methamphetamine produced outside Europe, from countries such as Afghanistan, Nigeria, Iran and Mexico. It is also important to monitor the flow of methamphetamine produced in the EU to third countries, including conflict zones.
- **Increase forensic and toxicological capacity at both European and Member State level.** Current capacity is insufficient to provide timely and accurate analyses of the methamphetamine market in Europe. Monitoring systems need to develop the capacity to report the form of methamphetamine (powder, crystal and liquid) and the route of administration (inhalation, smoking and injection). Methamphetamine and amphetamine must be clearly distinguished in all data sets.
- **Strengthen the capacity to rapidly identify and follow up on emerging threats.** A proactive approach is needed to rapidly identify and follow up on signals of increased methamphetamine availability and use. This will require a multi-indicator approach incorporating both established statistical data e.g. seizures, price and purity, law enforcement intelligence and new, more innovative monitoring methods, such as wastewater analysis, hospital emergencies, syringe residue analysis, drug checking and monitoring of darknet markets and other online supply channels.

Strengthen responses to reduce supply and enhance security

- **Strengthen operational responses through priority actions against key criminal actors.** Enhance cooperation and coordinated efforts by making full use of EMPACT and other European instruments that support cooperation such as operational task forces and joint investigation teams, pooling the resources of national authorities, EU agencies and participating strategic partners.
- **Target key entry points for trafficking methamphetamine.** Focus on maritime routes from Latin America, airports with connections to known production zones and on postal parcel traffic. Specific actions should be implemented on the Balkan route, to prevent the establishment of a methamphetamine supply line to Europe. The most effective screening technologies for the detection of methamphetamine and drug precursors in containers, vehicles and ships should be deployed at key locations.
- **Target key EU locations for methamphetamine production.** Authorities in the main production hubs must be supported to tackle production and prevent

displacement to other Member States. In particular, efforts must be made to prevent the transfer of specialist knowledge and expertise needed for the large-scale production of methamphetamine.

- **Disrupt criminal business models.** Financial investigations into money laundering conducted in parallel with investigations into methamphetamine production and trafficking operations provide opportunities to disrupt criminal enterprises. Particular attention needs to be paid to the criminal use of legal business structures to facilitate the trafficking of methamphetamine and to obtain the chemicals or equipment needed for production.
- **Target the supply of precursors and equipment used in methamphetamine production in the EU.** There is a need to prioritise operations that target the supply of precursors and other chemicals and equipment used to produce methamphetamine. A specific focus should be placed on the chemicals associated with large-scale production in the EU. In addition, it is important to target independent brokers and criminal networks providing specialised logistics and other services that facilitate production.
- **Strengthen public-private partnerships** to raise the awareness of methamphetamine risks, working with companies in the legitimate logistics sector, the chemicals industry and with equipment suppliers. Companies should be enabled and encouraged to report suspicious activities and to implement targeted preventive measures, such as know your customer initiatives.

Strengthen international cooperation

- **Further enhance international cooperation between the Member States, the EU, and key international stakeholders** working to reduce the supply of methamphetamine, precursors and other essential chemicals. The cooperation should be based on active engagement combined with an intensified exchange of operational and strategic information.
- **Initiate multilateral investigations into criminal networks trafficking methamphetamine and precursors into the EU.** Closer cooperation with trusted partners in methamphetamine-producing regions is needed. Special attention and priority should be given to cooperation with the UN system, the US, Latin American countries (particularly Mexico), as well as China and India.
- **Intensify cooperation efforts with countries on heroin trafficking routes to Europe.** The strong supply reduction partnership that has been established between the EU and Turkey focused on restricting drug flows on the Balkan route should be expanded to address methamphetamine-related threats. In addition, efforts should be made to engage countries neighbouring

Afghanistan and countries on the northern and southern heroin trafficking routes.

Investment in capacity-building

- **Increase the awareness of threats related to methamphetamine.** Raise awareness and provide training for border guards, customs and police focused on the routes and modi operandi used for trafficking methamphetamine and precursors. In particular, the risk of smuggling methamphetamine or ephedrine in liquid form should be highlighted.
- **Support the forensic analysis and chemical profiling of methamphetamine seizures.** Greater efforts are needed to harmonise the routine forensic analysis of methamphetamine seizures in Europe. The transfer of samples for chemical profiling should be facilitated by the Member States with a view to improve the intelligence picture, determine production methods and, potentially, the origin of the drug.
- **Increase capacities to safely dismantle sites related to methamphetamine production.** Training and access to specialised equipment is needed for law enforcement and other first responders in order to manage the safety risks at locations related to production, including illicit laboratories, chemical storage and waste dump sites.

Strengthen policy, public health and safety responses

- **Increase awareness of methamphetamine threats at policy level.** Awareness raising is needed to increase the preparedness of Member States to respond to methamphetamine-related threats. Support to policy at Member State level could be provided through threat assessments, targeted rapid alerts and risk communications in order to implement multi-disciplinary national and local action plans.
- **Develop prevention, harm reduction and treatment responses.** Identify evidence-based approaches to prevention, treatment and harm reduction, tailored to the needs of those who use methamphetamine. This includes measures to reduce the risk of overdose, infectious disease and mental health disorders. Prevention and harm reduction messages and interventions need to specifically address the risks associated with injecting, and smoking the crystal form of the drug.
- **Enhance the understanding and awareness of the environmental impacts of methamphetamine production.** Develop strategies and actions to address the environmental impact such as pollution, hazards to health and economic costs associated with cleaning contaminated sites and disposal of chemical waste.

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Methodology

Methodology: Read more about the methodology used to collect data for this analysis.

Abbreviations: Consult the list of acronyms and other abbreviations used in this resource.

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