Drug Crime as a Challenge for Sustainable Development: The Czech Republic Experience

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The issue of illegal drug production and trafficking represents one of the major challenges of modern society and the sustainable development of mankind. Achieving sustainable development goals such as good health and well-being (SDG 3), sustainable cities and communities (SDG 11) and peace, justice, and strong institutions (SDG 16) would be much more difficult if the issue of drugs-related crime were neglected. This chapter highlights problems associated with this type of criminality from both a global perspective and the perspective of the Czech Republic. It provides general recommendations on effective measures to combat such illegal behaviour. First, the paper discusses the cross-border context of illegal methamphetamine production and its impacts on the environment in both urban and rural areas. Second, it addresses the issue of new synthetic drugs, with an emphasis on semisynthetic cannabinoid HHC, focusing on the approach of Czech legislation and the practices of law enforcement authorities.

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KRIMINALITETA, POVEZANA Z DROGAMI KOT IZZIV TRAJNOSTNEGA RAZVOJA: IZKUŠNJA ČEŠKE

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Problematika nedovoljene proizvodnje in prometa z drogami predstavlja enega izmed izzivov sodobne družbe in trajnostnega razvoja človeštva. Doseganje ciljev trajnostnega razvoja, kot so zdravje in dobro počutje (SDG 3), trajnostna mesta in skupnosti (SDG 11) ter mir, pravičnost in močne institucije (SDG 16), bi bilo veliko težje, če bi zanemarili vprašanje kriminalitete, povezane s prepovedanimi drogami. Prispevek opozarja na težave, povezane s to vrsto kriminalitete, z globalnega in češkega vidika ter podaja splošna priporočila za učinkovito zaščito pred tovrstnim nezakonitim ravnanjem. Najprej razpravljamo o čezmejnem kontekstu nezakonite proizvodnje metamfetamina in njegovih vplivih na okolje v mestnih in podeželskih območjih. Nadalje je predstavljena problematika novih sintetičnih drog, specifično polsintetični kanabinoid HHC, s poudarkom na češki zakonodaji in praksi organov kazenskega pregona.

1 Introduction

Based on the United Nations World Drug Report from 2023, the production, trafficking, and subsequent abuse of drugs together constitute a global phenomenon. According to the United Nations, there have been changes in drug production over recent years. For instance, the area dedicated to cultivating opium poppy decreased by 40 per cent in 2021 compared to the previous year, while coca bush cultivation remained relatively stable during 2021 compared to previous years (United Nations Office on Drugs and Crime [UNODC], 2023). However, opium production has followed a persistent upward trend since 1998, with a seven per cent increase in 2021 compared to the previous year, resulting in a total of 7,930 tons (for data since 1998 see the United Nations World Drug Report from 2023; UNODC, 2023). Cocaine production reached a record high in 2020, with an estimated 1,982 tons of pure cocaine produced – an 11 per cent increase compared to 2019. In tandem with production, the demand for drugs and their subsequent usage remain substantial. In 2020, approximately 284 million individuals worldwide aged 15 to 64 acknowledged using some form of drug within the preceding 12 months, which represents 5,6 per cent of the population in this age group. This also represents a 26 per cent increase from the estimated 226 million people who reported drug usage in 2010, representing 5 per cent of the population in the same age group (UNODC, 2023).

The current state of this field of criminality arises from a variety of factors. These factors include cultural and social tolerance of some drugs, which has transformed into political movements advocating for the legalisation of specific drug types, such as Hippies in the US (Husak & de Marneffe, 2005) or various liberal political parties in the EU (Khan & Landwehr, 2023). Additionally, the emergence of new kinds of substances, such as semisynthetic psychoactive cannabinoids and synthetic cannabinoids, has contributed to the situation. The globalisation of the world has facilitated the rapid transfer of drugs and their precursors across vast distances (UNODC, 2023). Coupled with this, the adoption of novel technologies and online marketing strategies has further exacerbated the issue (Ministry of Interior of the Czech Republic, 2023). Each of these factors represents a very complex topic but due to the limited space, this chapter will not focus on them in more detail.

Drug-related criminality produces numerous negative consequences, including secondary criminal activities such as corruption, which erodes the rule of law and stability, and gang violence, which affects entire communities. Health concerns encompass the costs associated with medical treatment for drug users or victims of related criminality, expenses linked to legal and administrative proceedings, and the social impact on individual communities and society Moreover, there are environmental impacts to consider, such as water pollution caused by chemical substances used for production, soil pollution and exhaustion from plant-based drugs, and air pollution linked to methamphetamine production (UNODC, 2023). The externalities from drug-related crime represent challenges to the sustainable development of mankind. This is particularly evident when considering objectives such as good health and well-being (SDG 3), which includes providing healthcare for drug addicts, developing substitute drugs, relying on substance testing to detect risky additives, using preventive measures, and addressing drug-related pollution. The context of sustainable cities and communities (SDG 11) also comes into play, requiring efforts to prevent drug addiction within communities, with special emphasis on vulnerable social groups, identifying new drugs in localities, and addressing drug-related environmental pollution. Furthermore, the pursuit of peace, justice, and strong institutions (SDG 16) underscores the need to select an optimal drug policy, develop legislation that respects cultural, historical, and societal backgrounds, and react effectively to the emergence of new types of drugs. Communication of such policy and its reasoning is another crucial issue, as is the necessity for international cooperation between public authorities in this area as demonstrated below).

This chapter aims to provide recent information on the drug crime landscape in the Czech Republic, with a specific focus on selected issues and their implications for sustainable development. The Annual Report of the National Drug Headquarters for the year 2022 indicates that the prevailing situation in the Czech Republic is characterised by several new phenomena linked to drug-related crime (Ministry of Interior of the Czech Republic, 2023). Firstly, there is a widespread demand for methamphetamine across Europe that local production cannot adequately meet (European Monitoring Centre for Drugs and Drug Addiction, 2023). Secondly, traditional substances like cocaine are experiencing heightened availability due to overproduction, while new substances of both natural and synthetic origin are gaining popularity (European Monitoring Centre for Drugs and Drug Addiction,

2023). Thirdly, Europe has entered a new era of the pursuit of new approaches to drug regulation (European Monitoring Centre for Drugs and Drug Addiction, 2023). All these new challenges resonate in the Czech Republic due to its national specifics – the historically strong local position in methamphetamine production (Zábranský, 2007) and the popularity of cannabinoids, as well as new synthetic and semi-synthetic substances (Ministry of Interior of the Czech Republic, 2023). These core themes will be explored in this article, subjected to thorough analysis to comprehend the peculiarities of the issue within both global and local contexts, and thereby, to ascertain the most appropriate and effective resolutions.

2 Methamphetamine: The Old Threat to Sustainable Development

To provide a comprehensive overview of the current methamphetamine situation in the Czech Republic, we present basic information about this drug as well as the global situation regarding its production, trafficking, and consumption.

Methamphetamine (N-methyl amphetamine) belongs to the broader category of drugs known as stimulants (alongside cocaine), which are typically used to enhance to increase mental and physical energy levels (Harris & Lee, 2019). Within the subcategory of amphetamine-type stimulants, to which methamphetamine belongs, its effects are achieved by influencing the central nervous system through stimulating actions (UNODC, 2023). The general effects of methamphetamine use include suppression of hunger and fatigue, acceleration of psychomotor functions, induction of feelings of euphoria, warmth, empathy, and solidarity, as well as an increase in sexual appetite. Conversely, negative after-effects include feelings of despondency, depression, anxiety, and exhaustion; at the somatic level, they include weakness, muscle spasms, insomnia, hallucinations, and disillusion, leading to irrational behaviour. The primary danger associated with methamphetamine use lies in the development of irreversible mental disorders like paranoia and toxic psychosis, as well as the rapid development of both mental and physical dependence (Válková et al., 2019). Vearrier et al. (2012) describe numerous health effects of methamphetamine abuse, such as cardiovascular, dermatologic, haematologic, gastrointestinal, musculoskeletal or neurological diseases.

The current global landscape of methamphetamine production, trafficking, and abuse is experiencing significant growth. United Nations data on annual seizures of amphetamine-type drugs (which represents only detected drugs) indicate that approximately 72 per cent of seizures occurring between 2016 and 2020 are related to methamphetamine. The number of countries reporting seizures of this drug has risen from 84 during the 2006–2010 period to 117 in the 2016–2020 period, signifying a notable expansion in the geographical reach of methamphetamine trafficking (UNODC, 2023).

2.1 Methamphetamine Production

Unfortunately, methamphetamine production does not require a high level of expertise, as recipes are readily available on the Internet, and most of the necessary ingredients can be purchased at local hardware stores and pharmacies. This ease of access facilitates the production of methamphetamine in domestic laboratories, which can yield profits ten times greater than the costs spent on basic ingredients (Wyble, 2008). There are two types of methamphetamine laboratories: large-scale operations that can produce more than 4.5 kilogrammes (i.e., "superlabs") and small-scale operations that produce drugs for personal use or limited distribution ("mom and pop labs," as popularised in the TV series "Breaking Bad") (Wyble, 2008).

However, the production methods differ by region and are closely tied to the use of different precursors. The most common methods, according to Lehmert and Hýbl (2016), include the Red-P method (which uses red phosphorus and iodine in the reaction with ephedrine or pseudoephedrine), the P-2-P method (based on the reaction of phenylpropane-2-one with methylamine in a reducing environment), the Birch/Nazi method (which uses ammonium with lithium or sodium as catalysts in the reaction with ephedrine or pseudoephedrine), and the Leuckart method (involving the synthesis of amphetamine from BMK, a compound known as 1-phenyl-2-propanone). The United Nations notes that in Asia, Oceania, Africa, and most parts of Europe, production traditionally relies on ephedrine or pseudoephedrine (first and third methods). In North America, on the contrary, production involves various chemicals required for the manufacture of P-2-P and then methamphetamine. Recent seizures by national authorities indicate that many laboratories are increasingly switching to P-2-P for methamphetamine production, using various, even designer-made, precursors, with the largest quantities found in

Mexico, Belgium, and the Netherlands. The current trend in production includes the use of non-controlled chemicals as potential precursors (such as methyl glycidyl acid derivatives, benzyl chloride, benzyl cyanide, propiophenone, 2-bromopropiophenone, and bromine). Another significant trend involves the use of the Ephedra plant, which grows wild in Afghanistan and is used for ephedrine extraction (UNODC, 2023).

2.2 Methamphetamine Markets and Trafficking

According to the United Nations, intraregional trafficking of methamphetamine is a consistent trend, particularly within East and South-East Asia and North America. This is because many countries in these regions serve as primary departure or transit locations. The main destination markets for methamphetamine have remained relatively stable over the years. European countries and Near and Middle Eastern countries continue to play significant roles in methamphetamine production and trafficking, although this represents only 14 percent of all amphetamine-type production and trafficking in Europe, according to seizures conducted by national authorities. The only exceptions to this European trend in amphetamine-type drugs are the Czech Republic and Slovakia, where methamphetamine seizures surpass those of amphetamine (UNODC, 2023).

The consumption of methamphetamine in European countries has increased compared to the previous years, although it remains overshadowed by the usage of other amphetamines. According to United Nations data, the use of amphetamine overweighs that of methamphetamine in Western and Central Europe (28 percent for amphetamine vs 9 percent for methamphetamine) and Southeastern Europe (20 percent for amphetamine vs 8 percent for methamphetamine. The estimated prevalence of amphetamine users in Europe in 2020 stood at 0.5 percent of the population aged 15 to 64, corresponding to 2.9 million users (UNODC, 2023).

2.3 Impact of Methamphetamine Production and Use on Public Health

The effects of methamphetamine production and use on individual health, as well as on public health and the environment, have been the subject of various studies (Kates et al., 2014; Vearrier et al., 2012; Wright et al., 2020; Wyble, 2008). These studies illustrate that this problem is highly complex, its solution demands extra

costs, and the effects of methamphetamine production persist long after it ceases, even after decontamination of premises.

The impact of methamphetamine production and use on public health is deeply concerning for several reasons. Individual users and producers not only pose a risk to themselves (for effects of methamphetamine use on individual health (Válková et al., 2019; Vearrier et al., 2012) but also to society. This extends beyond the altered behaviour resulting from consumption to the strain on hospital resources due to the treatment of overdosed users and victims of methamphetamine laboratory explosions (Wyble, 2008), as well as individuals exposed to contamination effects (leading to skin, respiratory, immune problems, even behavioural and cognitive effects) following the cessation of production (Wright et al., 2020). Other impacts of methamphetamine use on local communities include, as noted by Grau (2007), an increase in crime, prison overcrowding, and child welfare cases.

The entire process associated with drug-related crimes, spanning from drug production and trafficking to consumption, exerts significant impacts on the environment (Wright et al., 2020). These impacts typically differ when comparing plant-based drugs, such as marijuana, cocaine, opium, or kratom, with synthetic drugs. The first category is linked to effects such as the carbon footprint generated during drug manufacture, as well as water and soil pollution caused by pesticides and other chemicals (UNODC, 2023). The impacts of the secondary category, including amphetamine-type drugs like methamphetamine or MDMA, are partially influenced by production methods, waste patterns, and waste disposal methods.

Since synthetic drug production typically concentrates in specific locations, waste disposal can significantly impact soil, water, air, and indirectly, the ecosystem, animals, and the food chain in these communities. According to the United Nations, the waste generated during methamphetamine and other amphetamine-type drug production is estimated to be between 5 and 30 times the volume of the product. These side effects of drug production must necessarily factor into the considerations of law enforcement authorities during their operations, as laboratories used for this type of production pose a substantial health risk. The United Nations also emphasises that a major portion of global methamphetamine production takes place in remote areas without water treatment, meaning that wastewater treatment – a key element in mitigating the environmental impact of drug production – is often

disregarded when addressing the environmental consequences of methamphetamine production (UNODC, 2023).

According to United Nations estimates, the waste generated in the production of synthetic drugs is at least five times the weight of the product. For amphetamine and methamphetamine, the minimum estimates range between 1,152 and 1,728 tons of global waste annually for the former, and between 1,233 and 2,466 tons for the latter. Another interesting data point concerns the expenses associated with cleaning up synthetic drug production sites, storage, and disposal locations. Estimates from Belgium and the Netherlands place the cost per site at 33,372 EUR (Belgium) and 13,566 EUR (Netherlands) (UNODC, 2023).

During methamphetamine production, various types of chemical waste are generated (Vearrier et al., 2012). Based on reports from methamphetamine laboratories in the Netherlands, this waste includes iodine, phosphorus, sodium hydroxide, ether, acetone, sulphuric acid, and hydrochloric acid, hydrochloric acid, lithium hydroxide, lithium, acetone, and dichloromethane. For amphetamine-type drugs, a distinctive feature of their production is that the waste contains significant residues of pre-precursors, precursors, impurities, as well as the product, along with volatile organic compounds like acetone, toluene, and ether. The latter compounds can potentially contaminate groundwater, and in substantial quantities, they could harm or eliminate the bacterial growth essential for sewage treatment in a drain field. In the case of methamphetamine, the use of fuels and solvents during production leaves its trace in the waste, often accompanied by traces of various metals such as lithium or mercury, both of which are highly toxic (UNODC, 2023). Similar outcomes of methamphetamine production are described by Kates et al. (2014). Wyble (2008) also highlights an additional problem, which is the level of residuals remaining after the decontamination of disposal sites or production facilities. It must be also mentioned that impact of disposing of this type of waste on the environment varies based on the physical and chemical conditions of the natural surface upon which it is spilt, as well as the dilution it undergoes (UNODC, 2023).

The worldwide situation shows us that methamphetamine production has numerous and severe effects on health and the environment. These effects are not limited to production itself, which, due to its nature as a combination of physical and chemical reactions and the conditions in which it is implemented, is highly dangerous and

poses an imminent threat to everything present or nearby. Contamination of premises, surrounding areas, individuals, and dumping grounds represents indirect and long-term threats to health and the environment. The costs incurred in waste disposal and decontaminating production areas are enormous (UNODC, 2023), yet the contamination of premises persists even after decontamination (Wyble, 2008).

3 Methamphetamine in the Czech Republic

The current state of methamphetamine production, trafficking and abuse in the Czech Republic is characterised as stable. According to National Drug Headquarters 2022 Annual Report, methamphetamine, alongside marijuana, represents the most frequently used drug in the country, with domestic production. Small-scale laboratories, producing up to 50 grams of the drug, predominantly satisfy local demand, while large-scale production, often orchestrated by Vietnamese-speaking criminal organisations, focuses on exporting the drug. In 2022, Czech law enforcement authorities managed to dismantle 199 illegal laboratories, confiscating 41 kilogrammes of methamphetamine, 20 kilogrammes of pseudoephedrine, and over 3.5 million pharmaceutical tablets of Ephedrine Arena (Ministry of Interior of the Czech Republic, 2023).

3.1 Methamphetamine Production

As previously mentioned, methamphetamine production in the Czech Republic is carried out by both domestic small-scale laboratories and more extensive industrial-scale laboratories, primarily situated in rural regions to minimise detection risks. The final product is distributed abroad or to nearby urban areas. One of the new trends involves methamphetamine synthesis in the Netherlands by criminal groups formerly operating in the Czech Republic, followed by re-importation to the Czech Republic or trafficking of "Mexican-methamphetamine", created in the Netherlands using the BMK method. The standard method of methamphetamine production is still based on extracting it from ephedrine and pseudoephedrine, closely linked to the use of pharmaceuticals containing these precursors, often imported from Poland and Romania. The National Drug Headquarters reports a decline in the sales of ephedrine- and pseudoephedrine-containing pharmaceuticals, now aligning with actual medical usage (Ministry of Interior of the Czech Republic, 2023).

Such pharmaceuticals are produced legally and illegally across various European countries, and their import into the Czech Republic surged notably in 2022. Pharmaceutical Ephedrine Arena, containing 50 milligrams of ephedrine hydrochloride per tablet, was found in packages of up to 1,500 tablets – potentially providing precursor materials for approximately 45 grams of methamphetamine production. By the end of 2022, a new pharmaceutical named "Cold Relief", originating from Romania, was seised in the Czech Republic, containing 120 milligrams of pseudoephedrine per tablet. Both pharmaceuticals lack medical registration in the Czech Republic and are often transported from Poland, emerging as the primary precursors for domestic methamphetamine production. This situation characterises Czech methamphetamine production due to strict regulations on the sales of ephedrine- and pseudoephedrine-containing pharmaceuticals, as well as the sales of red phosphorus (the primary precursor for the Red-P production method, widely used in the Czech Republic). As a result, local producers face greater difficulty obtaining the necessary manufacturing equipment. Consequently, due to the rapid development of alternative methods, there is likely to be a shift from the formerly dominant Red-P production method to other methods such as P-2-P or BMK (Ministry of Interior of the Czech Republic, 2023).

Considering the quantity of methamphetamine production, local laboratories are predominantly capable of manufacturing tens of kilogrammes, whereas Mexican methamphetamine laboratories can produce hundreds of kilogrammes. The most recent local trend in methamphetamine production involves the use of short-term rents of premises. After carrying out several manufacturing cycles, the manufacturers move the entire laboratory to another rented location, making it quite difficult for law enforcement authorities to track down and document these illegal activities (Ministry of Interior of the Czech Republic, 2023).

3.2 Methamphetamine Markets and Trafficking in the Czech Republic

In terms of methamphetamine trafficking within the Czech Republic, significant shifts are underway. Although local consumption continues to be met by domestic small-scale laboratories, large-scale production has moved beyond the country's borders, where precursors are more readily available and criminal penalties are much lower (Ministry of Interior of the Czech Republic, 2023). Since January 13, 2021, red phosphorus, used in the Red-P method, was reclassified in Annex II of Regulation

(EC) No 273/2004 of the European Parliament and the Council (2023). Consequently, it is categorised as a Category 2A substance, with its European Union-wide marketing in quantities exceeding 100 grams requiring registration. This legislative change has notably curtailed the use of domestically traded red phosphorus for methamphetamine production. Methamphetamine produced abroad, often in the Netherlands and Germany, is then brought back to the Czech Republic. The "Mexican methamphetamine" produced using the BMK method in other European countries was primarily seized in the Czech borderlands with Germany in 2022. This trend has also impacted the export of domestically produced methamphetamine, as the European market was inundated with cheaper BMK methamphetamine. Consequently, the remaining Czech Republic-to-Germany or Slovakia exports constitute a small fraction of domestic production (Ministry of Interior of the Czech Republic, 2023).

Drug consumption in the Czech Republic is predominantly centred around cannabis products, with approximately one-fourth to one-third of the adult population having used such substances. However, the use of other illegal drugs is significantly lower and decreasing among teenagers. Approximately 6–10 per cent of adults reported using cannabis products, accounting for 500,000 to 900,000 individuals, while methamphetamine and cocaine use were reported by 2–3 per cent of adults. The 2022 Dependency Summary Report identified 35,000 methamphetamine users at risk in the Czech Republic, indicating a 25 per cent increase over the past decade. Among these users, 1 per cent were children (Chomynová et al., 2023). Based on 2021 estimates, methamphetamine consumption in the Czech Republic reached 6.4 tons, compared to 600 kilogrammes of heroin or 1.1 tons of cocaine, reflecting stable methamphetamine consumption but a slight increase in cocaine use (Ministry of Interior of the Czech Republic, 2023).

3.3 Impact of Methamphetamine Production and Use on Public Health in the Czech Republic

Several studies have investigated the possible impacts of methamphetamine production and use on individual and public health and the environment in the Czech Republic (Hampl, 2015; Kuhn et al., 2019; Lehmert, 2018; Lehmert & Andrlík, 2017; Lehmert & Hýbl, 2016). This includes a study on the effect of methamphetamine water pollution on non-human organisms (Horký et al., 2021).

All these studies highlight the fact that methamphetamine use, and production have widespread effects, and their impacts are long-term and difficult to remove.

The environmental and potential health hazards associated with methamphetamine production are widely acknowledged in the Czech Republic. The presence of illegal domestic and professional laboratories raises concerns about site contamination, explosions, and waste disposal. The risks extend not only to the producers themselves but also to others residing near these labs and police officers conducting interventions (Lehmert & Hýbl, 2016).

Lehmert and Hýbl (2016) underscore that various high-risk substances (e.g., ammonium, hydrochloric acid, phosphine, ether) are used or created during the production process, with concentrations often exceeding permissible limits for firefighting interventions in full emergency gear, including respiratory protection. In case of laboratory contamination, according to Lehmert and Hýbl (2016), even one production cycle can affect a wide area, and the quantities of methamphetamine produced annually are growing. Inhalation exposure of 0.26 mg/kg body mass can result from contact with contaminated hands, leading to subsequent contamination of walls, furniture, carpets, and other items. Such contamination, persisting even after laboratory dismantling, poses potential health risks for subsequent occupants unaware of the dangers. A study by Lehmert (2018) indicates that residing in such premises could result in severe health issues even a decade later because of proven methamphetamine persistence if the drug penetrates walls. In the case of the first building decontamination in the Czech Republic (after the methamphetamine laboratory operating on nearby premises was dismantled), methamphetamine levels three times higher than considered safe were found even 57 metres away from the former laboratory (Lehmert, 2018).

The production process is not the sole issue. Contamination can also arise from laboratory accidents or during the discovery and dismantling of laboratories. Lehmert and Andrlík (2017) describe a case in which a methamphetamine producer, upon realising a home search was being conducted, decided to destroy all laboratory equipment and halt the chemical reaction by spilling the entire mixture of chemicals on the floor, causing significant contamination. The risk of accidents during production is increased by several factors, including using open flames, handling flammable liquids and chemicals, and mobility of necessary equipment that can be

easily transported during production (Hampl, 2015). If a laboratory explodes, methamphetamine disperses in high concentrations and doses throughout the surrounding area, seeping not only through water and soil but also through buildings and organisms.

The laboratory location holds immense importance when assessing direct and indirect damages. If situated in a remote location, as is often the case with large-scale laboratories, typically in rural border regions of the Czech Republic that are sparsely inhabited, the main issue is decontamination of the surrounding area, soil, and waters. This phenomenon of using remote rural regions is not unique to the Czech Republic; a similar situation is evident in the United States (Wyble, 2008). Small-scale laboratories are frequently located in apartments, rented hotel rooms, or even trucks. During firefighting operations in these locations, usually after an explosion, methamphetamine and associated substances penetrate the building and its equipment together with firefighting water and smoke. This poses major health risks for everyone involved (firefighters, law enforcement officers, inhabitants). For these reasons, firefighting water should be the last choice in such cases (Kuhn et al., 2019).

Methamphetamine production-related waste constitutes yet another pollution source connected with methamphetamine production. Depending on the method employed, its amount differs from 10 to 40 kilogrammes per 1 kilogram of methamphetamine produced. Such waste represents a severe hazard not only due to massive contamination but also because of possible reactions between individual chemicals, which can lead to the ignition of other materials. Disposal methods vary from improper spilling or dumping waste in rural areas through burning unloaded containers to setting the entire vehicle on fire with the loaded material. In the Czech Republic, sporadic waste disposal attempts are evident, often involving direct dumping onto streets or community garbage cans. Unfortunately, such actions led to fires in garbage trucks due to the ignition of discarded red phosphorus. In an incident involving a burning garbage truck, on-site decontamination efforts led to chemical spills on the road and surrounding grain fields. This event occurred just a few days after the fields were harvested by local farmers (Lehmert & Hýbl, 2016). Another concerning approach involves direct dumping in rural areas. Though initially packaged, the decomposition of these materials poses long-term threats. This method profoundly affects the environment and public health, as chemicals disperse through rain and wind, contaminating surface and underground waters.

Remarkably, a study by Horký et al. (2021) even demonstrated instances of methamphetamine addiction in fish due to freshwater pollution. This underscores the far-reaching consequences of such pollution.

From the previous text, it is evident that methamphetamine production, trafficking, and use in the Czech Republic follow global trends (increasing demand, new ways of production and the rise of new criminal groups). However, there are also some unique local characteristics such as changes in production methods, precursor composition, and the increasing import of both precursors. Economically more advantageous P-2-P or BMK methamphetamine produced in other countries is also a concerning development. Coupled with increased awareness of the severity of pollution related to methamphetamine production, shifts in traditional production and trafficking patterns due to regulations and emerging trends might lead to a rise in large-scale production using more efficient methods in rural areas. In contrast, small-scale domestic output will remain a significant threat in urban locations. According to Zeman (2014), prevention efforts in the Czech Republic primarily focus on reducing demand and supply. Moreover, harm reduction, including addressing environmental pollution in populated areas, should be of paramount concern.

4 New Psychoactive Substances: New Threat to Sustainable Development

The concept of new psychoactive substances is designed to bypass anti-drug legislation due to the lack of regulation on both national and international levels (Chiappini et al., 2021; Luzak, 2014). Consequently, they are typically not sold in the same manner as "traditional" drugs and are readily available in local gas stations, stores, and, of course, on the Internet (Cohen, 2014). Some of these substances are even sold in forms as innocent as a piece of candy. These substances pose a significant challenge to both national and international anti-drug policies and legislation, and various myths surround the public discourse concerning their regulation as well as facts about their use in medical treatment (Dleštíková, 2022).

4.1 New Psychoactive Substance Production

The United Nations identifies a broad category of new psychoactive substances as substances designed to evade existing national and international drug laws such as the Single Convention on Narcotic Drugs or the Convention on Psychotropic Substances. Within this expansive category lies a group of newly synthesised chemicals designed to mimic the psychoactive effects of controlled drugs. This category of substances is dynamic, volatile, and continually diversifying. As of December 2021, there were 1,127 new substances reported to the United Nations, including synthetics and plant-based variants. This is in comparison to 302 substances that were under international control by the same date (UNODC, 2023).

Given these circumstances, the scope of new synthetic drugs spans widely, encompassing aminoindanes (MDAI), Phencyclidine-type substances (ketamine), piperazines (mCCP, BZP), synthetic opioids, fentanyl analogues, phenethylamines (MBDB, PMMA), synthetic cathinones (mephedrone, butylene), and synthetic cannabinoids (UNODC, 2023). However, two main categories emerge: synthetic cannabinoids and synthetic cathinones (Cohen, 2014).

4.2 New Psychoactive Substances Markets and Trafficking

Most of these substances lack legitimate uses and established global markets, making monitoring their production and trafficking challenging. The continuous discovery of new substances adds to the complexity as they lack standardised nomenclature across different regions (UNODC, 2023). Various countries also have different mechanisms and thresholds for listing substances as "under control", as Lin et al. (2023) noted.

The transient usage patterns of some of these substances complicate their categorisation. This transience stems from either diminished demand, often due to the emergence of newer substances, or the substance being identified as illegal under national or international law. United Nations data on the assumed scale of the global drug market indicate that while it experienced rapid expansion between 2009 and 2018, it has since stabilised. Approximately 550 such substances are identified in the drug market, with 50 of them first identified in 2021. These substances primarily fall under stimulants like cathinones and phenethylamines, followed by synthetic

cannabinoid receptor agonists, hallucinogens (tryptamines and phenethylamines), and opioids – the latter being the third-largest group of new synthetic drugs reported to the United Nations by member states in 2020 (after new stimulants and cannabinoid receptor agonists) (UNODC, 2023).

The global issue of new synthetic drugs continues to expand. Seizures of these substances were reported in 57 countries from 2019 through 2020, a notable increase from the 30 countries reporting such seizures in 2009–2010 (equating to 41 percent of countries). Noteworthy seizures of new synthetic drugs included ketamine and synthetic cannabinoids, primarily in regions such as East and Southeast Asia, Turkey, the United States, Egypt, and the Russian Federation. In Western, Central, and South-Eastern Europe, the use of new psychoactive substances has decreased overall. However, Eastern Europe, Central Asia, and Transcaucasia have reported the spread of new synthetic substances, as evidenced by the quantities seised – 116 kilogrammes in 2005–2010 versus nearly 11 tons in 2015–2020. In 2021, European Union countries reported a total seizure of 8.5 tons of new psychoactive substances, with synthetic cathinone accounting for 72 per cent and synthetic cannabinoids comprising 28 per cent (UNODC, 2023). The European Monitoring Centre for Drugs and Drug Addiction highlighted that in the first half of 2022 alone, 24 new synthetic cannabinoids were reported to the EU Early Warning System, constituting half of the new substances reported (European Monitoring Centre for Drugs and Drug Addiction, 2023).

While a relatively positive trend of stable or declining usage of these substances exists, this does not apply universally. Ketamine stands as an exception. The driving force behind this trend is not fully understood. Still, one theory posits that initial positive reports on the effects of new synthetic drugs propagated faster than reports of adverse reactions, leading to a subsequent decline. This optimistic situation primarily concerns high-income countries and the general population. However, specific vulnerable groups, such as the homeless or prisoners, may have a higher prevalence of synthetic cannabinoid use (17.9 percent compared to 1.2–2.8 percent in the general population). Factors contributing to this trend include the affordability of these substances compared to standard drugs, and the lack of effective drug tests for detecting them (UNODC, 2023).

4.3 Impact of Psychoactive Substances Production and Use on Public Health

Assessing the health risks associated with these drugs proves challenging due to a lack of current data. Generally, the societal harm caused by such substances is less severe than that inflicted by conventional drugs, albeit this is partly because of their lower prevalence (UNODC, 2023). The general effects of individual health are difficult to point out; however, due to the complex pharmacodynamics of new psychoactive substances, there is an increasing level of concern about the onset of acute or chronic psychopathological consequences associated with them (Chiappini et al., 2021). Individual cases have shown health risks as severe as those posed by regular drugs.

Yet there are few studies available. A recent study by Chiappini et al. (2021) has identified suicidal and self-injurious tendencies linked to cathinones, synthetic cannabinoids, and synthetic opioids. A study by King and Corkery (2018) provides data on fatal toxicity connected with the use of new psychoactive substances.

The process of adding new substances to the list of illegal narcotics and psychotropic substances specified in international treaties often creates the fundamental issue of establishing legal grounds for criminalisation. However, this process, both on international and national levels, is time-consuming – time that is typically scarce when combating drug-related crimes. According to Luzak (2014), while some countries choose to directly include these substances in their national legislation (as done by Australia, Germany, the United Kingdom, and China), others take an alternate approach by penalising the sale of such substances under health or medicine control laws until comprehensive drug legislation is passed. Nevertheless, categorising synthetic cannabinoids as health-threatening medical products, as evident in the CJEU judgment in cases C-358/46 and C-181/14, was deemed unacceptable (Luzak, 2014).

5 Psychoactive Substances in the Czech Republic

The situation regarding new synthetic drugs in the Czech Republic can be exemplified by the significant increase in cases involving the seizure of new psychoactive substances in 2022 compared to 2021. Synthetic cathinone, stimulants

like substitutable amphetamines, and ketamine largely dominated these cases. A similar trend was observed with synthetic cannabinoids, opioids, and benzodiazepines, all of which pose a serious threat to public health (Ministry of Interior of the Czech Republic, 2023). The National Strategy to Prevent and Reduce Harm Associated with Addictive Behaviour 2019–2027 identifies new psychoactive substances as a challenge for the drug control system (Secretariat of Government Council for Drug Policy Coordination, 2020).

5.1 New Psychoactive Substance Production

According to the National Drug Headquarters Annual Report for 2022, the absolute numbers of such substances continue to rise, with new substances from different groups entering the system compared to previous years. While the past five years were marked by the prevalence of synthetic cannabinoids and cathinones, the years 2021 and 2022 saw the emergence of highly risky synthetic opioids in the form of fentanyl derivatives. Another concerning phenomenon in Czech drug culture involves the addition of potent substances to common drugs or non-psychoactive plant materials, such as synthetic cannabinoids being added to non-potent technical cannabis (Ministry of Interior of the Czech Republic, 2023).

One of the most discussed substances, aside from plant-based Kratom, which falls outside the scope of this chapter, is the semisynthetic cannabinoid hexahydrocannabinol (hereinafter HHC). This substance was imported in substantial quantities to the Czech Republic in 2022. While HHC is naturally present in cannabis plants in minimum concentrations, it is typically synthesised from another cannabinoid known as cannabidiol (CBD). The ease of production and its affordability have made HHC one of the most prevalent cannabinoids. It is readily available in the Czech Republic, sold in e-cigarette cartridges, as an active ingredient in vaping pens, and even added to edibles like jellybeans, cookies, and brownies (Ministry of Interior of the Czech Republic, 2023).

5.2 New Psychoactive Substances Markets and Trafficking in the Czech Republic

These substances are often transported into the Czech Republic via planes in small packages facilitated by shipping companies. Purchases of these substances are

frequently conducted online, raising questions about the quality of the ordered substances and the potential for fatal intoxication due to toxic impurities (Ministry of Interior of the Czech Republic, 2023).

The Czech Republic is a contracting party to both the Single Convention on Narcotic Drugs (United Nations, 1961) and the Convention on Psychotropic Substances (United Nations, 1971). The lists of illegal drugs stated by these international treaties were subsequently incorporated into Czech national legislation that provides lists of so-called addictive substances (Government Regulation on List of Addictive Substances, 2013; Law on Addictive Substances and Amendments to some Other Laws, 1998). In 2022, progress was made in addressing the synthetic drug situation in the Czech Republic through an amendment of relevant law (Government Regulation on the List of Addictive Substances, 2013). This amendment added 283 substances to the list of addictive substances, including 155 synthetic cannabinoids and 86 cathinones. This legal change rendered various substances illegal, making their possession or distribution punishable by law.

Interestingly, this regulation did not apply to all previously mentioned substances. In the case of HHC, its addition to the addictive substances list was proposed by the National Drug Headquarters and the Ministry of Defence. However, the Czech government ultimately chose not to include HHC on the list, instead subjecting it to further forensic analysis to ascertain its effects on the human body. Another factor in this decision was the consideration of categorising HHC as a "psycho-modulating substance", a new classification that would also apply to plant-based substances like Kratom and THCP. This category would involve regulated substances subject to quality controls and access restrictions for minors (Ministry of Interior of the Czech Republic, 2023).

5.3 Impact of Psychoactive Substances Production and Use on Public Health in the Czech Republic

As mentioned above, the impacts of psychoactive substances production and use on public health are the subject of only a few studies (Chiappini et al., 2021; King & Corkery, 2018). In the Czech Republic, the work of Kuchař (2018) is available, and as Dlešníková (2022) shows, the discussion is focused on the possible benefits of such substances rather than the negatives.

Kuchař (2018) asserts that synthetic cannabinoids are associated with severe health risks due to their significantly stronger effects, sometimes hundreds of times more potent than non-synthetic cannabinoids. Acute intoxication from these substances can lead to symptoms like agitation, abnormally increased heart rate, nausea, vomiting, and severe outcomes including heart and kidney failure, prolonged violent vomiting, panic attacks, loss of consciousness, and even the development of psychosis. Long-term use can also result in addiction with withdrawal symptoms similar to opioids, albeit without a readily available antidote. Incidents of mass intoxication involving 84 and 200 individuals were reported in the United States and Poland. In the Czech Republic, two cases of intoxication with fatal consequences were documented in 2018 (Kuchař, 2018). For comparison, a study by King and Corkery (2018) mentions 22 deaths connected with synthetic cannabinoids in Wales and England between 2014–2016).

Although the effects of HHC on the human body have not yet been extensively studied, consumer reports suggest that its effects may subjectively resemble those of cannabis, according to the European Monitoring Centre for Drugs and Drug Addiction (European Monitoring Centre for Drugs and Drug Addiction, 2023). Additionally, concerns have arisen about the potential health implications of these substances, particularly when available in forms that can deliver high doses.

The Czech government opted for a new approach, unique within the European context, by introducing a new category for substances with effects similar or analogous to other substances deemed illegal according to international treaties and national law. This decision was driven by the recognition that comprehensive scientific research is necessary due to the uncertain effects of these substances on the human body. At the same time, this approach allows for the use of these new psychoactive substances while research is conducted. However, while aligned with the fundamental principles of criminal law as ultima ratio (a last resort), this decision has not been accompanied by an official campaign highlighting the uncertainties surrounding the health effects of these substances. This lack of public communication potentially fosters unregulated use, magnifying issues related to dosing and the inclusion of additional substances that pose substantial health risks. Given these considerations, the chosen concept of new psycho-modulating substances raises concerns as it needs to effectively address the dangers associated

with these substances due to our limited understanding of their effects on the human body.

As a result, preventive efforts in this domain are primarily carried out by non-governmental organisations (NGOs), which focus on risk reduction through information dissemination and the provision of substance testing facilities for medical and user purposes. However, applying these ideas that are well-established in treating "traditional" drugs is not as common in the case of these unregulated substances (Macher et al., 2012).

6 Conclusion

This chapter provides an overview of the status of methamphetamine and new synthetic psychoactive substances from both a global and the Czech Republic perspective. The emergence of new methamphetamine production methods and significant developments in new psychoactive substances, particularly synthetic cannabinoids and cathinones, represent only a fraction of the complex array of challenges that humanity must address to ensure sustainable development. The Czech perspective underscores how contemporary local issues are intricately intertwined with global dynamics. The spreading of innovative methamphetamine production techniques is driven by their economic advantages, poised to replace costlier methods. Unfortunately, this is also influenced by legislative measures focused on the acquisition of essential precursors for the manufacture of methamphetamine using ephedrine and pseudoephedrine (Ministry of Interior of the Czech Republic, 2023).

Methamphetamine production and use pose an obvious imminent threat to public health and well-being (SDG 3). The production itself, by its nature as a combination of physical and chemical reactions, is highly dangerous and creates immediate risks to the health of the individuals involved, as well as those in surrounding areas. This becomes evident in cases where production occurs in densely populated areas, such as rental apartment buildings. As Lehmert and Hýbl (2016) noted, even a single production cycle can affect the entire surrounding area, leaving contaminated premises, such as an entire apartment building. The costs of waste disposal and decontamination of production areas are enormous (UNODC, 2023) and contamination of premises often persists after decontamination process (Wyble,

2008). Therefore, potential health issues remain even after production has ceased. The list of health problems connected with exposure to methamphetamine production ranges from cardiovascular, dermatologic, haematologic, gastrointestinal, musculoskeletal or neurological diseases (Vearrier et al., 2012) to death caused by ignition or explosion of chemicals at production sites. Since these health problems are associated with the premises, it raises questions about whether new inhabitants are aware that a methamphetamine lab was previously operating there. This specific aspect of methamphetamine production creates another threat to public health – it makes "hidden" contaminated premises that pose a serious threat to the health of new inhabitants. Another issue relates to pollution of water, soil, and air by both production and disposal of chemicals. Such pollution represents another severe source of danger to human health and well-being (SDG 3), which is easy to detect but costly to dispose of.

The current situation requires careful consideration from national law enforcement authorities and the international community when rethinking antidrug policies. Only by addressing these threats directly, along with providing information on possible risks to the public, will we be able to preserve sustainable cities and communities (SDG 11) and promote peace, justice, and strong institutions (SDG 16).

The landscape concerning new psychoactive substances necessitates a distinct approach – one centred on an early identification and scientific risk assessment before determining their legality. The European Union has already adopted such a stance through the EU Early Warning System. In the Czech Republic, the situation is more intricate. Despite the absence of scientific research on the effects of the semisynthetic cannabinoid HHC on the human body, the Czech government opted not to classify this substance as an addictive substance (Ministry of Interior of the Czech Republic, 2023). Instead, a novel category of psycho-modulating substances is being developed based on scientific evaluations. Until such a framework is established, HHC remains easily accessible to the general population, despite the uncertainty surrounding its physiological impacts and potential long-term consequences. It is regrettable that conclusions regarding the assumed effects on human health and risks connected with the use of HHC, which led to the decision not to regulate this substance strictly, collided with reality represented by the health problems of several individuals. The fulfilment of SDG 3 and SDG 16 by the Czech government in this area obviously represents a problem; these substances should be

subjected to further government efforts to secure the good health of individuals and establish strong, effective institutions.

This chapter presents the direct and indirect effects of drug production, trafficking and consumption, which represent a threat to the good health and well-being of individuals (SDG 3), sustainable cities and communities (SDG 11), and peace, justice, and strong institutions (SDG 16). Shedding light on these challenges lays the groundwork for their resolution. A comprehensive solution should be multifaceted, founded on balanced anti-drug legislation and prevention efforts that prioritise raising awareness within society about the risks of drug consumption and aftermath associated with drug production and trafficking. This emphasis is particularly relevant for emerging substances often portrayed as being alternatives to traditional drugs.

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References

Chiappini, S., Mosca, A., Miuli, A., Santovito, M. C., Orsolini, L., Corkery, J. M., Guirguis, A., Pettorruso, M., Martinotti, G., di Giannantonio, M., & Schifano, F. (2021) New psychoactive substances and suicidality: A systematic review of the current literature. *Medicina, 57*(6), 580. doi:10.3390/medicina57060580

Chomynová, P., Grohmannová, K., Dvořáková, Z., Orlíková, B., Rous, Z., & Černíková, T. (2023). Souhrnná zpráva o závislostech v České republice 2022. *Národní monitorovací středisko pro drogy a závislosti*. https://www.drogy-info.cz/publikace/vyrocni-zpravy/souhrnna-zprava-o-zavislostech-v-ceske-republice-2022/

Cohen, J. A. (2014). The highs of tomorrow: why new laws and policies are needed to meet the unique challenges of synthetic drugs. *Journal of Law and Health, 27*(2), 164–185.

Dleštíková, T. (2022). (De)criminalisation of psychedelics in the Czech Republic—Where are we heading in drug policy and legislation? *International Journal of Drug Policy*, *10*. doi:10.1016/j.drugpo.2022.103900

European Monitoring Centre for Drugs and Drug Addiction. (2023). *European drug report 2023: Trends and developments*. https://www.emcdda.europa.eu/publications/european-drug-report/2023_en

Government Regulation on the List of Addictive Substances. (2013). *Collection of Laws of the Czech Republic*, (463/13).

Grau, L. (2007). Cutting off the building blocks to methamphetamine production: Global solution to methamphetamine abuse. *Houston Journal of International Law, 30*(1), 157–202.

Hampl, R. (2015). Rizika výroby metamfetaminu z hlediska požární ochrany. *Bulletin národní protidrogové centrály, 20*(4), 27–31.

Harris, A. H., & Lee, C. H. (2019). *Introduction to forensic science and criminalistics* (2nd ed.). CRC Press.
Horký, P., Grabic, R., Grabicová, K., Brooks, B. W., Douda, K., Slavík, O., Hubená, P., Sancho Santos, E. M., & Randák, T. (2021). Methamphetamine pollution elicits addiction in wild fish. *Journal of Experimental Biology, 224*(13), jeb242145. doi:10.1242/jeb.242145
Husak, D.-E., & de Marneffe, P. (2005). *The legalization of drugs*. Cambridge University Press.
Kates, L. N., Knapp, C. W., & Keenan, H. E. (2014). Acute and chronic environmental effects of clandestine methamphetamine waste. *Science of The Total Environment, 493*(2014), 781–788. doi:10.1016/j.scitotenv.2014.06.066
Khan, D., & Landwehr, O. (2023). "Legalize it!?" – Opportunities and challenges for the regulation of cannabis under European law. *Eucrim*. *23*(1), 89–99. doi:10.30709/eucrim-2023-004
King L. A, & Corkery J. M. (2018). An index of fatal toxicity for new psychoactive substances. *Journal of Psychopharmacology*, *32*(7), 793–801. doi:10.1177/0269881118754709.
Kuchař, M. (2018). Syntetické kanabinoidy a pandemická intoxikace. *Bulletin národní protidrogové centrály, 23*(4), 3–6.
Kuhn, E. J., Walker G. S., Whiley, H., Wright, J., & Ross, K. E. (2019). Household contamination with methamphetamine: Knowledge and uncertainties. *International Journal of Environmental Research and Public Health, 16*(23), 4676. doi:10.3390/ijerph16234676
Law on Addictive Substances and on Amendments to some Other Laws. (1998). *Collection of Laws of the Czech Republic*, (167/98).
Lehmert, K. (2018). Unikátní sanace objektu kontaminovaného metamfetaminem [Unique remediation of an object contaminated with methamphetamine]. *Bulletin národní protidrogové centrály, 23*(2), 18–21.
Lehmert, K., & Andrlík, O. (2017). Kontaminace metamfetaminem ve stavbě přetrvá dlouho i daleko [Contamination with methamphetamine in construction will persist for a long time and far]. *Bulletin národní protidrogové centrály, 22*(4), 10–17.
Lehmert, K., & Hýbl, M. (2016). Šíření kontaminace z nelegálních laboratoří [Spread of contamination from illegal laboratories]. *Bulletin národní protidrogové centrály, 21*(1), 37–44.
Lin, O. A., Chuang, P.-J., & Tseng, Y. J. (2023). Comparison of controlled drugs and new psychoactive substances (NPS) regulations in East and Southeast Asia. *Regulatory Toxicology and Pharmacology*, 138, 105338. doi:10.1016/j.yrtph.2023.105338
Luzak, J. (2014). Synthetic marijuana not a "medical product". *European Journal of Risk Regulation, 5*(4), 548–552. doi:10.1017/S1867299X00004153
Macher, R., Burke, T. W., & Owen, S. S. (2012). Synthetic marihuana. *FBI Law Enforcement Bulletin, 81*(5), 17–22.
Ministry of Interior of the Czech Republic. (2023). *Police of the Czech Republic. National Drug Headquarters 2022 Annual report*. Ministry of Interior of the Czech Republic. https://www.policie.cz/clanek/vyrocni-zprava-narodni-protidrogove-centraly-za-rok-2022.aspx
Regulation (EC) No 273/2004 of the European Parliament and of the Council. (2023). *Official Journal,* (L/27).
Secretariat of Government Council for Drug Policy Coordination. (2020). *National strategy to prevent and reduce the harm associated with addictive behaviour 2019–2027*. https://www.drogy-info.cz/data/obj_files/33160/1044/National_strategy_2019_2027_fin_rev3.pdf
United Nations Office on Drugs and Crime (UNODC). (2023). *World Drug Report 2022*. UNODC Research. https://www.unodc.org/unodc/en/data-and-analysis/world-drug-report-2022.html
United Nations. (1961). *Single convention on narcotic drugs, 1961*. https://www.unodc.org/pdf/convention_1961_en.pdf
United Nations. (1971). *Convention on psychotropic substances, 1971*. https://www.unodc.org/pdf/convention_1971_en.pdf
Válková, H., Kuchta, J., & Hulmáková J. (2019). *Základy kriminologie a trestní politiky* [Basics of criminology and criminal policy]. C. H. Beck.

Vearrier, D., Greenberg, M. I., Miller, S. N., Okaneku, J. T., & Haggerty, D. A. (2012). Methamphetamine: History, pathophysiology, adverse health effects, current trends, and hazards associated with the clandestine manufacture of methamphetamine. *Disease-a-Month*, *2*(58), 38–89. doi:10.1016/j.disamonth.2011.09.004

Wright, J., Kenneally, M., Ross, K., & Walker, S. (2020). Environmental methamphetamine exposures and health effects in 25 case studies. *Toxics, 8*(3), 61. doi:10.3390/toxics8030061.

Wyble, J. (2008). Methamphetamine the new epidemic. *Michigan State University Journal of Medicine and Law, 11*(1), 115–144. doi:10.1146/annurev.publhealth.012809.103600

Zábranský, T. (2007). Methamphetamine in the Czech Republic. *Journal of Drug Issues, 37*(1), 155–180. doi:10.1177/002204260703700108