

Online drug monitoring

Key points

- We understand online drug monitoring to be the systematic monitoring, via the internet, of trends and developments in the use of substances. During online monitoring, data are systematically collected on search behaviour, the purchase of drugs, discussions regarding the risks or user experiences; the collected data are stored for later analysis.
- The Trimbos Institute, Netherlands Institute of Mental Health and Addiction, has been performing online drug monitoring since 2013 for our projects to map out trends in the use of (new) psychoactive substances.
- Online monitoring provides information with a high ecological validity that would otherwise be less easy to obtain. It also offers the possibility of obtaining information about difficult to reach populations.
- A limitation of online monitoring is that it is not always clear to what population the findings can be generalised. For prevalence estimates, online forum monitoring is therefore not always appropriate. As an early indicator of possible changes in opinions with respect to substances and substance use, it is a potentially effective tool.
- By combining data from online and offline monitors, a more reliable picture can be gained of the popularity of substances and the associated trends and developments than would be possible using the individual monitors: trends that are detected in one of the monitors can be verified using the other monitors.
- Online monitoring can be a sensible way to contribute to other monitors to obtain a detailed picture of (trends in) the popularity of substances, including new psychoactive substances¹. The online monitoring of drug trends will become increasingly important, because it seems that the internet will become an increasingly important medium for the purchase and sale of substances and for the discussions about drugs.

¹ We understand a new psychoactive substance (NPS) to be 'a new narcotic or psychotropic substance, in pure form or in a preparation, that has not been scheduled by the United Nations' drug conventions, but that may pose a comparable threat to public health as the substances that are regulated in these conventions.' (Council Decision 2005/387/JHA).¹ EMCDDA (European Monitoring Centre for Drugs and Drug Addiction).

Introduction

This factsheet describes methods used to monitor trends in the use of substances via the internet and our experiences with them. In recent years, the Trimbos Institute has collected information about new psychoactive substances (also called designer drugs or research chemicals), on internet forums where these substances are discussed. The reason for writing this factsheet is that online monitoring is now used in various projects, but the knowledge and experiences with using the various methods that we have used have not been bundled.

The objective of this factsheet is to provide insight into our experiences based on the following three questions:

- ① **What is online drug monitoring and how is it used?**
- ② **What experiences have we had in recent years with online monitoring?**
- ③ **What is the added value of online monitoring when compared to regular substance monitors?**



① What is online drug monitoring and how is it used?

What is it?

We understand online drug monitoring to be the systematic monitoring of trends and developments concerning substance use via the internet, for instance, discussions on internet forums or conversations on social media. User experiences are shared there, and users ask each other's advice about or discuss the risks associated with the use of specific substances or combinations of them. Online drug monitoring is also used to monitor the supply of drugs and other substances that are sold on the internet.

Online monitoring systematically collects data concerning search behaviour, discussions, user experiences or drug markets and stores it for further analysis. The data can be collected manually by reading, as a regular user of an internet forum or social medium, the discussion. When multiple, frequently used discussion groups or market locations are monitored simultaneously, it is extremely time consuming to do the monitoring manually. It is often more efficient to partially or entirely automate the collection of data. In addition to the time gained, the advantage of automated monitoring is that it follows a strict, reproducible protocol. The automated collection of the content of internet pages or other data and the extracting of relevant content from them is also called web crawling [1] or web scraping [2, 3].

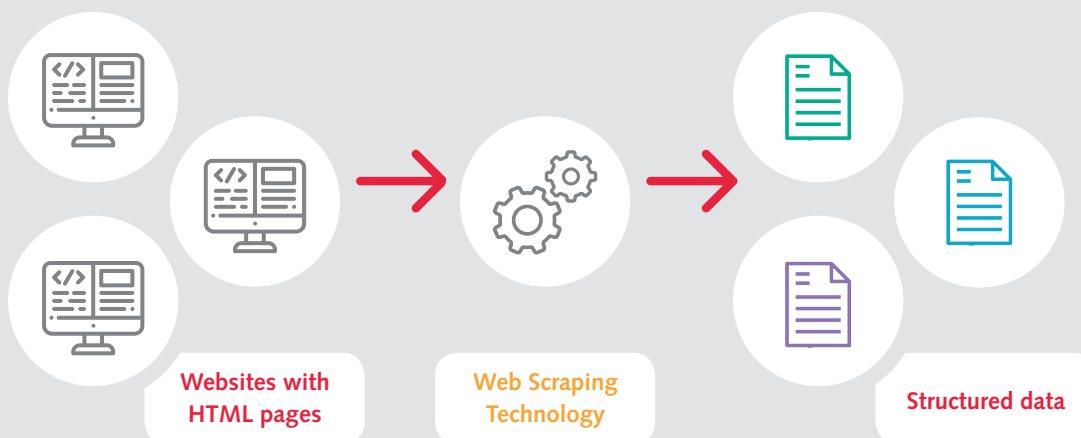
Web crawling and web scraping

A web crawler (also called a spider or spider bot) is software that searches systematically, based on previously specified parameters, one or more websites and indexes or collects the data found. In this way, it provides input for the web scraping process. Web scraping is a process whereby data from internet pages are collected and stored. This can be done manually, but normally when web scraping is discussed it is understood to mean the automated collection of data using software. This software searches for possibly relevant internet pages based on criteria supplied by the user and collects them in a way that a regular website visitor would do using a browser. The internet page is then searched for relevant content. What is relevant is determined by the user of the software. This could be fragments of text, or hyperlinks, or other content on the page. The relevant content that is found is copied and stored in a database. Usually, the crawling part of the software is made in a way that after processing a page in this way, it automatically goes to the next page, until it reaches a final point specified by the user in advance[2, 3].

How is online drug monitoring used?

Within the Trimbos Institute, since 2013, online drug monitoring has been used for various substance-related issues.

Figure 1: Schematic diagram of web scraping



One of the first projects to use a form of online monitoring was the Internet Tools for Research in Europe on New Drugs (I-TREND) project (refer also to subsection 2.1). The objective of this project was to provide help in preventing health and societal damage due to NPS use and to improve the knowledge about the effects and risks of these substances. Within this project, internet forums and online drugs shops (webshops) were selected and monitored. The method of approach developed in this project concerning the monitoring of internet forums was continued and developed as a regular monitoring activity after completion of the project.

The forums were selected in I-TREND based on their popularity in the Netherlands, with four forums being selected based on the results of using search terms such as 'research chemicals forum', 'designer drugs forum', 'legal highs forum' and '*nieuwe psychoactieve stoffen forum* - new psychoactive substances forum' and where the most new messages were posted every month. Every quarter, these forums were investigated to discover what was happening in the discussions about NPS.

Initially, manual counts were made of the number of newly started discussion topics since the previous measurement², the number of messages that were posted in the new topics ('posts') and the number of times that these topics were viewed ('views'). To be able to work more efficiently, a scraper was developed. It was developed in R, it crawls the forums and stores the titles of the topics, the link to the topic, the data mentioned above and the date on which each topic started. It is then determined whether a certain topic concerns an NPS. We do this by automatically comparing the title words of each topic to a list of (currently) 440 terms that refer to approximately 300 different NPS³. This list is regularly updated based on developments in the NPS market, so that we can also continue to keep track of the discussions concerning new NPS⁴ that have recently appeared on the market. The scraper is used for the generic monitoring of discussions about NPS, but also for quick scans concerning specific substances, such as forum discussions about new synthetic opioids (refer also to subsections 2.2, 2.3 and 2.4).

2 We look at newly started topics instead of, for instance, existing topics, because our interest in the first place is in recent trends and discussions as a proxy for the popularity of different NPS.

3 Example: for 2C-B we also monitor topic titles containing other notations such as 2cb, 2-CB; for 4-FA also 4FA, 4FMP, 4-FMP, flava, flux, etc.

4 To do this we use the tool to compare the list of newly started NPS topics ('HIT') with a list containing all the other topics started in the crawling period ('NO HIT').



By using the scraper to sort the topics into the type of NPS discussed, we can read exactly those topics that concern a particular substance. By performing a search every quarter, we can systematically maintain statistics about which NPS have been discussed, the popularity of the discussion (number of posts), and how many people showed an interest in the discussion (number of views). Because it is only the titles of the topics that are examined to determine whether a topic concerns an NPS, the data underestimates the actual number of discussions about NPS on the forums, but for gaining qualitative insight into the developments concerning the popularity of these new substances in the Netherlands, the method suffices. The data obtained by the online monitoring of forums is verified using our other monitors, such as the number of NPS that are submitted for testing to the Drugs Information and Monitoring System (DIMS) [4].

In addition to online drug monitoring using web scraping, we also use Google Trends to gain an indication of the popularity of substances [5, 6]. Using Google Trends, a user can gain insight, via graphs and tables, into how often a certain word is searched for using Google. It is also possible

to make a comparison between cities, countries and languages, and a comparison of the relative popularity of different search words.

Subsection 2.5 contains an example of a brief exploration of substances that we did using Google Trends.

Ethical and legal aspects of online drug monitoring

The monitoring of the internet and more specifically the forums and other social media where users discuss illegal substances has been the subject of heated ethical discussions for a long time [7-9]. Some researchers think that all of the data that can be found on the internet are public and can be freely collected and used. Others think that forum messages should not be freely used, for instance, because forum members do not always realise the possible impact of posting messages on forums. Guidelines have now been formulated for doing this type of research via the internet [10]. To keep on the safe side and to prevent any possible breaches of the privacy legislation, we also decided not to collect any data that could be used to trace an individual forum member or unique pseudonym.



② What experiences have we had in recent years with online drug monitoring?

In recent years, the Trimbos Institute has completed several projects in which online drug monitoring played a major role. These projects are described briefly below.

2.1 I-TREND (2013-2015)

The I-TREND project (2013-2015), which was subsidised by the European Commission, was coordinated by the French Observatoire Français des Drogues et des Toxicomanies (OFDT). In addition to the OFDT, it involved four other European partners: the CUNI University in Czech Republic, the SWPS University in Poland, the Liverpool John Moores University in Great Britain, and the Trimbos Institute in the Netherlands. The objective of this project was to provide help in preventing both health and societal damage due to NPS use and to improve the knowledge about the effects and risks of these substances. The project had various parts: the monitoring of forums where drugs were the subject of communication, the monitoring of web shops that supplied NPS, the carrying out of a survey using an online questionnaire about the use of NPS, and monitoring the composition of NPS that were purchased. The project resulted in various papers. Brunt et al. (2017) found that in spite of what is generally advertised in web shops about the purity of the substance on offer (>99%), in reality the purity of NPS varied considerably. Some NPS were wrongly labelled and some contained chemical analogues (including 25B/C-NBOMe instead of 25I-NBOMe, and pentedrone instead of 3,4-DMMC). But in some cases, the NPS proved to contain completely different substances than what was offered (e.g. pentedrone instead of α MT or 3-FMC instead of 5-MeO-DALT). Moreover, the sales prices differed considerably between the countries.

The researchers assume that this large variation in price and purity of the products bought are the effect of the market dynamics of supply and demand, but also of the role law enforcement plays in the various European countries [11]. In a study following on from I-TREND into the effects of a ban on the availability and accessibility of NPS, Belackova et al. (2017) concluded that there is no proof for assuming that prohibiting specific NPS at the national level influences the availability of substances on the online NPS markets. Triangulation of data regarding street trading and internet sales is required, as is more investigation into the possible relocation of markets to more difficult to find internet locations. In addition, the replacement of NPS that is banned by other, still legal NPS, is a point of consideration for future research [12].

2.2 NPS and changes in popularity

Since the Trimbos institute has been monitoring NPS-related drug forums, for years, 4-FA (4-FMP/4-fluoroamphetamine) was the NPS about which the most new topics started. 4-FA is a substance that has similar subjective effects to that of ecstasy and amphetamine [14]. The substance has been submitted increasingly to the DIMS since 2013 [15] and in 2016, the proportion of 4-FA samples with respect to the total number of submitted samples had risen to 12% [16]. A comparable trend can be seen in the results of the study into the nightlife scene. In 2016, a quarter of the people questioned had used 4-FA at least once in the past year, comparable to the use of amphetamine and cocaine in this group [13, 17].



In 2017, 4-FA was no longer the most discussed NPS in forums, it dropped to third place. This trend continued in 2018. In 2018, 20 new topics were started on this substance, compared to 119 in 2014. The data concerning the possible falling popularity of 4-FA have been compared to the data from other monitors. In addition to traditional sources including the CBS data (as given in the Annual Reports of the National Drug Monitor) we also investigated Google searches into 4-FA for the past years. A comparable trend can be seen. Most 4-FA searches took place in mid-2016, when the media paid a lot of attention to 4-FA. A relatively large number of searches were done prior to 4-FA being placed on Schedule I of the *Opiumwet* (Dutch Opium Act) on 25 May 2017.

After that there has been a steady reduction in the number of searches with 4-FA as the subject, in line with the declining popularity of 4-FA on the monitored forums. In other words, the trend in a reduction in discussions about 4-FA in 2018 seen through monitoring forums is also seen in the Google searches. Moreover, we also see this trend in other sources, including the data about the number of 4-FA samples submitted to the DIMS [15], the changed perception of risk among users as well as the use of 4-FA since the ban on 25 May 2017 [18] and a reduction of the proportion of 4-FA related health incidents in the Monitor Drug-Related Incidents (MDI) in 2017 [19].

Figure 2: Number of searches for 4-fluoroamphetamine (4-FA, 4FA, 4-FMP, 4fmp), in the period January 2016 until December 2018



In 2018, ketamine⁵ was the subject for which the most new topics, namely 52, were posted on the forums that we selected. In these topics all together 432 messages were posted; the subjects have been viewed more than 85,000 times. We also see the increase in popularity of ketamine in other sources, including 'Het Grote Uitgaansonderzoek' (The Great Nightlife Survey) from 2016, that shows that more than 17% of the investigated population ('participants in nightlife') ever used ketamine, more than the lifetime use of GHB or 2C-B in this group [13]. In addition, in 2018 there were relatively many discussions about substances including GHB, 2C-B, 6-APB, DMT (and 4-FA).

What is striking is the increasing popularity of kratom, based on the number of topics started in recent years, see also Figure 3. Kratom is a plant, *Mitragyna speciosa*, that grows naturally in Southeast Asia, where it is mainly used for medicinal purposes. The plant is also used as a recreational drug. The increasing trend on forums possibly suggests the increasing popularity of this substance, something we have hardly seen or never seen in the other monitors.

2.3 Changes in attitudes towards 4-fluoroamphetamine

Using internally developed software, we investigated the degree to which the nature of the discussions (the 'sentiment') could be measured automatically and whether changes in the nature could be identified.

Specifically, this means that we have investigated whether the increase in media coverage of incidents after using 4-FA, the resultant health warning in September 2016 and the fact of it being included in Schedule I of the *Opiumwet* (Dutch Opium Act) have led to a change in the sentiment, the feeling or the mood of the messages about 4-FA.

We have seen that initially 4-FA was often discussed, based on the number of new topics and posts. The number of posts about 4-FA increased from 76 in 2012 to 323 in 2015, after which this number fell annually to 135 in 2017. Statistical analyses show that in 2015 the posts about 4-FA were significantly more positive than those in 2017. This means that changes in the scope and sentiment of the forum posts were in line with the media reporting of 4-FA. Internet forum monitoring can help to identify trends in popularity, prevalence and health incidents related to NPS such as 4-FA [7] at an early stage.

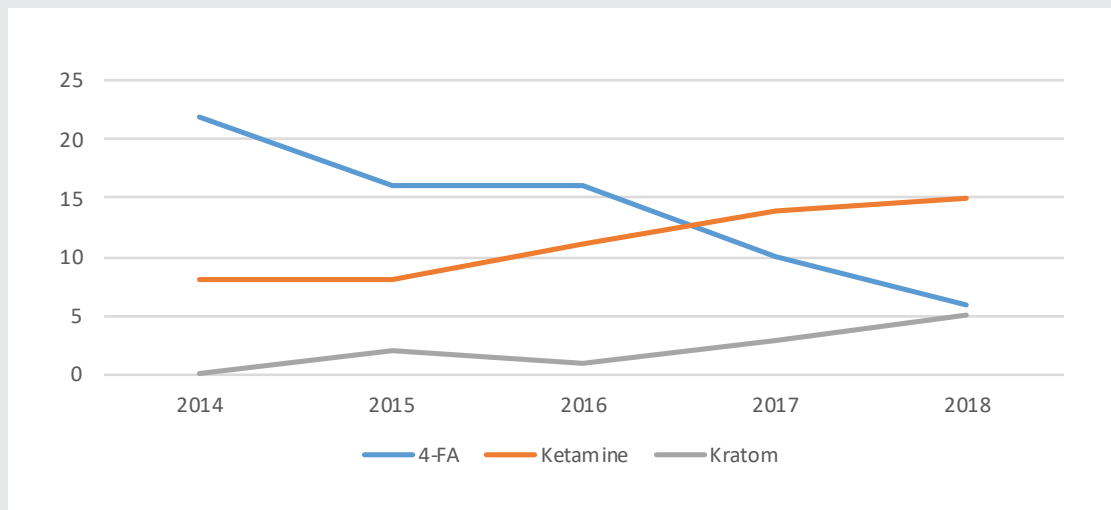
⁵ In this factsheet, we employ the EMCDDA's definition of NPS, which also includes more or less 'traditional' substances such as ketamine, GHB, 2C-B and DMT in this group.



Figure 3: Newly started topics, period 2014-2018, including 'traditional' NPS

2014 NPS	# new topics	%	2015 NPS	# new topics	%	2016 NPS	# new topics	%	2017 NPS	# new topics	%	2018 NPS	# new topics	%
4-FA	119	22	4-FA	90	16	4-FA	88	16	2C-B	59	21	Ketamine	52	15
2C-B	91	17	2C-B	70	13	2C-B	79	15	Ketamine	36	14	GHB	51	15
GHB	44	8	GHB	46	8	Ketamine	60	11	4-FA	29	10	2C-B	47	14
Ketamine	42	8	Ketamine	43	8	GHB	49	9	GHB	19	7	6-APB	22	6
NPS general	30	6	NPS general	31	6	DMT	26	5	3-MMC	14	5	DMT	22	6
DMT	25	5	MXE	25	4	3-MMC	17	3	NPS general	14	5	4-FA	20	6
MXE	22	4	6-APB	19	3	NPS general	15	3	DMT	10	4	Kratom	16	5
6-APB	12	3	3-MMC	17	3	6-APB	14	3	Phenibut	9	3	NPS general	11	3
2C-E	10	2	DMT	16	3	3-FPM	8	1	6-APB	8	3	1P-LSD	10	3
4-MMC	7	1	Etizolam	12	2	MXE	8	1	Kratom	8	3	3-MMC	9	3
Bk-2C-B	7	1	Kratom	11	2	2C-E	7	1	1P-LSD	6	2	Etizolam	9	3
3-MMC	6	1	1P-LSD	8	1	Kratom	7	1	ALD-52	6	2	4-FMA	6	2
Etizolam	6	1	2C-E	7	1	1P-LSD	6	1	MXE	5	2	Phenibut	6	2
MDPV	5	1	AL LAD	7	1	3,4-CTMP	6	1	3-MeO-PCP	4	1	Flunitrazolam	5	1
25I-NBOMe	4	1	Phenibut	7	1	AL LAD	6	1	4-MMC	4	1	2C-E	4	1
2C-I	4	1	MDPV	7	1	DOC	6	1	U-47700	4	1	4-MMC	4	1
5-MAPB	4	1	Bk-2C-B	6	1	2C-D	5	1	AL LAD	3	1	ALD-52	4	1
AH-7921	4	1	25I-NBOMe	5	1	2-FMA	5	1	3-FA	2	1	25C-NBOMe	3	1
Diclozepam	4	1	5-MeO-MIPT	5	1	4-AcO-DMT	5	1	4-AcO-DMT	2	1	25D-NBOMe	2	1
GBL	4	1	GBL	5	1	Etizolam	5	1	4-FMA	2	1	3-HO-PCE	2	1
	540			553			535			282			345	

Figure 4: % Newly started topics about 4-FA, ketamine and kratom compared to the total newly started NPS, 2014-2018



2.4 Keeping track of synthetic opioids

In 2018, we also investigated discussions about new synthetic opioids, including substances related to fentanyl. The reason for this was the problems associated with these substances in the United States and Canada, and the possibility that the use of these substances and the health problems associated with them would also increase in Europe. Traditional monitors do not yet point to an increase in the non-medical prescribed use of new synthetic opioids in the Netherlands. It is probable that these subjects are discussed frequently on forums⁶.

In May 2018, the forums that we monitored were scanned for subjects about these substances. Between January 2014 and May 2018, we found a total of 18 topics on the forums that we monitored where the title suggested that they concerned new synthetic opioids⁷ (see Figure 5). Half of these topics concerned U-47700, a substance that has been linked to multiple fatal and non-fatal incidents throughout the world.

But if we compare the number of new topics about opioids to those of other NPS groups, such as phenethylamines (including 4-FA and 2C-B), it is clear that these opioids are discussed relatively infrequently (see Figure 6).

If we examine the Google searches, we see a comparable picture: in the Netherlands, U-47700 is searched for far less than the searches for substances that have a comparable effect, such as heroin or oxycodone (see Figure 7).

Based on the above, the cautious conclusion can be drawn that, for the time being, new synthetic opioids cannot count on a high degree of interest on forums or in Google searches, which in turn suggests that these substances are probably not (yet) used on a wide scale in the Netherlands. However, we can use our monitors to keep track of the development in the non-medical use of these substances.

6 We have concentrated on several forums on which NPS are discussed relatively frequently; it is conceivable that this group of substances is discussed much more on other forums, such as patient/ client forums.

7 To do this, a list of almost 60 search terms was made of new synthetic opioids, which was used to crawl the forums and sub-forums.



Figure 5: Topics started between 2014 and mid-2018 with a new synthetic opioid in the title

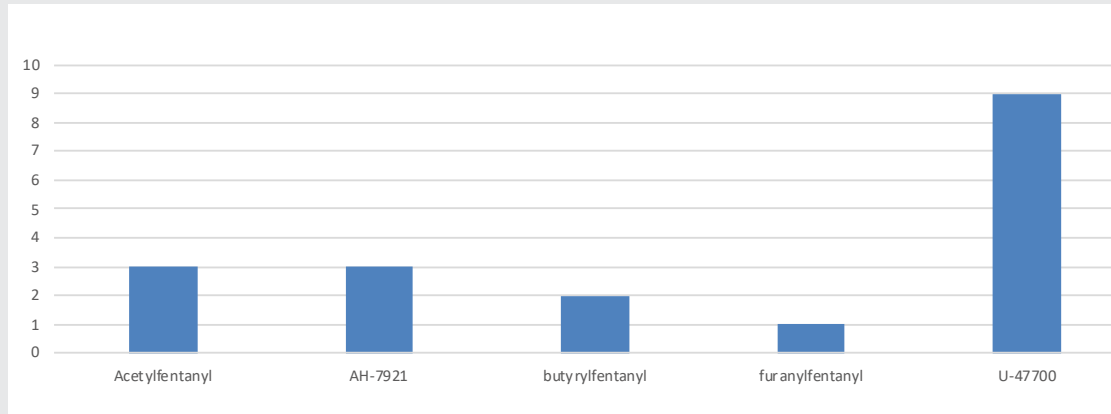


Figure 6: Number of newly started topics per NPS group, period 2014-2018

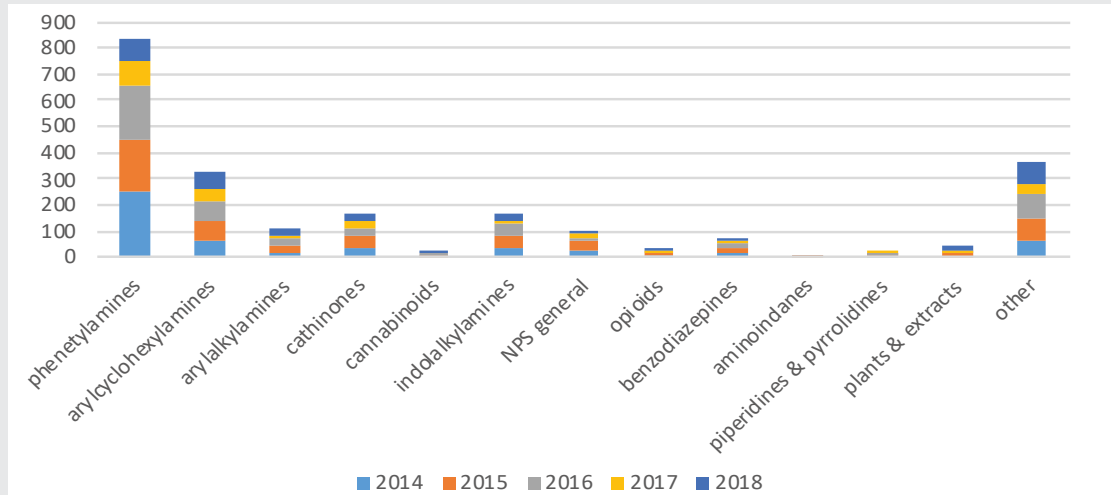
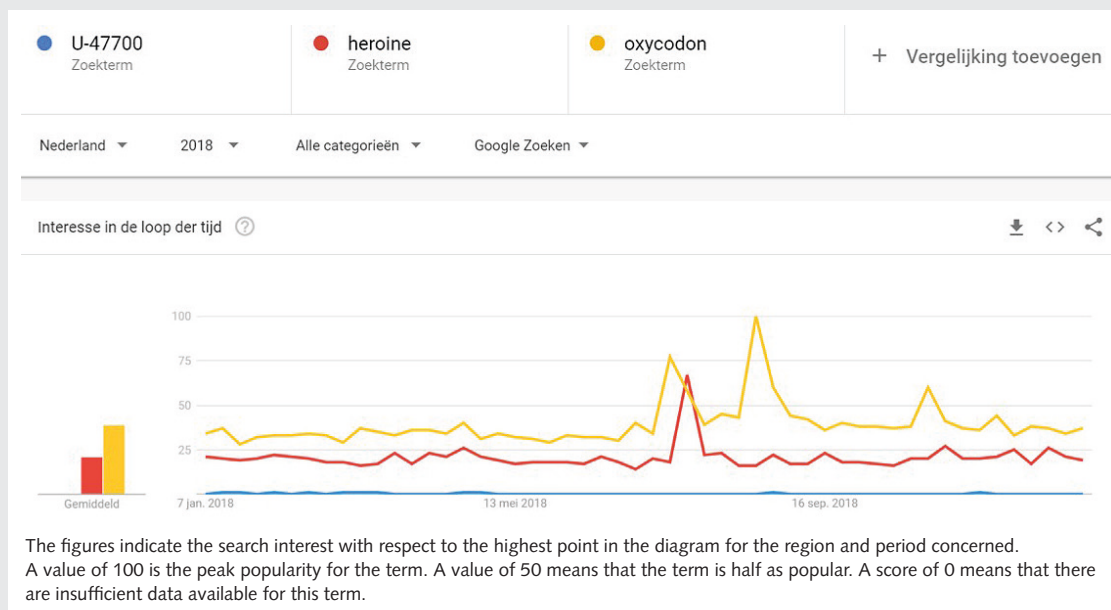


Figure 7: Interest in U-47700, heroin and oxycodone, measured based on the number of Google searches, reference year 2018



2.5 Use of Google Trends in a quick-scan concerning the IQOS

In 2018, the Trimbos Institute carried out a quick-scan into the benefit and feasibility of monitoring trends in new smoking products via the internet. Here we focused on the IQOS (which stands for I-Quit-Ordinary-Smoking). This is a tobacco product that was introduced in 2014 (in the Netherlands in 2017) in which tobacco is not burnt but heated. Recent research by among others the American Food and Drug Administration has demonstrated the harmfulness of this product [6]. In spite of this, the product is sold in many countries, including the Netherlands. For the sake of this factsheet, we recently conducted a new quick-scan.

The question at the heart of this quick-scan was if it was possible to use Google Trends to answer the following three questions: (1) is the product popular in the Netherlands when compared to other countries? (2) how has this developed through time? and (3) is there regional variation within the Netherlands in the popularity of the product?

To answer these questions, a link was made between the R statistical environment and Google Trends. In fact, this meant that Google Trends was scraped; using scripting we could consult the Google Trends database. In doing so, we operationalised the popularity as the number of Google searches for the product name.

A word cloud of various drug names and terms. The most prominent words are 'Flunitrazolam' and '25D-Nbome'. Other visible words include 'Research', 'Chemicals', 'Dutch Opium Act', 'Ketamine', 'Synthetic', 'Spioido', '5-Mapp', 'Ghd', '3-Fa', 'Phenibut', 'Phenylethylamines', '2C-I', 'Al-Lad', '2C-B', 'Diclazepam', 'Mdpv', and 'NPS designer drugs'.

We requested, analysed and compared the data concerning the number of searches within the Netherlands and in other countries in the last five years.

Figure 8 shows the changes in popularity within the Netherlands when compared to a number of surrounding countries (Germany, Belgium, France and Great Britain), and worldwide.

Figure 9 shows the popularity in the same period per country. The higher the score for a date or country, the higher the number of searches and therefore the popularity. It concerns weighted relative scores per country and unit of time, with a maximum set at 100, with corrections being made for the total number of searches per country. This means that the scores for the time and between countries are comparable.

Figure 10 shows the popularity per province in the Netherlands.

The three figures show that the number of searches for the product has increased through time in the Netherlands, the surrounding countries and worldwide with the increase in the Netherlands being much more limited than worldwide. The increase in the surrounding countries is comparable. The same picture is given by the country comparison (Figure 9): The relative number of searches in the Netherlands when compared to the other countries is low, which indicates a relatively low popularity of the product. When we see the provincial variation within the Netherlands in the number of searches, we see some variation, but not to the same degree as between countries. The amount of data on which this is based is also limited, meaning that random variation possibly also plays a role.

It can be concluded from this, that with respect to the product an increase can be seen in its popularity in the Netherlands when compared to the first year after its introduction, but that the popularity seems to be low when compared to that in a large number of other countries. In particular outside of Western Europe, there seems to be more interest in this product. We also conclude that the method used makes it possible to relatively simply and quickly draw conclusions about the popularity of a new product.

Figures 8-10: Change in the popularity of the iQOS between several countries, per country and per province in the Netherlands.

Figure 8

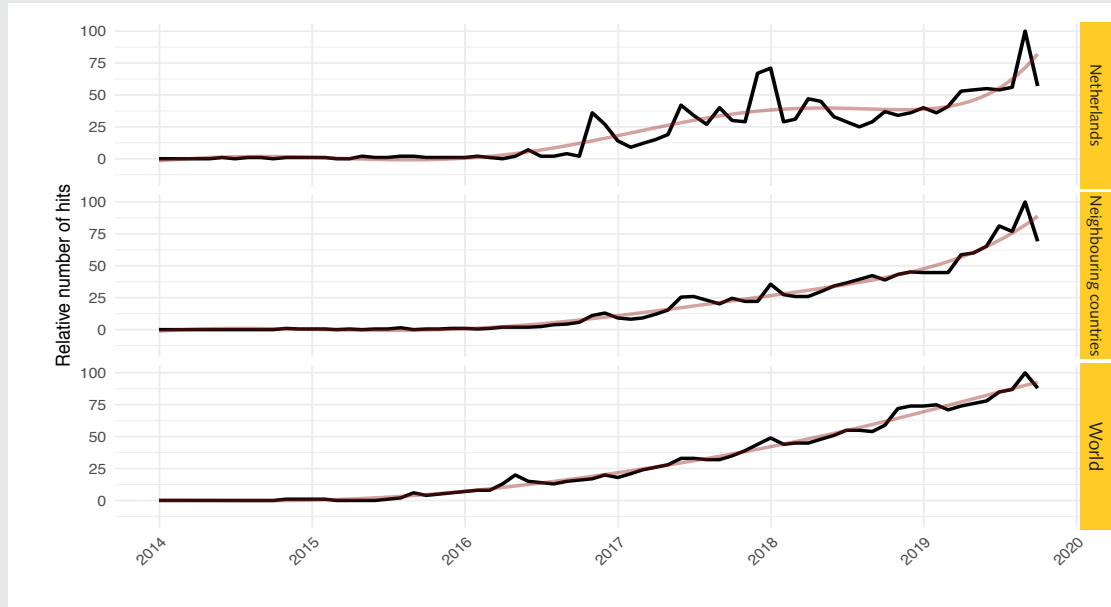


Figure 9

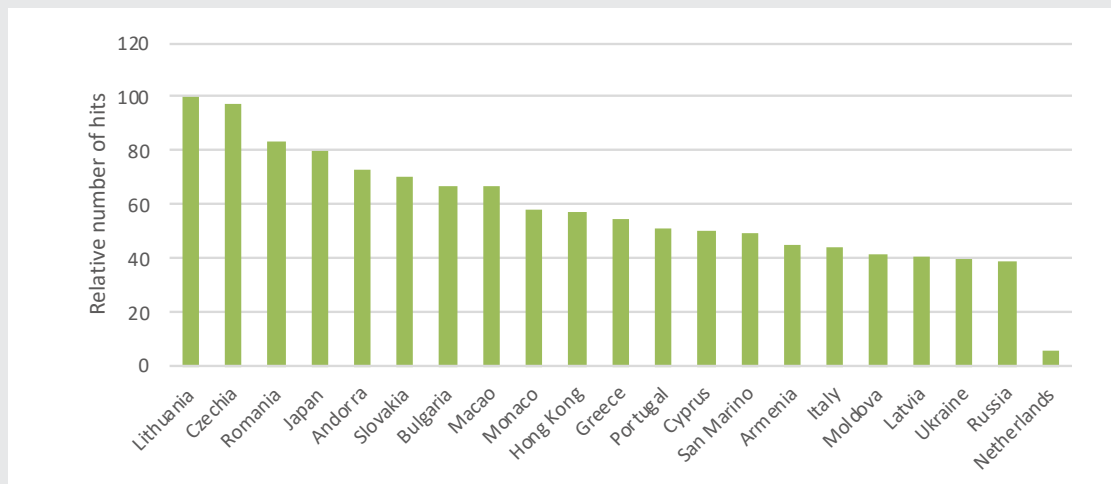
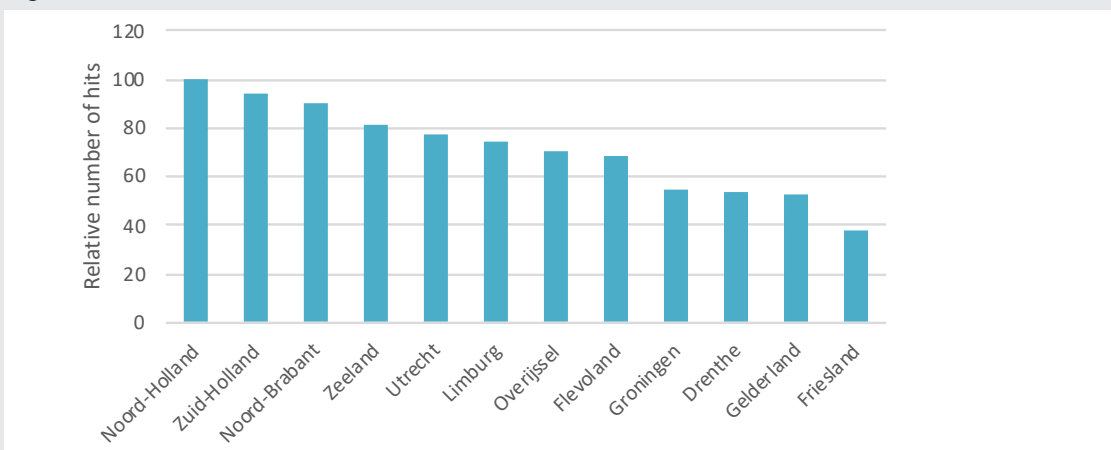


Figure 10



③ What is the added value of online drug monitoring compared to the regular substance monitors?

What are the advantages and disadvantages of online monitoring?

Every monitoring method has its advantages and disadvantages. Traditional population studies, such as questionnaires, can give a bias when respondents do not want to provide certain information or when the sample does not represent the population being studied. The prevalence of drug use (and NPS in particular), is usually too low to collect deep data concerning the use (patterns, effects, risks and the like) using a questionnaire survey in a representative sample of the general population. When targeted sampling is used of the populations at risk, it is more difficult to substantiate the representativeness of the findings.

Online monitoring provides information with a higher ecological validity that is more difficult to obtain in other ways [21], and makes it possible to obtain information from difficult to reach populations – as long as these populations are sufficiently represented online. Another advantage of online monitoring is that it relatively quickly gives an impression of the societal developments based on what is communicated on the internet. Because online discussions are often kept, it is often possible to perform retrospective studies. Data is also collected that is not influenced by how a study is set up. In this way a realistic impression is given of the information that users share with each other online. It remains the question to which population generalisations can be made when online monitoring is used. It is our experience that online forum monitors are not suitable for estimating prevalence. They are potentially useful as an early indicator of possible changes in substances and substance use. A disadvantage of online monitoring is the dependence on existing forums and discussions, and the inability to direct the data collection or to ask in-depth questions about the central subject. There are challenges in the technical, ethical and legal areas, as was pointed out earlier in this factsheet.

What is the added value of online monitoring?

By combining data from different monitors an attempt is made to obtain a better picture of the popularity of substances and the associated trends and developments than is possible based on the individual monitors.

A trend that is detected in one of the monitors can be verified using the other monitors. It is expected that the most apparent trends will be detected in multiple monitors.

Online monitoring forms an extra channel for detecting new trends in a timely way or to verify trends detected in other monitors. To be able to detect trends in a timely way or to verify them quickly, it is desirable to continually monitor them, especially where NPS is concerned. Things develop quickly, new substances follow each other in quick succession, and the popularity of substances fluctuates strongly. The methods that we have developed and used have detected new indications and supported those of other monitors (refer to 2.3). The collected data proved useful to complement existing monitors that focus on developments in the drug market and have possibly a predictive value with respect to new trends that are not yet identified by other monitors. In recent years, data from our online monitors have been used in reports of the *Meldpunt Nieuwe Drugs* (Reporting Desk New Drugs) and the *Coördinatiepunt Assessment en Monitoring nieuwe drugs* (Coordination Centre for the Assessment and Monitoring of New Drugs) (CAM), and will possibly also be found to be useful in assessing the risk of NPS about which little is known [7].



Conclusion

This factsheet has addressed what online drug monitoring is and how it is used. The experiences that we have gained in recent years of online monitoring have also been discussed as has the added value of online monitoring for the regular substance monitors.

The added value of our monitors is, in particular, that they can quickly explore current and historical trends, without requiring invasive, time-consuming and expensive studies to be made. Based on the experience gained with online monitoring, we can conclude that it can be meaningfully used to complement other monitors or used independently to give a detailed and qualitative picture of (trends in) the popularity of substances, including NPS. Online monitoring also provides us with new information about the risks and effects of less well-known NPS. The representativeness of the findings from the online monitors has not yet been demonstrated, which means that for quantitative estimates of, for instance, user numbers we will prefer to consult the regular monitors.

Drug forums contain lots of relevant information that can be collected relatively easily. But social media, including Facebook, Instagram and Telegram are also increasingly used to discuss substances and also as platforms for the purchase and sale of substances [22, 23]. That is why we will explore the possibilities of monitoring these channels more intensively so that they can be used in the future. We will also explore how we can structurally and systematically monitor the cryptomarkets⁸ and the associated forums on the Darknet⁹. There are challenges in the fact that many of these online markets are only briefly active. Another challenge for our task as the national drug monitor is that discussions on the cryptomarkets are normally carried out in English, which makes it unclear where the forum members come from.

It is obvious that the internet will become an increasingly important platform for the purchase and sale of drugs and also for discussions about substances. Therefore, it is our task to stay up to date, also online, of the latest developments.

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- 8 Also referred to as darknet markets, with the main characteristics being anonymous access via special software such as the TOR browser, payment in internet currencies (in particular Bitcoin) and the possibility and possibly the obligation for the purchaser to assess the purchase.
- 9 That part of the internet that is not indexed by search engines, also called the Darkweb, and that can only be accessed using special software or browsers.





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Colophon

Trimbos Institute
PO Box 725
3500 AS Utrecht
T: +31 (0)30 – 297 11 00
E: dguuwe@trimbos.nl

Authors
Daan van der Gouwe
Matthijs Blankers
Margriet van Laar
Programme Drug Monitoring & Policy
(DMP)

Layout and production
Canon Nederland N.V.

Photos
gettyimages.nl

Ordering information
This factsheet can be downloaded via
www.trimbos.nl.

Article number: AF1695-ENG

September 2019

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