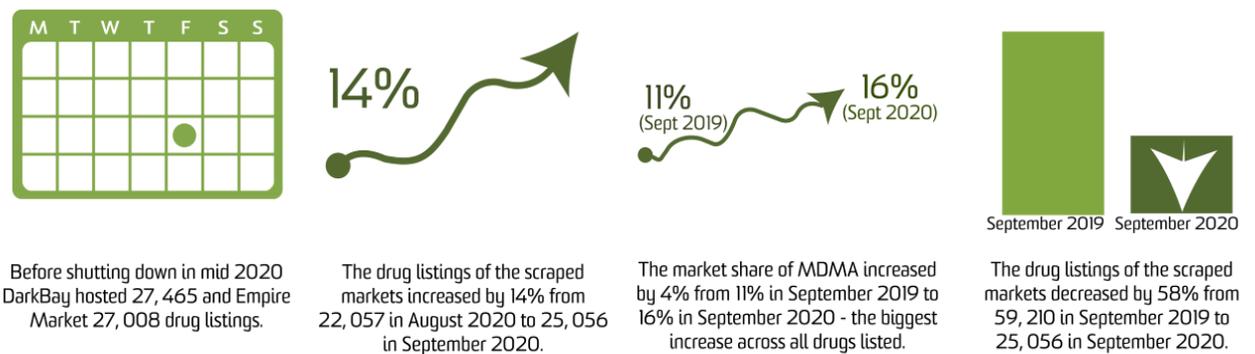
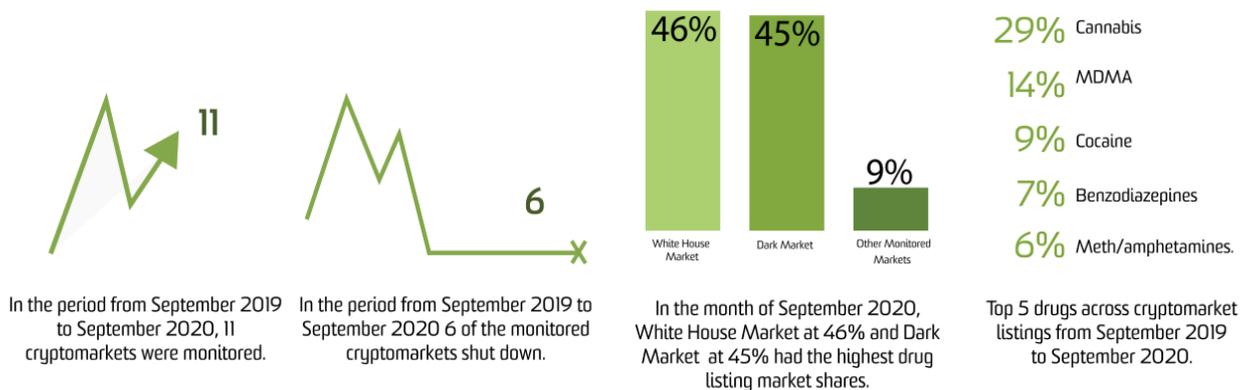


TRENDS IN THE AVAILABILITY AND TYPE OF DRUGS SOLD ON THE INTERNET VIA CRYPTOMARKETS, SEPTEMBER 2019 – SEPTEMBER 2020

Authors: Rajat Katyal, Nicola Man, Anant Mathur, Raimondo Bruno, Monica J. Barratt and Amy Peacock
National Drug and Alcohol Research Centre
University of New South Wales Sydney

Key Findings



- Since 1st September 2019, 11 cryptomarkets have been monitored weekly, of which 5 were active at the end of the monitoring period (i.e., 30th September 2020): Cannahome, White House Market, Monopoly Market, Dark Market and Cannazon.
- In September 2020 there was a weekly average of 25,056 drug listings per scrape, with a 14% increase from 22,057 average weekly listings per scrape in August 2020.

- In comparison to the previous year, September 2020 had a 58% decrease in listings, from 59,210 average weekly listings per scrape observed in September 2019.
- Since the last [Bulletin \(May 2020\)](#), 2 major cryptomarkets have shut down: DarkBay and Empire Market. These markets had 27,465 and 27,008 drug listings, respectively, when last scraped whilst active (11th June 2020 and 23rd July 2020, respectively).
- In the last monitored month (September 2020), White House Market and Dark Market on average accounted for 91% of the observed weekly drug listings (46% and 45%, respectively).
- The greatest market share of drugs listed on the cryptomarkets from September 2019 to September 2020 was held by cannabis (29%), followed by MDMA (14%), cocaine (8.9%), benzodiazepines (6.8%), meth/amphetamine (6.3%) and opioids (excluding heroin; 5.6%). This trend has been largely consistent over time.
- The market share of cannabis declined from 34% in September 2019 to 30% in September 2020, while the market share of MDMA increased from 11% in September 2019 to 16% in September 2020.
- Focusing on the period of the COVID-19 pandemic, March 2020 to May 2020 saw an increasing trend in the average number of drug listings, while the period from June 2020 to August 2020 saw a decline in the average number of drug listings. The aforementioned major market closures in this period must be considered when interpreting these findings

Background

This bulletin series reports on trends in the availability and type of substances sold on the internet via cryptomarkets over the last 13 months (a new bulletin is released typically every four months). The current bulletin focuses on analysis of listings from 1st September 2019 to 30th September 2020.

[Drug Trends](#) have identified, crawled (or ‘scraped’), extracted, categorised and analysed drug listings on cryptomarkets on a weekly basis since 1st January 2014, formerly using VBA programming processes, and since 9th August 2018 using a range of programmed automated processes in Python that operate with minimal manual input. Further background and information regarding the methods are available for [download](#).

Panel A. Terminology

[Cryptomarkets](#) (‘darknet markets’) are anonymous online trading platforms that facilitate the purchasing of illicit goods and services via multiple sellers.

Number of listings is the sum of listings per single scrape each week belonging to a specific market and/or drug category. For this measure, duplicate listings (defined as listings with identical names and same quantity of drug by a single vendor on a single market) within the same week are removed.

Number of vendors is the sum of unique vendors per single scrape each week selling a specific drug category within each market. For this measure, a vendor is considered unique only within the same market; that is, the same vendor may be counted multiple times across different markets. Please note that the number of vendors is not summed across different markets in our visualisation and bulletin.

Our reporting focuses only on identified English language cryptomarkets selling drugs which have ≥ 100 drug listings and ≥ 1 vendor. For a historical record of marketplaces monitored by DNeT, we refer the reader to our [interactive timeline](#).

Analyses are concentrated on listings on these marketplaces advertising the sale of illicit drugs (e.g., heroin), key licit drugs (e.g., alcohol, tobacco, e-cigarettes) and pharmaceutical medicines, as well as drug-related paraphernalia (e.g., needles and syringes, colorimetric reagent kits).

Following extraction of common text features across each listing (e.g., drug listing name, vendor name and the price in bitcoin or dollars), individual listings are categorised according to a pre-specified classification structure using a rules-based approach through text-matching in the first instance, followed by a long short-term memory (LSTM) artificial neural network (target predictive percentage 90%) that has been trained on historically categorised listings for those not matched through the former process (see [methods](#) for full details).

An accompanying public [online interactive data visualisation](#) is available, allowing viewers to interact with data collected over the total monitoring period. Data presented here comprise number of listings and number of vendors observed in a single scrape in a given week (see **Panel A**). These data can be considered reasonable estimates for trends in drug availability, as we cannot guarantee immediate identification and capture of cryptomarkets once they emerge. Further, data provided here can only be used as a proxy of drug availability on cryptomarkets: we have not translated to any metric that reflects the sale volume of a market or specific drug. See [here](#) for further discussion of caveats to interpretation.

Note: There are various approaches to collecting, collating, categorising and analysing cryptomarket data, and inherent challenges in these processes. For this reason, we have attempted to be as transparent as possible about our procedures. Our monitoring is an ongoing process, requiring constant refinements to the various stages. We welcome feedback and suggestions so that we can continue to improve utility of these data and our reporting on them (drugtrends@unsw.edu.au).

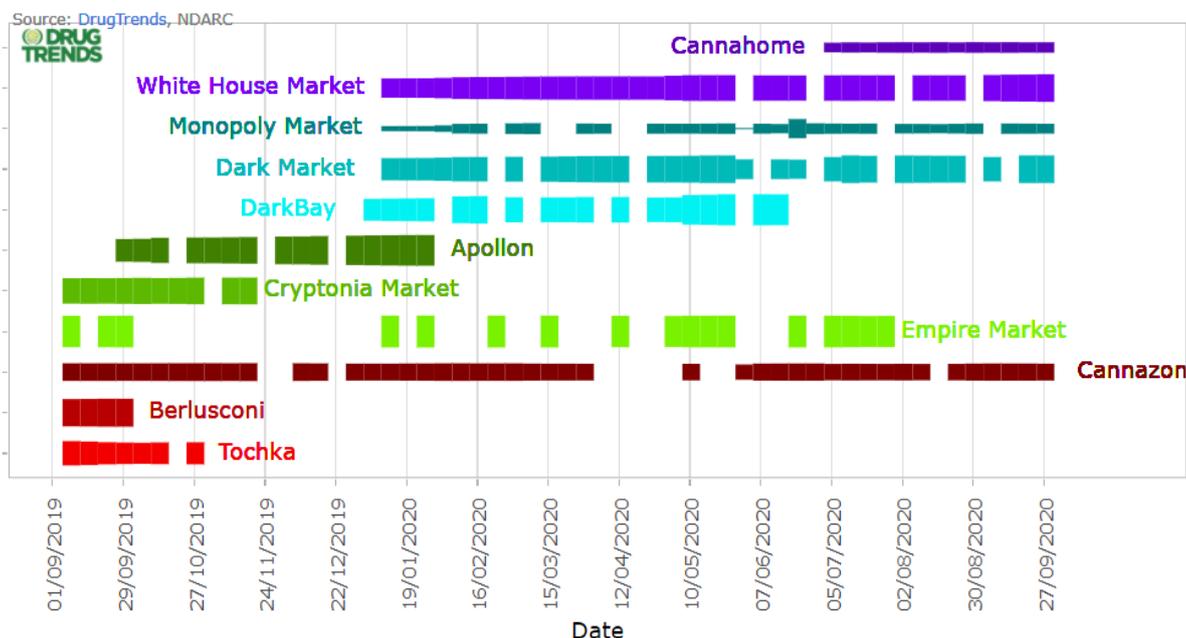
Findings

Profile of Markets

The current bulletin reports findings for the time period 1st September 2019 to 30th September 2020. In that period, 11 cryptomarkets were monitored (**Figure 1**). Of these, six markets were closed for the following purported reasons.

- [Berlusconi](#) – An Italian law enforcement operation resulted in the closure of the market on 26th September 2019.
- [Tochka](#) – Closed on the 24th October 2019 with an exit scam as reported by the site users and published by Deeponionweb.
- [Cryptonia Market](#) – For reasons unknown to the authors, Cryptonia Market ceased operations on 14th November 2019.
- [Apollon](#) - Due to an exit scam, Apollon ended operations on 23rd January 2020 as reported by darknetstats.
- [DarkBay](#) – DarkBay was last seen active on 11th June 2020 and closed possibly due to an exit scam as speculated in the darknet reporting sites ([searchlight](#) and [darklink](#)).
- [Empire Market](#) – Empire market announced its pending closure in mid-July 2020 and was last seen active on 23rd July 2020 by the authors. There have been reports of ongoing DDOS attacks on the Market as an extortion to make money, which have eventually lead to market closure while the site admins have exit scammed the users with an estimate of \$13 million in bitcoins ([bankinfosecurity](#) and [cointelegraph](#)).

Figure 1. Markets monitored from 1st September 2019 to 30th September 2020.



Note: See our [interactive timeline](#) for a complete historical record of all cryptomarkets monitored since January 2014. Breaks indicate period where market crawling was not achievable. The width of the bar is proportional to the log of the number of drug listings observed in each week for each market.

Active cryptomarkets:

Out of the 11 cryptomarkets monitored during this period (1st September 2019 to 30th September 2020), 5 remain currently active: Cannahome, White House Market, Monopoly Market, Dark Market and Cannazon. Of these 5 cryptomarkets, White House Market and Dark Market comprise the largest active cryptomarkets that are currently monitored, with 11,463 and 11,063 average listings in the month of September 2020, respectively.

Cryptomarket closures: May 2020 to Sep 2020

Since the release of the last [Bulletin \(May 2020\)](#), 2 large cryptomarkets have closed: Empire Market and DarkBay. Empire Market was the largest cryptomarket in this period in number of listings. Indeed, Empire Market hosted 27,465 drug listings when last seen operational on 23rd July 2020 (as observed in **Figure 2**). Empire Market was not consistently operational until closure, with successful scrapes conducted for 33 weeks of the 67 weeks since its inception, and major disruptions from September 2019 to June 2020 (**Figure 1**). Recent disruptions were [mainly attributed](#) to DDoS (Distributed Denial of Service) attacks.

Besides Empire Market, DarkBay was the other market which hosted a large number of drug listings before closure on 11th June 2020. When first scraped on 2nd January 2020, DarkBay hosted 4,053 drug listings. The number of listings subsequently grew by 531% to 25,611 listings when last seen active on 11th June 2020. There was a particular sharp increase in listings observed when scraped on the 30th April 2020 versus the 7th of May 2020 (see **Figure 2**), with an almost three-fold increase from 7,470 to 19,738 listings, respectively. However, the number of vendors on DarkBay remained nearly the same (291 vendors on 30th April 2020 and 301 vendors on 7th of May 2020, as observed in the [interactive visualisation](#)). This sharp increase in the number of drug listings before the cryptomarket closure can be hypothesised as fake/dummy listings which is seen as an indicator of scam activity as seen in other markets like [Agartha](#) popular for scamming users with fake listings.

Cryptomarket closures: Sep 2019 to May 2020

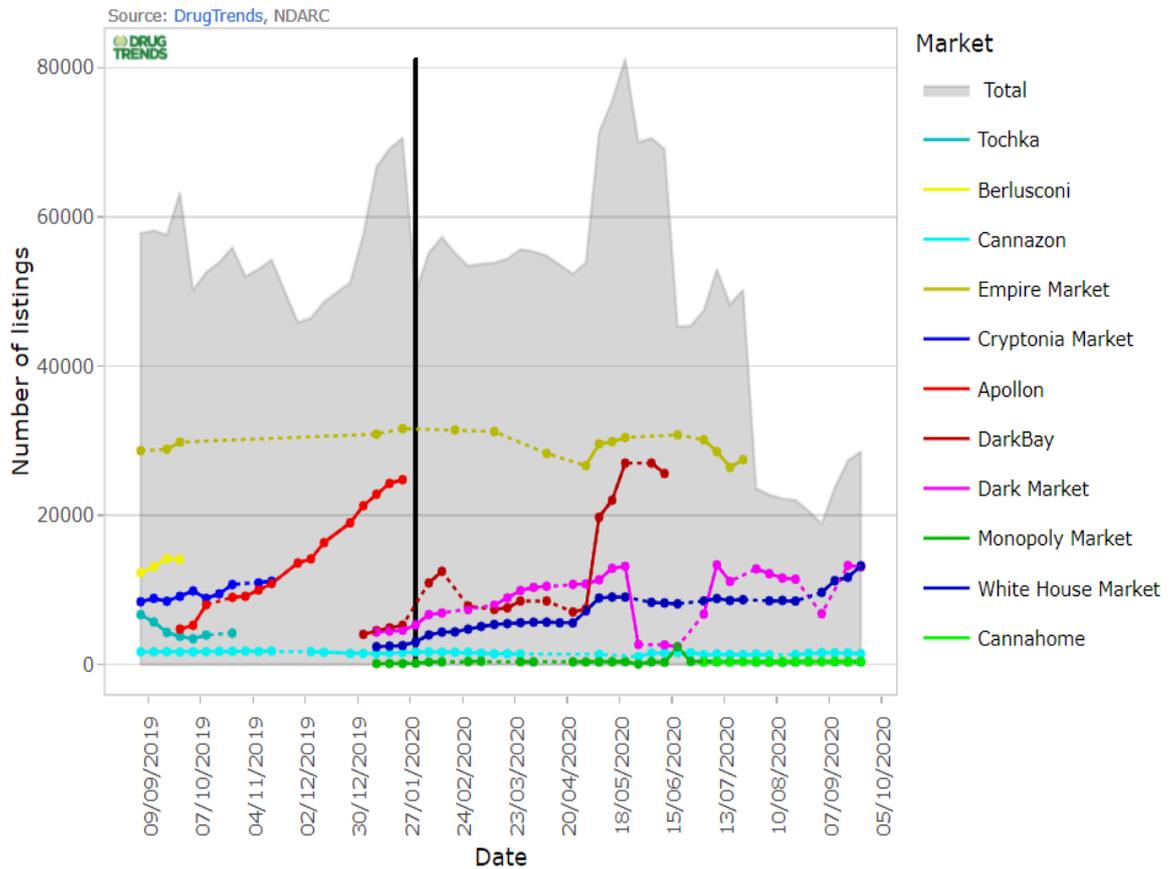
Another now defunct cryptomarket which showed a similar exit trend to DarkBay was Apollon. Apollon hosted 24,755 drug listings on the 23rd January 2020 before its closure on 28th January 2020, an increase from 4,759 listings (or of 420%) since monitoring of this market commenced on the 26th September 2019 (**Figure 2**). Apollon closed due to an exit scam.

The remaining markets which are now defunct (i.e., Berlusconi, Tochka and Cryptonia Market) were comparatively smaller, and closed early in the current reporting period (i.e., between September and November 2019).

From **Figure 1**, we can observe that the longest operational market for this period was Cannazon (total duration of monitoring: 128 weeks, commencing in the last week of April 2018). Cannazon is a cannabis-specific cryptomarket, with the number of drug listings per scrape ranging between 1,000 and 2,000 within the current reporting period.

The two largest cryptomarkets of note in the past month of monitoring were White House Market and Dark Market, showing steady growth with minimal downtime. White House Market has been operational from 9th January 2020, showing a 451% increase in number of drug listings, from 2,400 when first observed, to 13,235 listings when last observed on 24th September 2020 (**Figure 2**). Dark Market grew by 200% from 4,358 drug listings on 9th January 2020 to 13,094 drug listings when last observed on 24th September 2020 (**Figure 2**).

Figure 2. Total number of drug listings by marketplace from 1st September 2019 to 30th September 2020.



Note: Complete interactive visualisation available [here](#). Shaded area displays the total number of drug listing across all markets monitored at a given time. Caveats to this metric are outlined in the [methods](#). Dashed lines indicate interpolated data over periods where a market could not be monitored. Note that the commencement and discontinuation of the coloured lines indicates the opening and closure of the named market. The black vertical line indicates the date when the World Health Organization declared COVID-19 a [Public Health Emergency of International Concern](#).

Comparison to previous month: number of listings

Overall, there was a weekly average of 25,056 drug listings per single scrape observed across all the markets in the final month of monitoring (September 2020; Table 1). This was a 14% increase in the average listings compared to the previous month of August 2020 (average of 22,057 drug listings per weekly scrape).

Comparison to same month in the previous year: number of listings

Relative to the same month in the year prior, September 2020 saw a 58% decrease in average weekly listings as compared to September 2019, with the latter having 59,210 average weekly listings across all observed cryptomarkets.

This was a large decrease in the number of listings and can be attributed to three major cryptomarket closures during this period: Apollon, DarkBay and Empire Market.

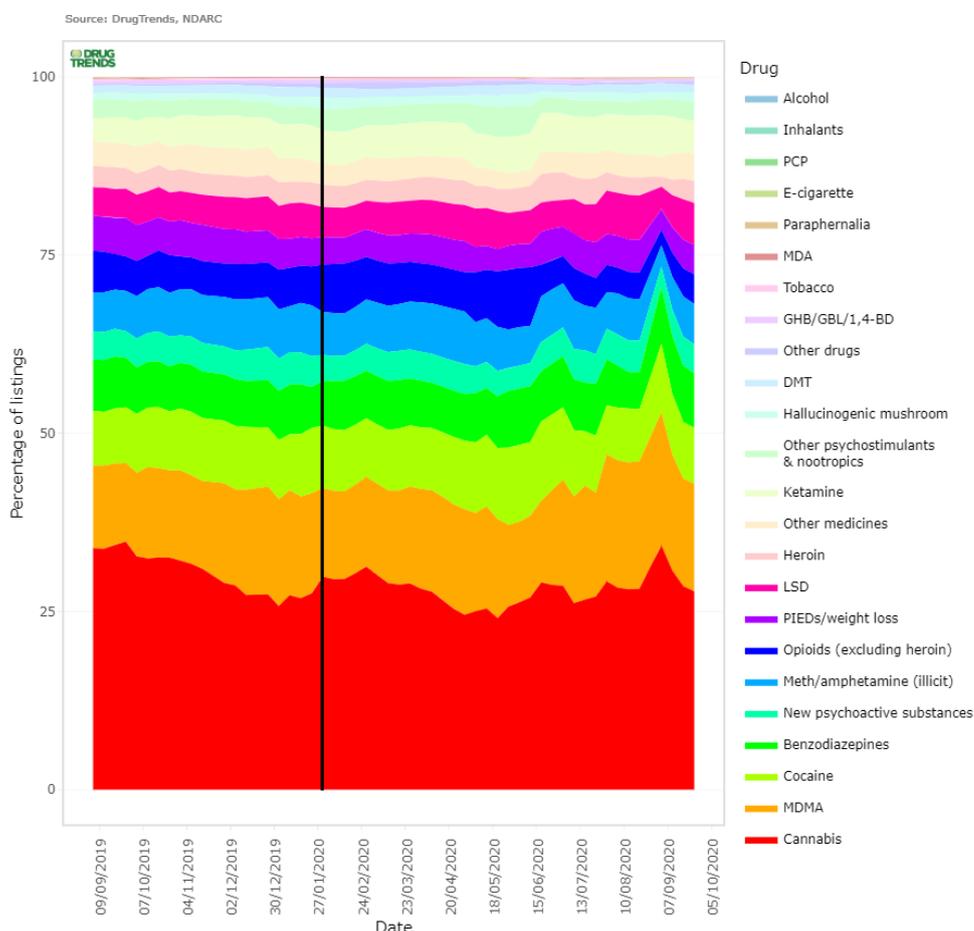
It is also important to note a dramatic fall in the number of drug listings following the closure of Dream Market in March 2019 (i.e., preceding this period of monitoring). Listings were low post Dream Market closure in the months of April-May 2019, with indications of a potential recovery from other cryptomarkets from June 2019 up to June 2020. However owing to market closures, the number of listings has subsequently declined, with figures recording in August-September 2020 similar to those observed in April-May 2019 in the immediate aftermath of the Dream Market closure (see this comparison on the [interactive timeline](#) and **Figure 6**).

Substance Availability

Market listings captured through cryptomarket monitoring have been categorised into drug classes according to this [methodology](#).

Cannabis comprised the bulk of the listings identified across all markets over the total period of monitoring (29%), followed by MDMA (14%), cocaine (8.9%), benzodiazepines (6.8%), meth/amphetamine (6.3%) and opioids (excluding heroin; 5.6%) (see **Table 1**, **Figure 3** and **Figure 4**). New psychoactive substances comprised 4.0% of listings, although challenges in their categorisation must be noted (see [methods](#) for further detail).

Figure 3. Percentage breakdown of listings by drug class over time from 1st September 2019 to 30th September 2020.



Note: Complete interactive visualisation available [here](#). Missing data are interpolated in this figure. See [here](#) for information on how interpolated data were computed. The black vertical line indicates the date when the World Health Organization declared COVID-19 a [Public Health Emergency of International Concern](#).

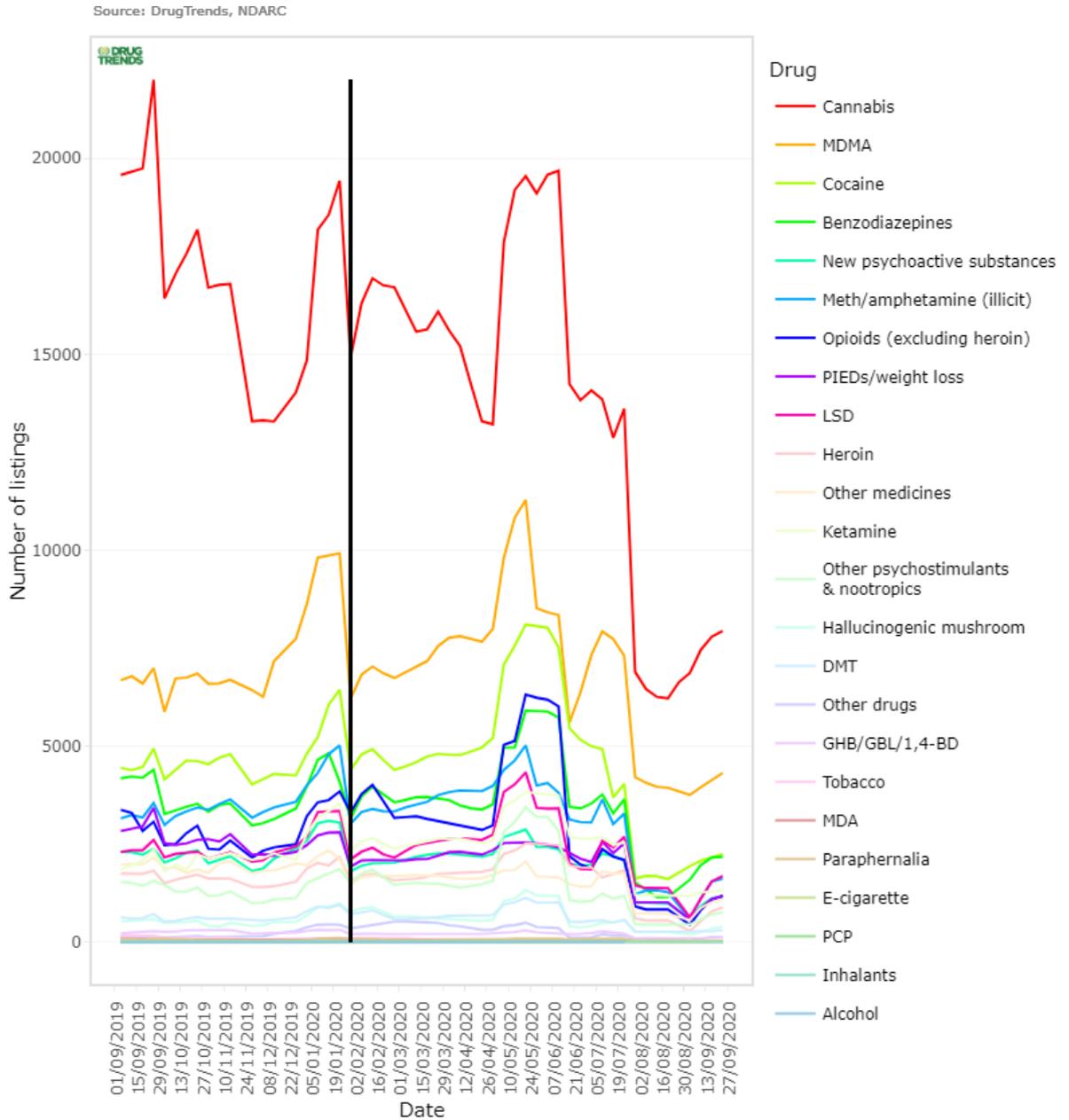
Comparison to previous month: market share

In terms of change in the percentage of drug listings across all markets disaggregated by drug (i.e., the ‘market share’ for each drug), there was <3% difference in the market share for each drug class across all markets when comparing the percentage of all listings observed in August 2020 versus September 2020. The largest changes observed were a 2.2% increase in market share for benzodiazepines, and a 1.8% decrease in market share for MDMA, from August to September 2020.

Comparison to same month in the previous year: market share

There was <5% market share change for each drug across all markets when comparing the percentage of all listings observed in September 2019 versus September 2020. Here the biggest gain observed was for MDMA, with an increased market share of 4.7% from September 2019 to September 2020. The largest decrease observed was for cannabis, with a 4.2% decline since September 2019.

Figure 4. Number of listing disaggregated by drug for all markets from 1st September 2019 to 30th September 2020.



Note: Missing data are interpolated in this figure. See [here](#) for information on how interpolated data were computed. MDA, tobacco, paraphernalia, e-cigarettes, PCP, inhalants and alcohol have not been included in the figure. To view these data see our [interactive visualisation](#). The black vertical line indicates the date when the World Health Organization declared COVID-19 a [Public Health Emergency of International Concern](#).

From the month of April 2020 to May 2020, there was an increase in the absolute number of listings per drug across all markets (i.e., the 'relative market size') for the majority of the drug categories, with a few exceptions. The most notable changes in this period were observed in the listings for psychostimulants and nootropics (75% increase to 2,532 average listings per scrape), hallucinogenic mushrooms (70% increase to 944 average listings per scrape), opioids excluding heroin (52% increase to 4,471 average listings per scrape) and cocaine (51% increase to 7,360 average listings per scrape) (see Table 1). As mentioned in the earlier section, this month on month increase could be largely attributed to the sharp increase in listings for the Dark Bay Market and a minor increase in White House Market for the month of May 2020 over April 2020.

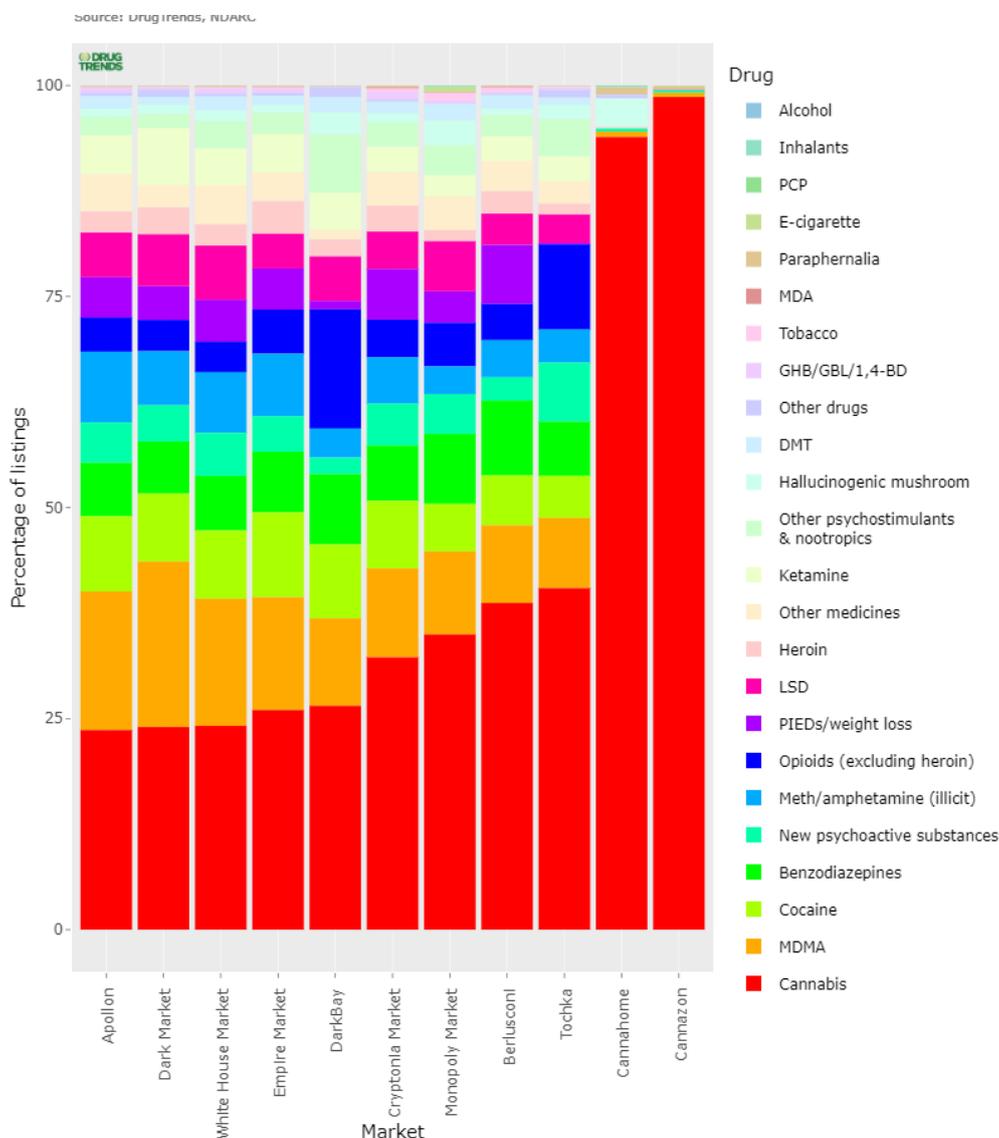
In terms of change in the absolute number of listings per drug across all markets (i.e., the 'relative market size') from the month of May 2019 to May 2020, most categories had increased due to an overall threefold increase in drug listings. However, there were notably large increases in some categories, namely: cocaine (224% increase in average number of listings to 7,360 in May 2020) and ketamine (251% increase in average number of listings to 3,530 in May 2020).

Table 1. Breakdown of total listings by drug class from 1st September 2019 to 3th September 2020

Drug Category	Percentage of Total (%) ^a		Market Share Percent Change (%) ^b		Market Size ^c Sep 2020	Relative Market Size (%) ^d	
	Sep 2019- Sep 2020	Sep 2020	Aug 2020 to Sep 2020	Sep 2019 to Sep 2020		Aug 2020 to Sep 2020	Sep 2019 to Sep 2020
Benzodiazepines	6.8	7.9	2.2	0.7	1,971	58	-54
Cannabis	29	30	1.0	-4.2	7,514	18	-63
Cocaine	8.9	8.4	0.8	0.7	2,106	25	-54
DMT	1.2	1.1	-0.1	0.0	280	6.9	-56
GHB/GBL/1,4-BD	0.4	0.4	0.0	0.0	100	7.6	-59
Hallucinogenic mushroom	1.2	1.2	0.0	0.2	295	18	-46
Heroin	3.1	2.5	0.1	-0.5	619	20	-65
Ketamine	4.6	5.0	-0.4	1.6	1,264	5.5	-39
LSD	4.6	5.0	-0.9	0.9	1,241	-3.5	-48
MDMA	14	16	-1.8	4.7	4,040	2.2	-40
Meth/amphetamine (illicit)	6.3	4.9	-0.6	-0.7	1,217	0.7	-63
New psychoactive substances	4.0	3.8	-0.5	-0.1	943	0.5	-59
Opioids (excluding heroin)	5.6	3.5	0.0	-1.8	879	13	-72
Other medicines	3.2	3.5	0.4	0.1	885	27	-56
Other psychostimulants & nootropics	2.8	2.5	0.5	-0.1	622	40	-59
PIEDs/weight loss ^e	4.2	3.7	-0.6	-1.4	928	-3.2	-69
Total ^f	100	100	N.A.	N.A.	25,056	14	-58

Note: All values in table have been calculated using interpolated data. See [here](#) for information on how interpolated data were computed. ^a This column displays the percentage of total listings across all marketplaces observed in the month of September 2020. ^b These columns display the change in percentage of total listings attributed to each drug across all marketplaces in the stated months (e.g., from May in one year to May in the next year). ^c This column displays the average number of weekly listings observed across all marketplaces in the month of September 2020. ^d These columns display the relative change in the average number of weekly listings observed in the stated months (e.g., from September in one year to September in the next year). Each column is colour coded to highlight the highest numbers in green, the average numbers in amber and lowest numbers in red, following the colour scale range. ^e PIEDs: performance and image enhancing drugs. ^f The total row includes all drug listings presented in our Bulletin. Alcohol, e-cigarettes, Paraphernalia, tobacco and inhalants, PCP, MDA and other drugs are not shown in this table due to small values. – Per cent suppressed for values <0.05.

Figure 5. Drug composition of markets monitored from 1st September 2019 to 30th September 2020.

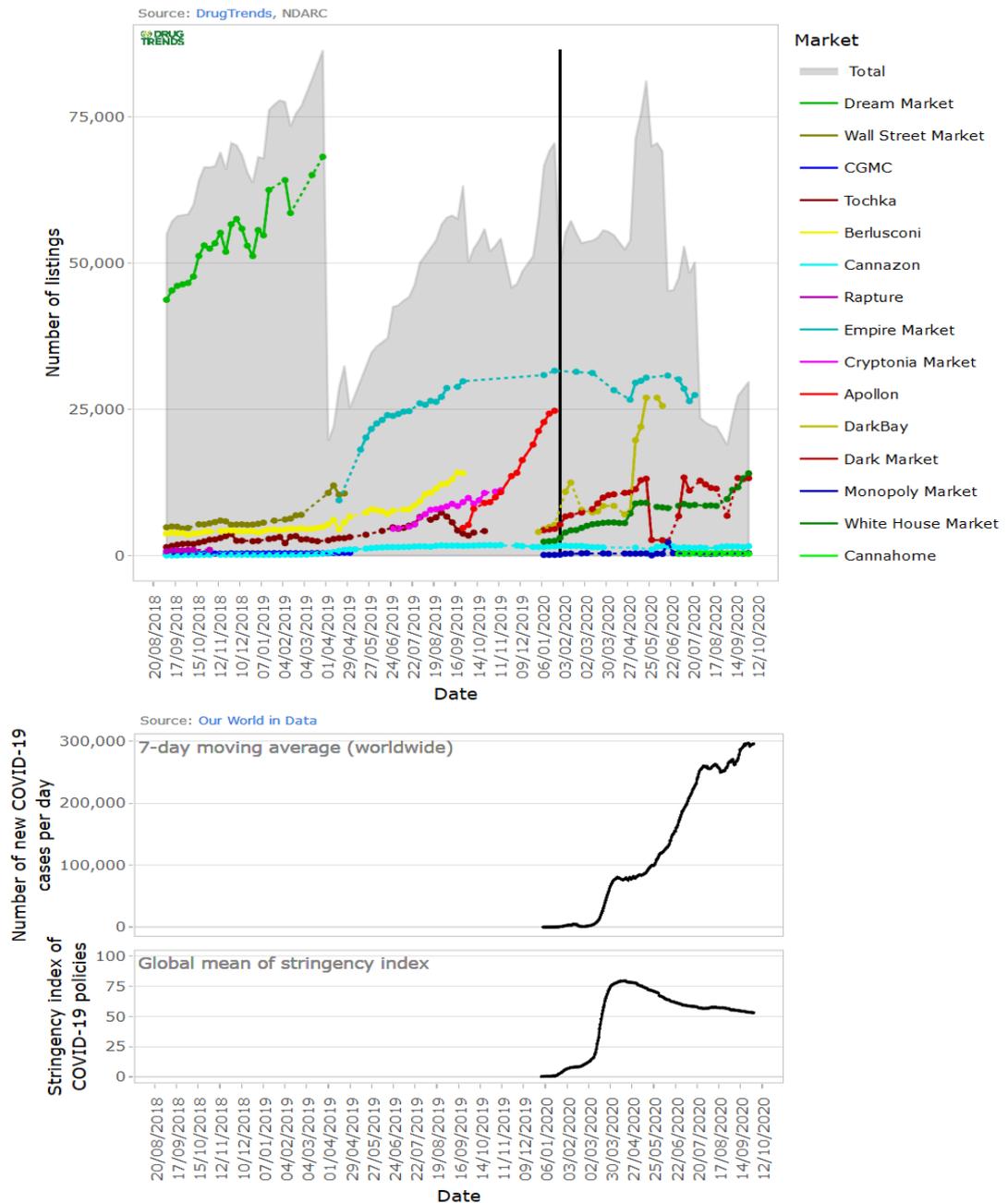


Note: See Figure 1 and our [interactive timeline](#) for the duration of monitoring each market. This figure displays drug class percentage of all listings observed from 1st September 2019 to 30th September 2020) for each marketplace monitored. Missing data are interpolated in this figure. See [here](#) for information on how interpolated data were computed. Cannahome and Cannazon are cannabis-specific cryptomarkets.

Figure 5 shows the breakdown of listings by drug type per market. These analyses show that most markets monitored listed an array of different drugs, although listings for two markets (CGMC and Cannazon) comprised >90% cannabis. There was also variability in the market share attributed to each drug across markets. For example, DarkBay and Tochka had a greater market share of opioid listings relative to other markets, while Dark Market had the greatest share of MDMA listings relative to other markets.

Impacts of COVID-19 and Associated Restrictions on Cryptomarkets

Figure 6. Total number of drug listings by marketplace from 1st September 2018 to 30th September 2020, number of new COVID-19 cases per day (worldwide) and Stringency index of COVID-19 policies.



Note: Data on new COVID-19 cases and policies are taken from [Our World in Data](#). The monitoring for the number of new COVID-19 started on 31st December 2019. As we have plotted the 7-day moving average, the first data point is on 3rd January 2020 which shows the mean number of cases per day from 31st December 2019 to 6th January 2020.

Figure 6 shows the time series for number of drug listings mapped against a key indicator of the COVID-19 pandemic; namely, the [number of new cases globally](#) since the start of monitoring on 31st December 2019. The global mean of a measure or index for stringency of COVID-19 policy derived by [Hale et al. \(2020\)](#) is also shown in the figure.

The figure suggests an initially stable trend in the average number of drug listings observed in the early months of the COVID-19 pandemic between February–April 2020 as the number of new COVID-19 cases increased and COVID-19 related policies was introduced or tightened globally. However, the cryptomarkets appeared quite volatile and there was a sharp increase in May 2020 primarily to a single market (i.e. DarkBay).

We can observe a decline in the average drug listings, particularly from June–Aug 2020, while new COVID-19 cases still increase globally. This decline can be largely attributed to the two major cryptomarket closures during this period: DarkBay and Empire Market. As evident from the stringency index, COVID-19 related policies appeared to have gradually relaxed from around April 2020 onwards until the end of the monitoring period on 30th September 2020. However, the global mean of this index is not indicative of the changes in policy in a particular country or region.

The monitored drug listing trends have been dependent on the volatile nature of cryptomarket activity, even before the pandemic (**Figure 6**). As such, the current evidence is inconclusive on whether the COVID-19 pandemic (measured by number of new cases and/or stringency of government policies) had an impact on the observed drug listings. However, there are important nuances to explore beyond crude count of number of vendors and number of listings. Ongoing monitoring will be important to further elucidate changes in drug cryptomarkets alongside the evolution of the COVID-19 pandemic.

For the interested reader, we highlight recent findings from the [European Monitoring Centre for Drugs and Drug Addiction \(EMCDDA\)](#) showed increased trade across three marketplaces in February and March 2020, with [other research](#) has shown showing an increase in unsuccessful transactions on cryptomarkets in April 2020. We would also direct the reader to a recent [editorial](#) considering potential impacts of COVID-19 and associated restrictions on buying and selling drugs on cryptomarkets.

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Related links

- Data visualisations: <https://drugtrends.shinyapps.io/cryptomarkets>
- Methods document: <https://ndarc.med.unsw.edu.au/resource/methods-trends-cryptomarket-drug-listings>
- For more research from the Drug Trends program go to: <https://ndarc.med.unsw.edu.au/program/drug-trends>

Contact us

Email: drugtrends@unsw.edu.au