

Tracing Patterns in International Synthetic Opioids Trafficking Through Activity on Online Platforms

By: Mohar Chatterjee

Class Year: 2022

Advisor: Mark Hansen



Cover Image: Fentanyl be Killing (Y)our Friends.

Location: La Brea, Los Angeles, on the corner of Lindenhurst and Fairfax Avenue.

Photograph By: Mohar Chatterjee. Taken: January 8, 2022.

Copyright

Mohar Chatterjee

2022

Acknowledgements

I owe thanks to the following people:

Derek Kravitz — a steadfast mentor, and a keen editor.

Mark Hansen — whose instincts have yet to steer me wrong.

Ellande Tang — a partner in every sense of the word.

Kabir Mohammed — a picker-upper of spirits.

Anastasiia Carrier — a journalistic mind like no other.

Partha and Nandita Chatterjee — without whom none of this would have been possible.

I also wish to acknowledge all my sources, every one, who spoke to me about the

Sisyphean battle against synthetic opioids. This epidemic too shall be defeated.

A Life Interrupted

On a Friday night in December 2016, Tashara Burnside made a phone call to a woman she had not spoken to in three months. "Good things are happening in my life," Tashara said.

Tashara had just been promoted to general manager at a Jimmy John's franchise store in Ames, Iowa, that she'd been working at since she was eighteen. She and her girlfriend, Sadie Dalglish, had just moved out of Sadie's parent's house and into a townhome. They were still unpacking their stuff. And Tashara was set to pick up a brand new car that weekend.

It was an emotional call. The woman on the other end of the line told Tashara that she needed a hug. "I need one too," said Tashara. They made plans to meet up the very next day.

Across town, Natasha Terrones was excited. She was going to see her daughter again.

But Tashara never made it.

In the early morning hours of Saturday, December 10, a police car pulled up outside Natasha's home. The officers told Natasha that her daughter had been found unresponsive and had been transported to a local hospital. The police suspected a drug overdose.

On Sunday, Tashara was transferred to Mercy Medical Center in Des Moines, Iowa, where she would be able to receive more supportive care, including a dialysis treatment. But her condition did not improve. A week later, on December 17 at 10:01pm, Natasha made the decision to remove her daughter from life support.

Tashara was only twenty-five at the time of her death.

“She fought so hard,” Natasha told me, her voice breaking. But now, Natasha said, it was up to the criminal justice system to find justice for her daughter.



Figure 1: *December 17, 2016, 10:01 p.m.. Left to Right: Natasha Terrones (mom), Tashara Burnside, Devon Terrones (brother). Source: Natasha Terrones*

A Glimpse of my Findings

Tashara was one of more than 19,000^{1,2} people in 2016 who had died of a synthetic opioid overdose — roughly a third of all drug overdose deaths in the United States. By October 2021, nearly two thirds^{3,4,5} of all drug overdose deaths in the preceding twelve months — more than 66,000 fatalities — involved synthetic opioids.

Synthetic opioids get their name because unlike Heroin, Morphine, Codeine and other opiates, their manufacturing process does not require any naturally occurring ingredient like opium seed-pods. Instead, they can be synthesized entirely in a laboratory. The most easily recognizable synthetic opioid today is Fentanyl, although many other chemicals also fall into this category.

Cheap to make and extremely potent in their impact on human brain chemistry, drug runners have found it massively profitable to “cut” drugs like Heroin and Oxycodone with synthetic opioids like Fentanyl.

¹ Jones CM, Einstein EB, Compton WM. Changes in Synthetic Opioid Involvement in Drug Overdose Deaths In the United States, 2010-2018 JAMA. 2018;319(17): 1819-1821. <https://nida.nih.gov/sites/default/files/infographic-synthetic-opioids.pdf>

² “Products - Data Briefs - Number 294 - December 2017.” 2019. 2019. <https://www.cdc.gov/nchs/products/databriefs/db294.htm>.

³ National Institute on Drug Abuse. 2022. “Overdose Death Rates.” National Institute on Drug Abuse. January 20, 2022. <https://nida.nih.gov/drug-topics/trends-statistics/overdose-death-rates>.

⁴ CDC. 2021. “Drug Overdose Deaths in the U.S. Top 100,000 Annually.” Wwww.cdc.gov. November 17, 2021. https://www.cdc.gov/nchs/pressroom/nchs_press_releases/2021/20211117.htm.

⁵ “Products - Vital Statistics Rapid Release - Provisional Drug Overdose Data.” CDC. Based on data available for analysis on April 03, 2022. <https://www.cdc.gov/nchs/nvss/vsrr/drug-overdose-data.htm>.

“We’re seeing [Fentanyl] mixed in with everything,” said Jeffrey Todd Scott, the Special Agent in Charge (SAC) of the Drug Enforcement Agency (DEA) division in Louisville, Kentucky.

Bolstered by online trade, most of the synthetic opioids inundating the market today have made their way through a vast, largely unregulated international trade route, stretching from Chinese chemical manufacturers to Mexican drug cartels — largely evading law enforcement — until they reach street corners stretching from New York to San Diego, proliferating rural and urban America alike.

For the last six months, I have tried to connect trends in the online advertisement of synthetic opioids to fragmented cross-borders drug distribution networks and unintentional overdose deaths in the United States.

To this end, I analyzed more than 16,600 unique narcotics listings, scraped from darknet sites, tracked down the corporate entities behind

Some Important Definitions

Clearnet: *refers to the publicly accessible Internet. The clearnet is visible to everyone using numerous, conventional web browsers.*

Darknet: *refers to networks that are not indexed by search engines such as Google, Yahoo or Bing. It is an overlay network to the internet that can only be accessed by specialized software, system configurations and special authorizations, and often makes use of non-standard communication protocols in order for it to be deliberately inaccessible by the internet. The darknet is anonymous and conceals IP-addresses.*

Dark Web: *refers to the hidden collection of internet sites on the darknet.*

Darknet marketplaces: *collectively refers to online gray and black markets that operate via darknets such as Tor or I2P. They are commercial websites that are part of the the dark web. Abbreviated as DNMs. These platforms are primarily used to sell or broker transactions involving drugs, cyber-arms, weapons, counterfeit currency, stolen credit card details, forged documents, unlicensed pharmaceuticals, steroids, and other illicit goods.*

clearnet advertisements of deadly chemicals, and interviewed numerous DEA agents, police investigators, medical examiners, forensic toxicologists, and analytics experts.

These methods reveal a nuanced time lapse of how synthetic opioid traffickers have evolved in their practices over the last decade, adapting to regulatory pressures and leveraging different online platforms in their supply chain to maximize profits.

This investigative process also yielded another important discovery: I spotted an emerging class of next-generation synthetic opioids on darknet marketplaces, collectively called Nitazenes.

Attempting to track the fatal impact of Nitazenes also highlighted that deaths involving novel synthetic opioids are likely to be undercounted by county medical examiners and coroners, and subsequently at the federal level by the U.S. Centers for Disease Control and Prevention's National Vital Statistics System, partly due to limitations in medicolegal death investigations, despite efforts to standardize the process. In the absence of reliable data, darknet markets (DNMs) and select clearnet platforms can provide a valuable early warning system for local and federal law enforcement officials looking to monitor the circulation of an emerging class of synthetic opioids.

My examination of darknet markets was aided by an API created by Hikari Labs⁶ – a first-of-its-kind data retrieval tool developed by a team at Carnegie Mellon University (CMU), led by Nicolas Christin, a computer researcher and Associate Professor at CMU.

⁶ “Hikari Labs.” n.d. Markets.hikari.io. Accessed April 14, 2022. <https://markets.hikari.io/>.

Using the beta-version of the interface, I queried the Hikari database and analyzed seven years of historical synthetic opioid DNM listings, across dozens of active and inactive darknet marketplaces.

My findings build upon a landmark 2019 C4ADS⁷ report⁸, and a Senate-commissioned report on synthetic opioid trafficking⁹ published by the RAND Corp.¹⁰ in February 2022.

Chemical Genesis

In the 1950s, a Belgian chemist, Dr. Paul Janssen, was driven to develop better opioid pharmaceuticals for pain relief. He founded a research laboratory in 1953 called Janssen Pharmaceutica. By 1957, his team had synthesized phenoperidine, an opioid analgesic used clinically as a general anesthetic. But Janssen Pharmaceutica's big breakthrough came in 1960, when Dr. Janssen first synthesized Fentanyl. At the time of its creation, Fentanyl was the most potent opioid in the world, roughly 100 times stronger than Morphine in its effects. His research laboratory was acquired by Johnson & Johnson only a year later, in 1961.¹¹

⁷ Center for Advanced Defence Studies is a nonprofit data analysis organization that reports on global conflict and transnational security issues.

⁸ Michael Lohmuller, Nicole Cook, and Logan Pauley, Lethal Exchange: Synthetic Drug Networks in the Digital Era, Washington, D.C.: Center for Advanced Defense Studies, November 17, 2020. <https://www.c4reports.org/lethal-exchange>

⁹ Commission on Combating Synthetic Opioid Trafficking, Final Report, Reports from the Commission on Combating Synthetic Opioid Trafficking (2022), February 8, 2022. Rand Corp. https://www.rand.org/pubs/external_publications/EP68838.html#related.

¹⁰ RAND Corp is an American nonprofit global policy think tank, financed by the U.S. government and private endowment, corporations, universities and private individuals.

¹¹ Millar, Abi. 2018. "Fentanyl: Where Did It All Go Wrong?" Pharmaceutical Technology. February 27, 2018. <https://www.pharmaceutical-technology.com/features/Fentanyl-go-wrong/>.

The origins of the drug class Nitazene also can be traced back to Janssen's attempts to develop central nervous system depressants with Morphine-like analgesic activity using the organic compound Benzimidazole. These opioids are fundamentally different¹² from Fentanyl in their chemical structure, and some newer analogs are over 10 times more potent. But Nitazenes never gained approval for clinical use due to reports of an overdose in early human studies and high risk of potential abuse.

Some more Important Definitions

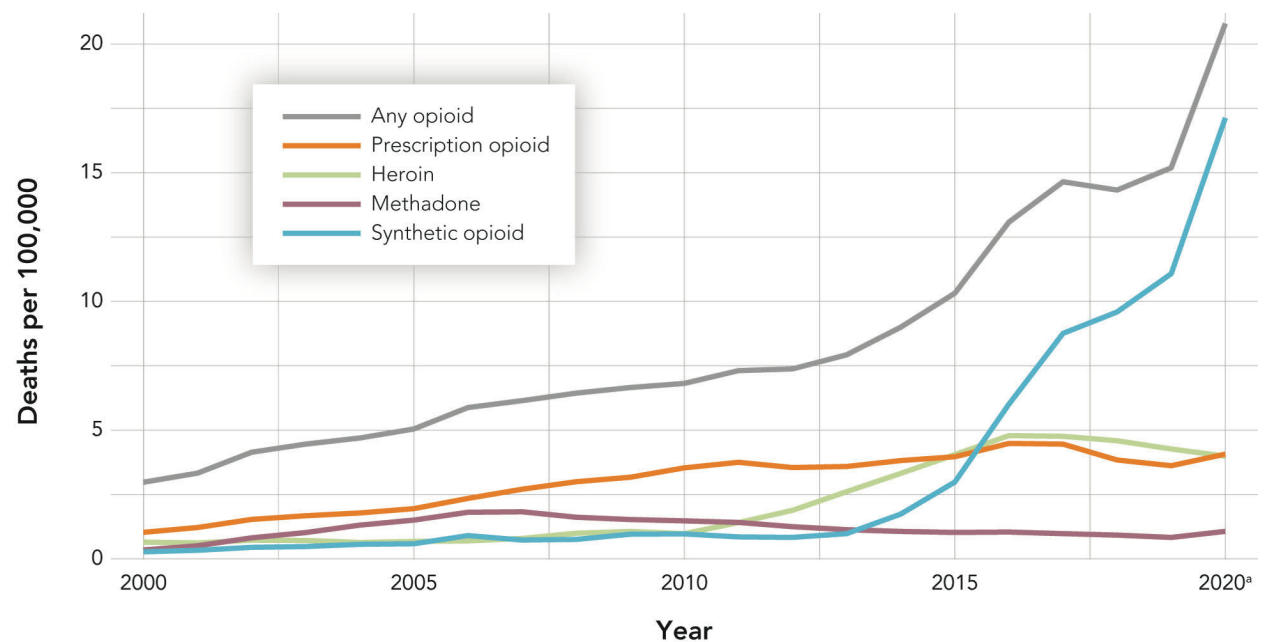
Drug Analogs: *the analog of an existing drug molecule shares structural and pharmacological similarities with the original compound. There are three sub-categories of drug analogs: analogs possessing chemical and pharmacological similarities (direct analogs); analogs possessing structural similarities only (structural analogs); and chemically different compounds displaying similar pharmacological properties (functional analogs). In the United States, a controlled substance analogue is simply a substance which is intended for human consumption, is structurally substantially similar to a schedule I or schedule II substance, is pharmacologically substantially similar to a schedule I or schedule II substance, or is represented as being similar to a schedule I or schedule II substance and is not an approved medication.*

Schedule I Controlled Substances: *substances in this schedule have no currently accepted medical use in the United States, a lack of accepted safety for use under medical supervision, and a high potential for abuse.*

Schedule II or IIN Controlled Substances: *substances in this schedule have a high potential for abuse which may lead to severe psychological or physical dependence.*

¹² "Benzimidazole - an Overview | ScienceDirect Topics." n.d. [www.sciencedirect.com](https://www.sciencedirect.com/topics/medicine-and-dentistry/benzimidazole).
<https://www.sciencedirect.com/topics/medicine-and-dentistry/benzimidazole>.

Traces On the Ground: USA



SOURCE: Analysis of multiple-cause-of-death data (Wide-Ranging Online Data for Epidemiologic Research [WONDER], Centers for Disease Control and Prevention [CDC], "National Center for Health Statistics Mortality Data on CDC WONDER," last reviewed December 22, 2020).

NOTE: The following International Classification of Diseases, tenth rev. (ICD-10) poisoning codes indicate drug: T40.1 (heroin); T40.2 (semisynthetic opioids, typically prescription); T40.3 (methadone); and T40.4 (synthetic opioids except methadone). *Any opioid* includes T40.0 (opium) and T40.6 (unspecified narcotics).

^a Death counts for 2020 are provisional and subject to change.

Figure 2: Opioid-Involved Overdose Death in the United States, 2000-2020.

Chart by: RAND Corp.

Since the start of the 21st century, the United States has seen a sevenfold increase in the per capita rate of deaths involving opioid overdoses, from nearly three per 100,000 in the year 2000 to more than 20 per 100,000 in 2020. Up until 2015, the drug crisis in the U.S. centered around prescription opioids¹³, as reported in opioid overdose death statistics.

Overdoses involving Heroin, growing since 2011, briefly overtook prescription opioid overdoses in 2015. But overdoses involved more potent synthetic opioids like Fentanyl

¹³ ICD Cause of Death: T40.2 - Natural & semi-synthetic opioids

began rising dramatically in 2014. By 2016, overdose deaths involving synthetic opioids¹⁴ had outpaced both Heroin and other prescription opioids.

And while Heroin or prescription opioid overdoses declined in the latter half of the 2010s, synthetic opioid overdose deaths have continued to rise almost unimpeded.

Fentanyl was implicated in the vast majority of these deaths. While Fentanyl, at least the original chemical compound, is certainly not the deadliest synthetic opioid to exist, it is currently the most prevalent.

A recent examination¹⁵ of quarterly national seizure data from High Intensity Drug Trafficking Areas¹⁶ published March 31 of this year showed that drug seizures containing Fentanyl have been increasing in the U.S. More than a quarter of all Fentanyl seizures are now in pill form, which means those who obtain non-prescription pills for drugs like Oxycodone or Alprazolam run the risk for unintentional, potentially deadly exposure to Fentanyl.

Nationally, between the first quarter of 2018 and the last quarter of 2021, the number of Fentanyl-containing powder seizures went from 424 to 1,539, and the weight of such

¹⁴ ICD Cause of Death: T40.4 - Synthetic opioids, excluding methadone

¹⁵ Palamar, Joseph J., Daniel Ciccarone, Caroline Rutherford, Katherine M. Keyes, Thomas H. Carr, and Linda B. Cottler. 2022. "Trends in Seizures of Powders and Pills Containing Illicit Fentanyl in the United States, 2018 through 2021." *Drug and Alcohol Dependence* 234 (May): 109398. <https://doi.org/10.1016/j.drugalcdep.2022.109398>.

¹⁶ The High Intensity Drug Trafficking Areas (HIDTA) program was created by Congress with the Anti-Drug Abuse Act of 1988 to provide assistance to Federal, state, local, and tribal law enforcement agencies operating in areas determined to be critical drug-trafficking regions of the United States. This grant program is administered by the Office of National Drug Control Policy (ONDCP). There are currently 33 HIDTAs, and HIDTA-designated counties are located across 50 states, US territories, and the District of Columbia. <https://www.dea.gov/operations/hidta>

powder Fentanyl seizures increased eightfold, from 298 kilograms to 2416 kilograms. Only 0.006 grams of Fentanyl is enough to be a fatal overdose for even the most seasoned opioid user.

The number of Fentanyl-containing pill seizures across the U.S. increased ninefold in the same time period, from 68 to 635. The total number of Fentanyl-containing pills seized increased from over 40,000 in the first quarter of 2018 to more than 2 million in the fourth quarter of 2021. The ratio of such pill seizures to total Fentanyl-containing seizures more than doubled in that time.

The Physical Cross-Borders Supply Chain

The manufacturing origin of most synthetic opioids is not a secret. And neither are their biggest buyers in the Western hemisphere.

Research published^{17,18} by the RAND Corp. and C4ADS tells us that today, the supply chain for the vast majority of the Fentanyl-class synthetic opioids looks something like this:

Chemical manufacturers located in China ship chemical inputs called precursor chemicals to Mexican drug trafficking organizations (DTOs), who turn these inputs into finished

¹⁷ Lohmuller, Cook, Pauley, Lethal Exchange, Center for Advanced Defense Studies (2020). <https://www.c4reports.org/lethal-exchange>

¹⁸ Commission on Combating Synthetic Opioid Trafficking, Final Report, Rand Corp (2022). https://www.rand.org/pubs/external_publications/EP68838.html#related.

Fentanyl products in small, clandestine labs. These products, packaged as powders or pressed counterfeit tablets, packaged to look like other drugs, are trafficked to the northern border, where they are smuggled into the United States on foot or by personal vehicle.

On the ground in San Antonio, Texas, DEA agent Dante Sorianello, the No. 2 official in the field office, told me: “What we have seen in the last six months is Fentanyl-laced counterfeit Oxycodone pills to the tune of over 200,000 in different multi-thousands shipments, destined for San Antonio, coming from members of the Sinaloa Cartel.”

Among the many Mexican DTOs, the two most dominant¹⁹ are the *Cártel de Sinaloa* and the *Cártel Jalisco Nueva Generación*, or the Sinaloa Cartel and the CJNG, who moved from plant-based drugs like Heroin into drug production, starting with methamphetamine over the past two decades. But since 2014, these traffickers have increasingly entered the illegal supply chain for Fentanyl.

¹⁹ Commission on Combating Synthetic Opioid Trafficking, Final Report, Chap. 2 (pp. 5-12) Rand Corp (2022). https://www.rand.org/pubs/external_publications/EP68838.html#related.

The Dynamic, Unstable World of Darknet Drug Markets

Yet the supply chain did not always look like this. In fact, prior to 2019²⁰ — before the Chinese government expanded legal controls over all Fentanyl-class substances — suppliers would ship online orders of finished synthetic opioids or Fentanyl precursors to end buyers directly in the U.S. via postal or express consignment. The suppliers were still mostly traceable back to China and the narcotics largely escaped detection in the huge volumes of inbound packages.

These direct sales were facilitated, in part, by rising darknet marketplaces like Silk Road and AlphaBay. Launched in 2011, Silk Road was the first modern online black market to demand public attention²¹ — a \$1.2 billion operation at its peak²², serving more than 100,000 customers and popularizing the use of Bitcoin in black-market transactions. By March 2013, 70 percent of the products listed on the platform were drugs.^{23,24} By October 2013, The market was taken down²⁵ by an FBI investigation, and its administrator

²⁰ Ibid.

²¹ Mohar Chatterjee, Brown Institute for Media Innovation and MuckRock's Documenting COVID-19 Project. 2021. "The Demise of White House Market Will Shake up the Dark Web." *Wired*. November 1, 2021. <https://www.wired.com/story/white-house-market-dark-web-drugs-goes-down/>.

²² Bearman, Joshua. 2015. "Silk Road: The Untold Story." *Wired*. May 23, 2015. <https://www.wired.com/2015/05/silk-road-untold-story/>.

²³ Chen, Adrian. 2011. "The Underground Website Where You Can Buy Any Drug Imaginable." *Gawker*. June 1, 2011. <https://www.gawker.com/the-underground-website-where-you-can-buy-any-drug-imag-30818160>.

²⁴ Ball, James. 2013. "Silk Road: The Online Drug Marketplace That Officials Seem Powerless to Stop." *The Guardian*, March 22, 2013, sec. World news. <https://www.theguardian.com/world/2013/mar/22/silk-road-online-drug-marketplace>.

²⁵ Bearman, Joshua. 2015. "The Untold Story of Silk Road, Part 2: The Fall." *Wired*. May 14, 2015. <https://www.wired.com/2015/05/silk-road-2/>.

eventually sentenced to life in prison without parole.²⁶

Other markets swelled to fill the vacuum, chief among them

AlphaBay. It was established in late 2014, and it encouraged, but did not mandate, the use of Monero, a competing cryptocurrency. By July 2017, AlphaBay was roughly 10 times bigger than Silk Road ever was.

Around this time, a multinational law enforcement operation²⁷ shut down AlphaBay. One of the two lead administrators was arrested and found²⁸ dead in his cell weeks later.

Some defining characteristics of DNMs today:

1. *Communication between buyers and vendors usually requires a PGP encryption key. PGP or Pretty Good Privacy is a security program used to decrypt and encrypt email and authenticate email messages through digital signatures and file encryption.*
2. *Many DNMs tend to prefer decentralized cryptocurrencies like Monero (XMR) over Bitcoin. XMR has the reputation of being more secure because it uses stealth addresses for transactions. These are one-time addresses that are not linked with a previously used address, making it difficult to connect trades to people. Rebooted AlphaBay even runs its own internal XMR mixer to add an extra layer of defense.*
3. *Many DNMs also operate in escrow, i.e the platform holds the money until the buyer receives the goods, to discourage fraud.*
4. *But money transfers for actual trades can also happen off-platform, using wire services in addition to crypto transfers.*

²⁶ Greenberg, Andy. 2017. "Silk Road Creator Ross Ulbricht Loses His Life Sentence Appeal." Wired. May 31, 2017. <https://www.wired.com/2017/05/silk-road-creator-ross-ulbricht-loses-life-sentence-appeal/>.

²⁷ Viswanatha, Robert McMillan and Aruna. 2017. "Illegal-Goods Website AlphaBay Shut Following Law-Enforcement Action." *Wall Street Journal*, July 13, 2017. <https://www.wsj.com/articles/illegal-goods-website-alphabay-shut-following-law-enforcement-action-1499968444>.

²⁸ Murdoch, Lindsay. 2017. "AlphaBay Suspected Co-Founder Alexandre Cazes Found Dead in Thai Jail." *Brisbane Times*. July 15, 2017. <https://www.brisbanetimes.com.au/world/alphabay-suspected-cofounder-alexandre-cazes-found-dead-in-thai-jail-20170715-gxburv.html>.

After the AlphaBay bust, users scrambled to find a successor to AlphaBay. Many fled to Hansa Market and were caught by law enforcement, since Hansa had already succumbed²⁹ to the Dutch police.

Other major contemporaries like Dream faced their own troubles. Dream's founder had been arrested³⁰ by American police in August 2017. Beleaguered by DDoS attacks and operational security issues, the platform finally shut down³¹ in 2019.

But AlphaBay's story is not completely done as the site's old co-administrator, DeSnake, resurfaced^{32,33} only last September to start a

Even more Important Definitions

Scraping: *in computing, web scraping refers to the process of extracting large amounts of information from a website. This may involve downloading several web pages or the entire site. The downloaded content may include just the text from the pages, the full HTML, or both the HTML and images from each page.*

DDoS Attack: *a DDoS or denial-of-service attack is a cyber-attack in which the perpetrator seeks to make a machine or network resource unavailable to its intended users by temporarily or indefinitely disrupting services of a host connected to a network.*

²⁹ Staff, WIRED. 2018. "How Dutch Police Took over Hansa, a Top Dark Web Market." WIRED. WIRED. March 8, 2018. <https://www.wired.com/story/hansa-dutch-police-sting-operation/>.

³⁰ Solon, Olivia, 2017. "Trip to World Beard Competition Ends in Arrest for Alleged Dark Web Drug Dealer." *The Guardian*. September 28, 2017. <https://www.theguardian.com/us-news/2017/sep/28/world-beard-moustache-competition-drug-dealer>.

³¹ "Dream Market Will Permanently Suspend Operations next Month - Deep Dot Web." 2019. Web.archive.org. March 30, 2019. <https://web.archive.org/web/20190330123331/https://www.deepdotweb.com/2019/03/29/dream-market-will-permanently-suspend-operations-next-month/>.

³² DarknetOnions.com. 2021. "AlphaBay Market Is Back!" *DarknetOne*. August 14, 2021. <https://darknetone.com/alphabay-market-is-back/>.

³³ Greenberg, Andy. "He Escaped the Dark Web's Biggest Bust. Now He's Back." *Wired*. September 23, 2021. <https://www.wired.com/story/alphabay-desnake-dark-web-interview/>.

newly rebooted AlphaBay Market³⁴ with a reportedly higher standard for operations security.

It is against this backdrop that the Hikari Labs startup collects data on product listings, including vendor names, product descriptions, listing dates, amounts, and country of origin, as well any available data on user transactions like product and vendor reviews, through daily, programmatic scrapes of most active darknet market sites.

Through an exclusive data collaboration with Hikari Labs, I was able to use their API to access their database of product listings and vendors.

The process of accessing and scraping modern DNMs is far from a trivial task, given the heightened digital security on these online platforms. While their earliest scrapes date back to the first modern DNM, Silk Road, their data collection is not necessarily uniform over the years. Nicolas Christin, the Carnegie Mellon professor whose team built the API, and whose research focuses on online crime modeling and cryptocurrency, recalls, for example, that “2018 was actually really bad for marketplaces — they were really hard to scrape. So for us, who do research on it, that was a pain in the neck.”

But he also notes that scarcity of sales scrapes can act as a proxy for customer experience. “If we're having a hard time scraping those markets, because they're always

³⁴ “Alphabay Market.” n.d. DarknetOne. Accessed April 14, 2022.
<https://darknetone.com/market/alphabay-market/>.

down or there is always a problem, it means that customers also have problems accessing them.”

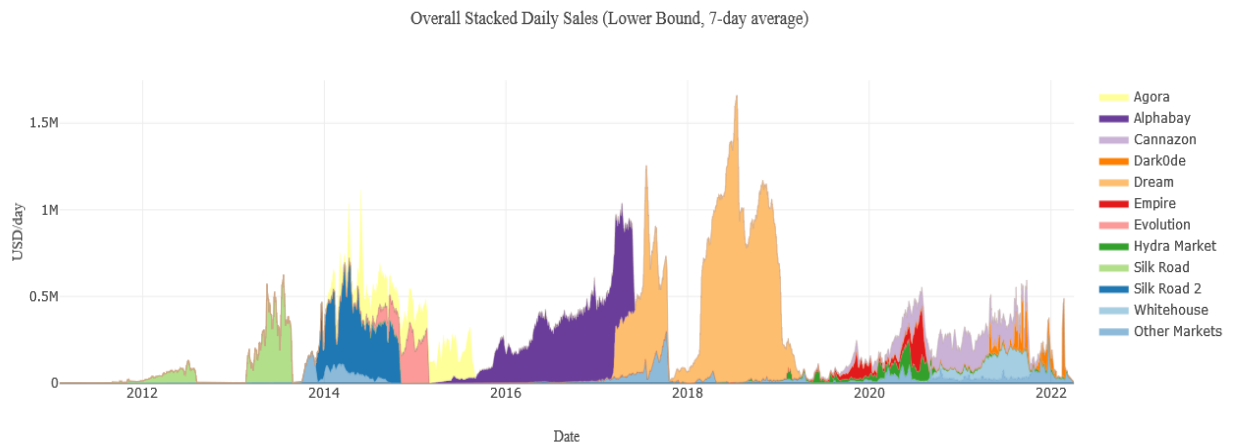


Figure 3: *Lower bound of overall stacked daily sales.*

Aggregated across 37 markets (8 active), 1.4 million item listings.

Source: Hikari API³⁵, retrieved April 8, 2022

DNMs are far from a stable trading platform. The above graphic allows us to visualize the relative prominence of each new darknet marketplace as it was born, attracted users, and eventually died. Sometimes, there is a clear market leader, but there are periods where there is an “oligarchy” of smaller markets competing for users, as Christin puts it.

A market can grow quite quickly in the number of users and product listings. Look at the steep rise in daily sales for Dream Market, as an example. But they can also shut down very quickly, as a result of exit scams, law enforcement operations, security breaches,

³⁵ Hikari Labs Homepage. Accessed April 14, 2022. <https://markets.hikari.io/>.

DDoS attacks, or simply to escape legal scrutiny (which was the case for Whitehouse Market, whose sales can be found towards the bottom right-hand corner of the graphic).

Hydra Market, the world's largest and longest-running darknet market, was shut down only last week, in April 2022, as the result of a transnational law enforcement operation.³⁶ In total, experts estimate³⁷ that Hydra facilitated over \$5 billion dollars in illicit cryptocurrency transactions since it launched in 2015. The majority of those transactions were sales of illegal drugs, which were strictly limited to Hydra's target market of former Soviet states.

Clearly, there are drawbacks to trading on darknet markets, not the least of which include a high barrier to entry. This is where the clearnet — the regular, publicly accessible Internet — has allowed suppliers to reach buyers more easily, while still dodging substance control regulations. Overall, online platforms on both the dark web and the clear net constitute a crucial part of the synthetic opioids supply chain.

“The use of internet-based communications and social media ...play a critical role linking buyers in Mexico with chemical manufacturers in Asia. Encrypted darknet marketplaces or unmonitored social media forums and business-to- business (B2B) platforms make it

³⁶ Department of Justice. “Justice Department Investigation Leads to Shutdown of Largest Online Darknet Marketplace.” 2022. [www.justice.gov](https://www.justice.gov/opa/pr/justice-department-investigation-leads-shutdown-largest-online-darknet-marketplace). April 5, 2022. <https://www.justice.gov/opa/pr/justice-department-investigation-leads-shutdown-largest-online-darknet-marketplace>.

³⁷ Greenberg, Andy. “Shutdown of Russia’s Hydra Market Disrupts a Crypto-Crime ATM.” Wired. April 5, 2022. <https://www.wired.com/story/hydra-market-shutdown/>.

easier for distributors to trade in illegally manufactured synthetic opioids or uncontrolled precursors with minimal risks,” the 2022 RAND report states.

Still, the commission behind the RAND report was somewhat limited by the scope of their data collection. On the clearnet, following previous work by C4ADS, the commission adopted a systematic approach to collect clearnet data from July 15 to Aug.31, 2021. They used common search engines to search for terms that a potential buyer of synthetic opioids or related precursor chemicals would use in order to find clearnet suppliers.

On the darknet, the commission focused only on the most popular marketplaces that existed during the months of July to September 2021. In many ways, the commission’s analysis of these online platforms reflected only a small snapshot in time.

In contrast, the Hikari API allows us to draw on rich samples of DNM sales data from as early as 2012, so that we may understand how vendors on different online platforms adapted in response to contemporary regulations. Although the darknet represents only a small fraction of overall synthetic opioid sales globally, this data, combined with methodical interviews, traditional investigative reporting techniques, and extensive literature reviews, allows us to more accurately estimate and contextualize the role of different online platforms in the synthetic opioids supply chain.

Tracking Synthetic Opioid Supply on the Darknet

With the advent of online black markets like Silk Road and AlphaBay, any person with a computer connection and a cryptocurrency wallet could order synthetic opioids from overseas vendors, or even set up their own downstream distribution.

Such was the case for Mohammed Alaa Allawi³⁸, an original AlphaBay vendor who opened the floodgates for counterfeit pills doped with Fentanyl in the San Antonio region in 2015, centered around the University of Texas campus there.

The lead DEA investigator on Allawi's case spoke to me on the condition of anonymity in order to maintain the integrity of his ongoing undercover narcotics investigations. The lead investigator's identity and statements were verified by his supervisor, DEA Special Agent Dante Sorianello.

"His handle on AlphaBay was dopeboy210." said the lead investigator. 210 is the area code for San Antonio.

A former interpreter for the U.S. Army in Iraq, Allawi owned a pill-press operation that he used to make and sell Oxycodone tablets pressed with Fentanyl.

³⁸ Department of Justice. "Fentanyl Distributor Who Used the Dark Web and Crypto Currency in Furtherance of His Criminal Enterprise Sentenced to 30 Years in Federal Prison." 2019. [www.justice.gov](https://www.justice.gov/usao-wdtx/pr/Fentanyl-distributor-who-used-dark-web-and-crypto-currency-furtherance-his-criminal). October 3, 2019.
<https://www.justice.gov/usao-wdtx/pr/Fentanyl-distributor-who-used-dark-web-and-crypto-currency-furtherance-his-criminal>.

Doing a fuzzy search for “Fentanyl” on the Hikari API returns some of Allawi’s listings on AlphaBay. Dopeboy210’s last listing was seen on May 25, 2017. He was selling pills with 30 milligrams of Oxycodone pressed with Fentanyl, according to the product description. The vendor made at least \$52,800 in platform sales from that specific listing alone. I found 20 other DNM listings for Fentanyl-laced Oxycodone pills made by the same vendor.

According to the lead investigator, Allawi’s own source was primarily Chinese vendors, also on the dark web. He received their shipments in Los Angeles, where other members of his operation would transport it over-land into San Antonio. Allawi was eventually implicated in the overdose death of a U.S. Marine stationed at Camp Lejeune, North Carolina.

In June 2019, he pleaded guilty³⁹ to one count of “conspiracy to possess with intent to distribute” Fentanyl, resulting in death and serious bodily injury. He also pled guilty to one count of “possessing a firearm in furtherance of a drug trafficking crime” as well as one count of “conspiracy to commit money laundering.”

Even as the DEA arrested and indicted domestic sellers like Allawi operating at the downstream end of the synthetic opioid supply chain, larger DTOs filled the void. Encouraged by the influx of interested buyers, Chinese chemists rushed to manufacture Fentanyl analogs faster than they could be banned by the government.

³⁹ Department of Justice Press Release on Mohammed Alaa Allawi, October 3, 2019. <https://www.justice.gov/usao-wdtx/pr/Fentanyl-distributor-who-used-dark-web-and-crypto-currency-furtherance-his-criminal>.

Consider this 2017 advertisement for MethoxyacetylFentanyl, sold at \$11 per gram from the vendor BenzoChems on AlphaBay: “MethoxyacetylFentanyl is a novel opioid drug developed by our factory on april 2017 designed to replace the bans on FuranylFentanyl and Acrylfentanyl. It is powdery and potent and 3mg is sufficient to get a high for someone with low tolerance.”

I queried the Hikari API to collect data pertaining to Fentanyl and the analogs of Fentanyl that most frequently⁴⁰ showed up in overdose deaths: “Fentanyl,” “fentanil,” “methoxyacetylFentanyl,” “carfentanil,” “acrylFentanyl,” “furanylFentanyl.” I categorized the unique listings by the annual quarter they were last seen in, and found the following:

⁴⁰ O'Donnell, Julie K., John Halpin, Christine L. Mattson, Bruce A. Goldberger, and R. Matthew Gladden. 2017. “Deaths Involving Fentanyl, Fentanyl Analogs, and U-47700 — 10 States, July–December 2016.” *MMWR. Morbidity and Mortality Weekly Report* 66 (43): 1197–1202. <https://doi.org/10.15585/mmwr.mm6643e1>.

Unique DNM Listings for Fentanyl and Known Analogs

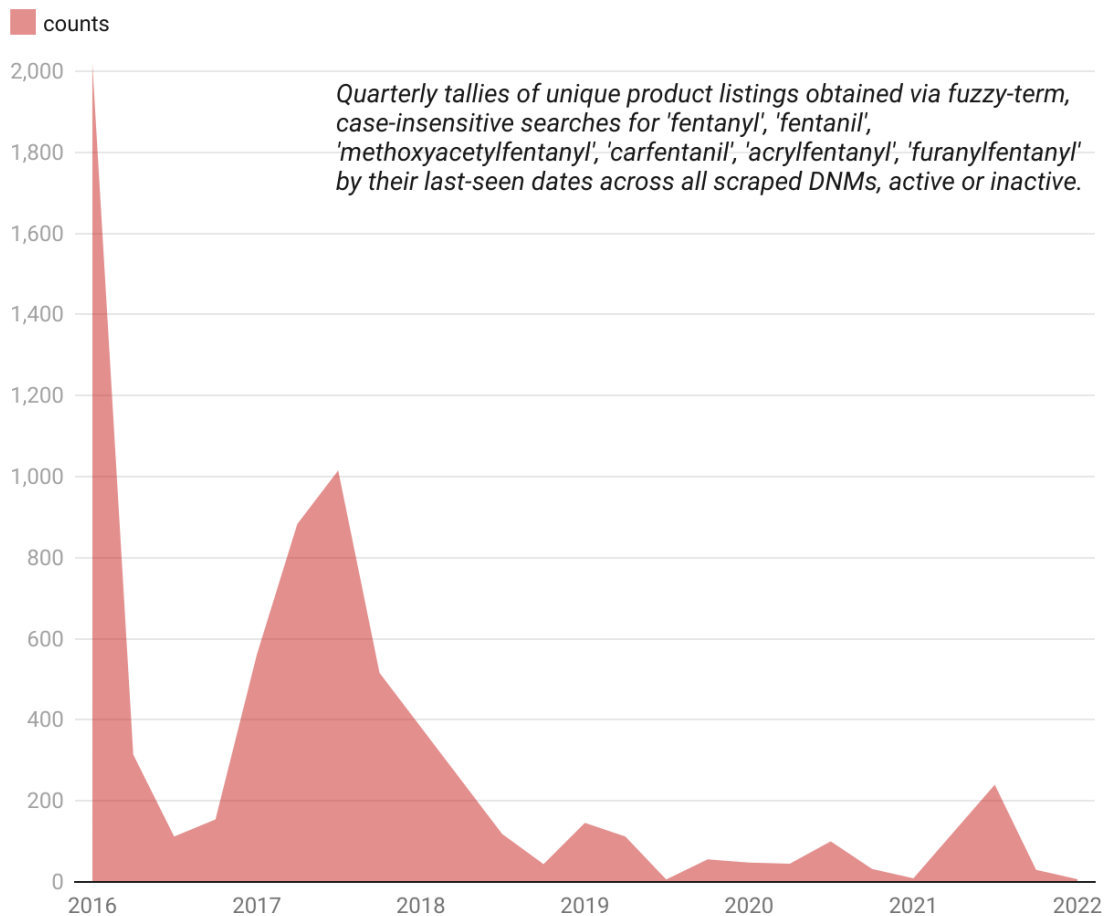


Chart: Mohar Chatterjee • Source: Hikari API • Created with Datawrapper

Figure 4: *Unique DNM Listings for Fentanyl and Known Analogs, by Quarter. 2016 Q1 - 2022 Q1 (partial). Chart By: Mohar Chatterjee*

In 2016, there were more than 2,000 unique dark web listings for Fentanyl and its various analogs — but this was also the peak. These listings do not capture the volume of sales where the buyer and the vendor connected through a DNM listing, but the actual sale occurred off-platform. Over half of these listings (51 percent) were found on the original AlphaBay Market and the Dream Market — two of the biggest DNMs by product sales in

the past decade. Both markets have since closed. Although new markets have sprung up, none have claimed the same volume in market share.

Further analysis of these listings, viewed against the timeline of controlled substances regulations, allows us to make the following claims about the role that DNMs play in the synthetic opioid supply chain:

1. Suppliers seem to use darknet markets as a way to sell off newly-illegal narcotics stock. Right after a specific synthetic opioid lands on a controlled substances list, sellers leverage the anonymity promised by darknet sites to make a profit on their pre-existing stock while still evading heightened scrutiny from manufacturing and export regulators.

China placed the classic Fentanyl on its controlled substances list in 2015, responding to international pressure. In June 2015, China seized 50 kilograms of Fentanyl in the southern port city of Guangzhou and another 70 kilograms heading to Mexico.⁴¹ It is right after these events, in the first quarter of 2016, that we spot one of the two peaks in the graph of unique Fentanyl and Fentanyl analog listings above.

⁴¹ Palmer, Alex. "The China Connection: How One D.E.A. Agent Cracked a Global Fentanyl Ring," *The New York Times*. October 16, 2019.
<https://www.nytimes.com/2019/10/16/magazine/china-Fentanyl-drug-ring.html>.

The second peak occurs in the third quarter of 2017, just after China began introducing stricter regulations^{42,43} on the unauthorized manufacturing and handling of Fentanyl and some of its analogs. Effective March 1, 2017, the Chinese government put Carfentanil, Furanyl Fentanyl, Valeryl Fentanyl, and Acryl Fentanyl on their controlled substances list. Another four Fentanyl-class substances — U-47700, MT-45, PMMA, and 4,4' DMAR — landed on that list on July 1, 2017. It is important to note that of the roughly 5,000 chemical manufactures that were registered in China at the time, only 15 known narcotics and controlled substance manufacturers were ever inspected by Chinese authorities.⁴⁴

By May 2019, China issued its strictest manufacturing ban yet, targeting the underlying chemical structure of the Fentanyl class of drugs and the Chinese government had put 91 manufacturers and 234 individual distributors under “strict supervision,” warning them not to export Fentanyl or related drugs, like carfentanil. This ban proved to have market-defining abilities. On the darknet, listings for such Fentanyl analogs petered out almost entirely.

⁴² Drug Enforcement Agency. 2018. “China Announces Scheduling Controls on Two Fentanyl Precursor Chemicals.” www.dea.gov. January 5, 2018.. <https://www.dea.gov/press-releases/2018/01/05/china-announces-scheduling-controls-two-Fentanyl-precurs-or-chemicals>.

⁴³ Pardo, Bryce, and Beau Kilmer. 2019. “China’s Ban on Fentanyl Drugs Won’t Likely Stem America’s Opioid Crisis.” [Www.rand.org](http://www.rand.org). May 22, 2019. <https://www.rand.org/blog/2019/05/chinas-ban-on-Fentanyl-drugs-wont-likely-stem-americas.html>.

⁴⁴ Ibid.

2. The dark web also plays a key role in the downstream distribution of dangerous opioids from a domestic seller to end-users. “It seems like the dark net favors more end users - people that are selling prohibited drugs themselves,” observed Bryce Pardo, one of the principal investigators for the 2022 RAND report and the associate director of the RAND Drug Policy Research Center.

In fact, over a third of all Fentanyl and Fentanyl analog vendors I found on these DNMs — active and inactive — had self-reported their country of origin as the United States.

The DEA's Lagging Darknet Defense

The illicit narcotics trade has moved online for nearly a decade now. By 2017, two major darknet marketplaces — Silk Road and Alphabay — had already gone through both a boom and a bust. Other DNMs were already expanding to fill the void. It was only then that DEA agents across multiple regional offices received any in-service training to help them combat online drug trades affecting their area of jurisdiction to track dark web sellers.

“We have a cyber section in Virginia,” said Louisville’s SAC Scott, “that I don’t think existed ten years ago. We have pushed out significant training. Some investigators I worked with early on were teaching themselves about wallet-watching - cold wallets and hot wallets - and all things related to cryptocurrency.” SAC Scott told me that these

enterprising individuals later became the vanguard for the rest of the bureau, training other agents. When I asked when these training sessions first materialized, SAC Scott said, “That would have been around 2017, 2018.”

By 2018, at least \$8.8 million worth of Fentanyl class opioids had been sold across all the darknet marketplaces monitored by the Hikari API. The true number is likely around three to four times higher, according to Christin, since his team can only track a fraction of all sales taking place on these platforms. The upper bound of Fentanyl or Fentanyl analog sales that had already happened on DNMs by the time DEA agents received in-service training on how to track them was well over \$35 million.

A Lower Barrier to Entry - Synthetic Opioids on the Clearnet

In March 2022, Sergeant Cole Hippen of the Ames Police Department pulled up old police reports on a synthetic opioids investigation. He had first read these reports in 2017. He was a detective then, assigned to follow up on the Tashara Burnside case.

“At the time of response, officers did locate and collect some kind of a white powder substance on the back of a DVD,” said Sgt. Hippen. “There was a straw, if I remember correctly.”

The paraphernalia the officers found was consistent with the statement that Tashara's girlfriend Sadie had given the police. It was Sadie who had supplied the drugs that December night in 2016. Her dealer was a juvenile highschool student at Ames High.

The substance, Sgt. Hippen said, was confirmed to be U-47700, or just U4, by the Iowa Division of Criminal Investigation lab. His investigation into the origins of the white powder led him to a research chemical website for "Ching Labs," easily accessible by anyone on the clearnet. Sadie's text messages with her 17-year-old dealer corroborated these findings.

Just that November, the DEA had temporarily placed U4 on their Schedule I controlled substances list.⁴⁵ "At the time of my investigation in early 2017, U-47700 was kind of in that transitional period where the DEA had just made the emergency declaration that it was a controlled substance," Sgt. Hippen recalls.

That website has now been taken down. But it's not difficult to trace the teenage dealer's steps. Through archive.org's WaybackMachine, I was able to get some screenshots of what the Ames High student and U-47700 dealer would have seen in 2016:

⁴⁵ Drug Enforcement Agency Press Release. "DEA Schedules Deadly Synthetic Drug U-47700." November 10, 2016. [www.dea.gov](https://www.dea.gov/press-releases/2016/11/10/dea-schedules-deadly-synthetic-drug-u-47700).
<https://www.dea.gov/press-releases/2016/11/10/dea-schedules-deadly-synthetic-drug-u-47700>.

Chinglabs: Chinese Research Chemical Vendor

Search To Find Your Favourite Research Chemical On Sale

Our products are not offered for human consumption

Subscribe to our newsletter

Join our mailing list to receive updates about our website, discounts, special offers, news and more. New Subscribers Get 20% OFF of their first order!

| FuranylFentanyl Powder | U47700 Powder |
|--|---|
| IUPAC: N-(1-(2-phenylethyl)-4-piperidinyl)-N-phenylfuran-2-carboxamide | IUPAC: Methyl 2-((1-(4-fluorophenyl)methyl)-1H-indazole-3-carbonyl)amino)-3-methylbutanoate |
| CAS Number: 101345-66-8 | CAS Number: 121348-98-9 |
| Molecular Formula: $C_{24}H_{26}N_2O_2$ | Molecular Formula: $C_{21}H_{22}FN_3O_3$ |
| Formula Weight: 374.484 | Formula Weight: 383.41 |
| Learn More About FuranylFentanyl | Learn More About U47700 |
| Pricing (Shipping + 1 time reship Included) | Pricing (Shipping + 1 time reship Included) |
| 2g : 100 5g : 200 10g : 300 50g : 600 USD 100g : 1100 USD | 3g : 80 5g : 150 10g : 200 50g : 600 USD 100g : 1100 USD |
| <input type="button" value="PURCHASE"/> | <input type="button" value="PURCHASE"/> |

Figure 5: Screenshots from Chinglabs.com via archive.org's Wayback Machine

By June 2017, the ChingLabs website declared that U-47700 was their best-selling chemical. The website promised discreet shipping, safe and secure trades, and “hearted” bitcoin transactions. Their main markets were in the U.S., European Union, and Australia.

Between September 2017 to February 2018 — at most 7 months after the June 2017 U-47700 ban in China — their clearnet site went offline. I did not find any evidence of their appearance in the Hikari data. If they advertised on the darknet, then it was not under the same ChingLabs banner.

By 2020, finished synthetic opioids could scarcely be found on the clearnet or the darkweb. But in reality, many Chinese chemical manufacturers simply pivoted to selling the largely unregulated precursor chemicals required to make Fentanyl instead.

Fentanyl Precursors on the Clearnet

The illicit production of Fentanyl is typically carried out using one of five known methods: Janssen, Valdez, Gupta, Siegfried, and Dieckmann, according to the 2022 RAND report. The precursor chemicals usually involved in the manufacturing process include 4-AP⁴⁶, 4-ANPP⁴⁷, and NPP⁴⁸. These five manufacturing methods differ slightly in the number of unique steps, the number of purification steps, the production yields,

⁴⁶ Chemical name: 4-anilinopiperidine. CAS Number: 23056-29-3

⁴⁷ Chemical name: 4-anilino-N-phenethylpiperidine. CAS Number: 21409-26-7

⁴⁸ Chemical name: N-phenyl-N-(piperidin-4-yl)propionamide. CAS Number: 39742-60-4

and the specific precursors used, but the chemicals involved are uncontrolled in the United States and elsewhere and are widely available through legitimate commercial sources. Subject-matter experts have indicated that further innovations to improve or simplify these production routes are not needed: their synthetic ease, achievement of sufficient yields of Fentanyl, and high availability, high substitutability, and low cost of starting materials and laboratory infrastructure render them readily adoptable.

I found only 37 unique DNM listings for common Fentanyl precursors in the darknet over the past seven years. But given the uncontrolled nature of these chemicals, it makes sense that vendors would choose to maximize their visibility and their profits by sticking to the clearnet instead.

“On the clearnet, we found not only bespoke vendor websites,” said RAND’s Bryce Pardo, “but also listings on classified ad spaces, social media spaces, and B2B networks that allowed pretty much anybody to find a producer that could manufacture a sizable amount of the precursor chemical for delivery to a drug trafficking organization.”

The social media site with the largest number of precursor listings? Pinterest.

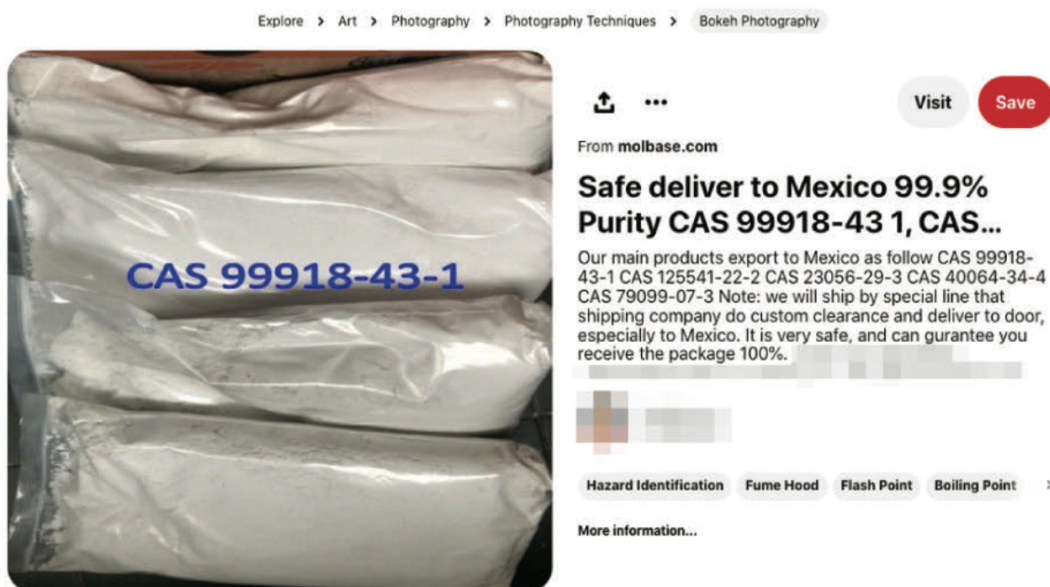
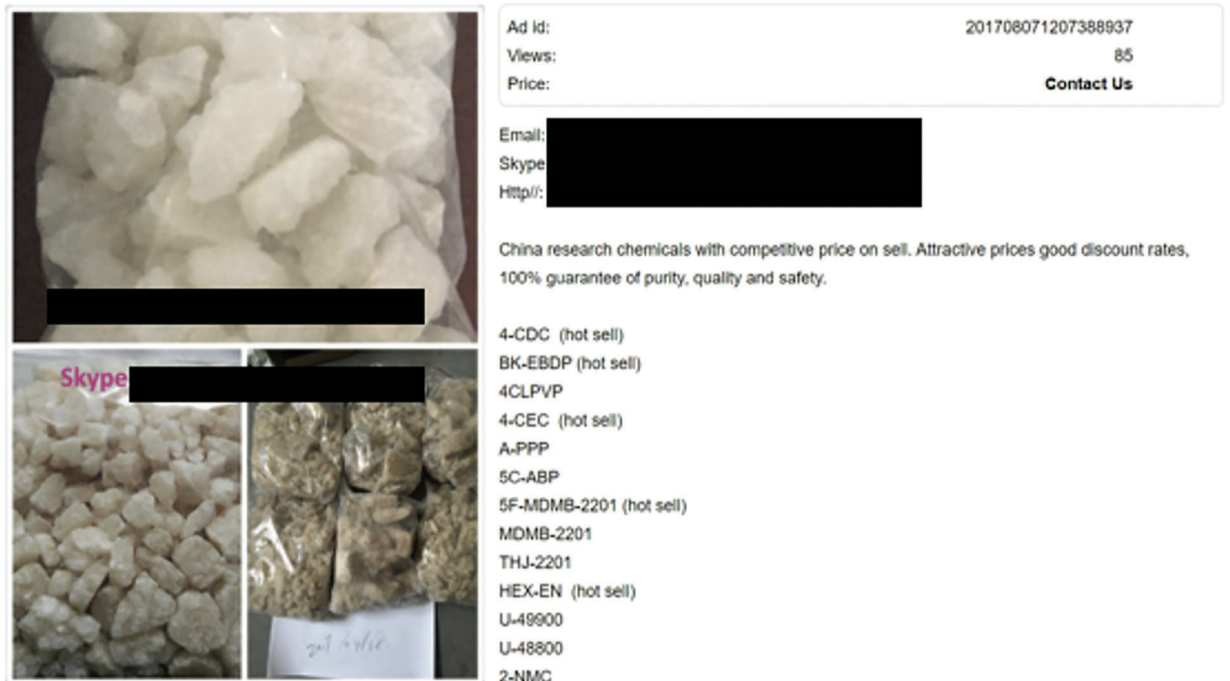


Figure 6: *Example Posts by Illegal Sellers on Pinterest.* Source: RAND Corp.⁴⁹

These listings on social media and classified ad spaces are easily obscured from the public simply by indexing with CAS, or Chemical Abstracts Service, registry numbers. The images on these clearnet listings are often embedded with one or more CAS registry numbers for various Fentanyl precursor chemicals. Often, the images will also contain the Whatsapp number to contact to set up a trade. Some of these listings guarantee delivery to Mexico and customs clearance. “It was a wink and nod — they knew exactly who they were selling to,” said Pardo.

⁴⁹ Commission on Combating Synthetic Opioid Trafficking. “Technical Appendices”. Appendix E. Figure E.5. “Example Posts by Illegal Sellers on Pinterest” Rand Corp (2022). February 8, 2022. https://www.rand.org/pubs/external_publications/EP68839.html

Hanford, CA > Buy & Sell > Buy & Sell in Hanford, CA > bk-ebdp hexen fub-amb u49900 fuf 3-m-fentanyl
bk-ebdp hexen fub-amb u49900 fuf 3-m-fentanyl



Ad id: 201708071207388937
Views: 85
Price: **Contact Us**

Email: [REDACTED]
Skype: [REDACTED]
Http:// [REDACTED]

China research chemicals with competitive price on sell. Attractive prices good discount rates, 100% guarantee of purity, quality and safety.

4-CDC (hot sell)
BK-EBDP (hot sell)
4CLPVP
4-CEC (hot sell)
A-PPP
5C-ABP
5F-MDMB-2201 (hot sell)
MDMB-2201
THJ-2201
HEX-EN (hot sell)
U-49900
U-48800
2-NMC

Figure 7: *Classified Ad Listing from shoppok.com. Source: RAND Corp.*⁵⁰

By aggregating data on corporate entities as identified by the email domain name on ad listings and the countries associated with bespoke website URLs, the RAND report found that the majority of B2B or Business-to-Business online listings originated from China (40 percent) and Jamaica (25.5 percent).

Email domain name analysis usually refers to email address suffixes that point to a registered chemical or pharmaceutical company outside the United States.⁵¹ And to obtain

⁵⁰ Commission on Combating Synthetic Opioid Trafficking. “Technical Appendices”. Appendix E. Figure E.13. “Classified Ad Listing from shoppok.com” Rand Corp (2022). February 8, 2022. https://www.rand.org/pubs/external_publications/EP68839.html

⁵¹ Ibid. “The Illegal Seller Networks”, E-10.

a proxy for the geographic location and legal owner of the domain, and possibly the company, the commission queried each URL against a WHOIS registrar, which provides the country for which the domain is registered.

Most of the entries originating from Jamaica can be attributed to the e-commerce website JamDeal, which is marketed to users in Jamaica but is registered to an individual in Florida. In the case of some listings emanating from websites registered in the Caribbean, an analysis of email domains suggests that suppliers are likely based in China.

At C4ADS, analyst Nicole Cook has spent years tying these ad listings to real-world manufacturers. “I have had pretty good success tying English language company names to Chinese language names, and then pulling up the records on the [Chinese] corporate registry,” she says. Cook was one of the authors of the 2019 C4ADS report, “Lethal Exchange”. She was also one of the creators of the C4ADS Synthetic Drug Supplier Database, which contains information on more than 100 entities linked to online vendors purporting to supply synthetic opioids or other precursor chemicals. Of these entities, 65 percent have filed corporate registries in mainland China or Hong Kong.

Cook is currently trying to dig deeper into the numerous Chinese chemical vendors who have cropped up in recent years. These vendors cannot all be traced back to a few common entities. That is to say, their ownership networks are fragmented. “There are some companies that have common ownership networks, but most are not connected,” Cook said. Her team has previously tried to identify Indian chemical companies

manufacturing precursors with limited success. The number of Indian companies with online listings was much lower than the Chinese-origin listings. But that may soon change as regulations tighten in China. The RAND report also points towards India's large pharmaceutical industry as a potential home for future synthetic opioid and precursor production.

Establishing Cartel Supremacy

The abundance of clear net precursor listings is available to any enterprising individual with internet access. So how did Central and South American cartels come to hold supremacy over the illicit drug trade networks in North America?

"Fifteen years ago, when I was working on the street, you had those mom-and-pop, almost Breaking Bad meth labs," recalls Louisville's SAC Scott. "We had a lot of those in Kentucky... a couple of individuals who had looked up how to make meth on the clear net. It's dangerous, but it's not hard. I spent a lot of time out in small rural areas tracking down individuals making a couple ounces of meth at a time."

SAC Scott continues: "Eventually that gave way to the Mexican cartels who were able to flood a place like Kentucky with potent cheap meth because they could make it at scale in

a superlab across the border. And so, folks didn't really have to make a mess in their bathtubs anymore.”^{52,53,54,55}

SAC Scott tells me that Fentanyl never even needed to go through its “mom-and-pop” phase. Unlike opiates like Heroin, producers did not need to grow crops to make extremely potent synthetic opioids, reducing overhead costs and operational footprint. From the get-go, Fentanyl produced staggering profits, and existing DTOs galvanized their resources to source these new products from a diverse group of Eastern chemical manufacturing corporations.

“Of late, we have seen bulk shipments of counterfeit Fentanyl pills, directly linked to sources in Arizona and California,” said Special Agent Sorianello. “And these sources are ultimately linked to the Sinaloa cartel, who were traditionally a Heroin marketing organization. And so it was not a big stretch for them to move into the synthetic opioid Fentanyl, which is 50 times more powerful than Heroin, with a much greater profit margin.” Special Agent Sorianello quickly clarifies: “I’m not saying some of the other

⁵² Writer, Alissa Skelton / World-Herald staff. “Mexican Cartel Picks up Slack after Nebraska Curtails Meth Trade.” Omaha World-Herald. October 3, 2014.
https://omaha.com/news/crime/mexican-cartel-picks-up-slack-after-nebraska-curtails-meth-trade/article_35b47e4e-1d1b-57cf-8801-cc87648fce31.html.

⁵³ Writer, Mike Gallagher. “The Cartels next Door: Mexican Drug Lords Corner Meth Market - Albuquerque Journal.” www.abqjournal.com. February 15, 2017.
<https://www.abqjournal.com/950174/next-door.html>.

⁵⁴ Writer, Kala Kachmar. “How This Couple Ran a ‘Redneck’ Meth Empire in an Appalachian County Ravaged by Addiction.” www.courier-Journal.com. November 24, 2017.
<https://www.courier-journal.com/in-depth/news/crime/2019/11/24/cartel-drugs-addiction-duo-ran-redneck-meth-empire-appalachia/4087610002/>.

⁵⁵ Writer, Nick Miroff. “Measuring America’s Changing Drug Habits on the Border.” *The Washington Post*, January 12, 2015.
https://www.washingtonpost.com/world/the_americas/losing-marijuana-business-mexican-cartels-push-Heroin-and-meth/2015/01/11/91fe44ce-8532-11e4-abcf-5a3d7b3b20b8_story.html.

cartels have not [also moved into Fentanyl trade]. But the Sinaloa cartel seems to have developed a real expertise in Fentanyl.”

“Precursors generate less revenue than finished Fentanyl, especially since Mexican chemists are probably having to use more than Chinese chemists because their yields are not as great.” says RAND’s Bryce Pardo. When Fentanyl emerged in seizures in packages arriving by air, destined directly for the United States, the purity was high, in the range of 50 to 90 percent. However, the purity of Fentanyl coming into the United States over land from Mexico in powder form was observed in the range of 5 to 10 percent on average.⁵⁶

But even operating large-scale synthesis labs to combine the precursors into Fentanyl costs DTOs in Mexico only a fraction of what it would say to grow opium or cannabis crops. And their potency means a small amount can go a long way. So by cutting more expensive narcotics with cheaper synthetic opioids, drug traffickers are able to increase their profit margin manifold. But at 100 times the potency of Morphine, even 2 milligrams of Fentanyl in a laced pill can be deadly to someone who has had no previous exposure to the drug. “It’s extremely profitable,” said SAC Scott. “Despite the massive human cost, that’s ultimately the driver in all this. I think there is little individual incentive to change this dynamic.”

⁵⁶ Commission on Combating Synthetic Opioid Trafficking. “Technical Appendices”. Appendix C. Section on Drug Prices and Purities in Traditional Trafficking. C-9. Rand Corp (2022). February 8, 2022. https://www.rand.org/pubs/external_publications/EP68839.html



Figure 8: *Educational poster on synthetic opioids.*

Published August 31, 2021, on International Overdose Awareness Day.

Source: U.S. Attorney's Office⁵⁷

The RAND report indicates that the Sinaloa and CJNG cartels have further strengthened ties to Chinese and Indian producers over the past years to import large quantities of precursor chemicals to transform into Fentanyl for smuggling to the United States.

But attempting to enforce Rule of Law and crackdown on cartel activities is no easy feat, as the 2019 shoot-out in Mexican city of Culiacán demonstrated. Narcotics kingpin “El Chapo” Guzman was captured in the battle, but the Sinaloa cartel took so many hostages in the city that Guzman was ultimately released.

⁵⁷ United States Attorneys' Offices. Twitter Post. August 31, 2021. 8:00 AM.
<https://twitter.com/usattorneys/status/1432674588761206785>

All of this leaves lawmakers and law enforcement officials in a regulatory Catch-22. “It’s a mess,” said Pardo. “Mexican drug law enforcement and counter narcotics efforts are really constrained by many factors, corruption being probably the most important one. Mexican drug trafficking organizations are extremely powerful and have challenged the state directly. And I think Mexico has made a very good point that the United States needs to do more to stop the southbound flow of firearms.” Pardo added that Mexican authorities do try to hold suspicious packages originating from China on whatever technicalities they can, but are limited by the lack of regulation on precursor chemical exports.

On their end, China has put many known Fentanyl and Fentanyl analogs on their scheduled items list, but new precursors and synthetic opioids pop up with increasing frequency, bolstered by online demand. The Chinese embassy in Washington recently pointed out⁵⁸ that the U.S. has not yet permanently classified Fentanyl and its analogs as controlled substances subject to the strictest controls, which contrasts with Beijing’s move to put them in that category. Fentanyl itself is classified as Schedule II in the United States, which allows it to be used by medical practitioners for pain management in some cases. Meanwhile, regional law enforcement officials in the U.S. find themselves grappling with the tail end of a constantly evolving supply chain that takes its toll on communities already long ravaged by opioid addiction.

⁵⁸ Delaney, Robert. “China Turns Fentanyl Overdose Problem Back on US.” 2021. South China Morning Post. September 3, 2021.
<https://www.scmp.com/news/china/diplomacy/article/3147397/china-rejects-blame-sharp-rise-us-Fentanyl-overdoses>.

The Undercounting Issue

On January 6, 2017, the Polk County medical examiner, Francis L. Garrity, filed a death certificate in Iowa for Tashara Brielle Burnside and sent a copy to Natasha Terrones, her mother.

The document confused Natasha. “Some of the dots just don't connect for me,” she insisted.

The death certificate, issued almost a month after Tashara’s overdose incident, listed her cause of death as “Anoxic Encephalopathy Six Days Following An Overdose of Heroin.” The U-47700 that Tashara ingested that night — confirmed by the Iowa Division of Criminal Investigation lab — was nowhere to be found on the death certificate.

Back in 2016, a friend had warned Natasha about Tashara’s girlfriend, Sadie, having an existing Heroin problem. In fact, Tashara’s relationship with Sadie was at the root of the months-long strife between mother and daughter. After Tashara’s overdose, Sadie confessed to Natasha that they had been actively experimenting with Heroin prior to the overdose. A medicolegal examiner would have been aware of these facts as well.

STATE OF IOWA
CERTIFICATION OF VITAL RECORD

STATE OF IOWA
IOWA DEPARTMENT OF PUBLIC HEALTH
CERTIFICATE OF DEATH

114-2016-028744

BIRTH NUMBER: 1991-028024

DECEDENT INFORMATION

NAME: Tashara Brielle Burnside
 PLACE OF BIRTH: Iowa
 ARMED FORCES: No
 NAMES (PRIOR TO ANY MARRIAGE):
 DECEDENT LAST: Burnside
 FATHER'S NAME: [REDACTED]
 MOTHER'S NAME: Natasha Terrones
 RESIDENTIAL ADDRESS: [REDACTED]
 INFORMANT NAME: Natasha Terrones
 INFORMANT RELATIONSHIP: Mother
 DATE/TIME OF DEATH: 12/17/2016 (Actual)
 02:32 AM (Actual)
 M.E. CONTACTED: Yes

SSN: 484-19-9862
 SEX: Female
 DATE OF BIRTH/AGE: 10/01/1991 25 Years
 CITIZENSHIP: United States
 MARITAL STATUS: Never Married
 RESIDENCE COUNTY: Story
 COUNTY OF DEATH: Polk
 INFORMANT ADDRESS: [REDACTED]
 PLACE OF DEATH: Inpatient
 FACILITY/ADDRESS: Mercy Medical Center-Des Moines
 Des Moines, Iowa 50314

MEDICAL CAUSE OF DEATH INFORMATION

IMMEDIATE CAUSE OF DEATH: Anoxic Encephalopathy Six Days Following An Overdose Of Heroin
 DUE TO OR AS A CONSEQUENCE OF:
 DUE TO OR AS A CONSEQUENCE OF:
 UNDERLYING CAUSE, IF ANY:
 OTHER SIGNIFICANT CONDITIONS:

MANNER OF DEATH: Accident
AUTOPSY PERFORMED/FINDINGS: Yes/Yes
DATE/TIME OF INJURY: 12/11/2016 04:00 AM
PLACE OF INJURY: Residence
LOCATION OF INJURY: [REDACTED]
DESCRIPTION OF INJURY: Abuse Of A Controlled Substance

TOBACCO CONTRIBUTED TO DEATH: No
ME CASE #: 16-77-3116
INJURY AT WORK: No
TRANSPORTATION INJURY: No
PREGNANCY, IF FEMALE: Unknown

CERTIFIER/TITLE: Francis L Garrity MD
DATE CERTIFIED: 01/06/2017
CERTIFIER ADDRESS: Not Available
 Iowa

FUNERAL HOME: Stevens Memorial-Chapel
 Ames, Iowa 50010
METHOD: Cremation

DISPOSITION

FUNERAL DIRECTOR: Kevin Kenney
PLACE: Ankeny Funeral Home and Crematory-Ankeny
LOCATION: Ankeny, Iowa

This is to certify that this is a true and correct reproduction of the original record as recorded in this state, issued under the authority of Chapter 144, Code of Iowa.
 This copy is not valid unless prepared on engraved border displaying state seal and signature of the Registrar.
THIS COPY NOT VALID UNLESS UNALTERED AND PREPARED ON CERTIFIED SECURITY PAPER

Story
 County of Issuance

01/11/2017
 DATE ISSUED

Terry E. Branstad
 GOVERNOR, STATE OF IOWA
 Kim Reynolds, Lt. Governor

Stacie Herridge
 County Registrar

Melissa R. Bird
 DEPUTY STATE REGISTRAR

S005032367C

FORM #508-0328S (Rev. 01/2016)

ANY ALTERATION OR ERASURE VOIDS THIS CERTIFICATE

Figure 9: Tashara Burnside's Original Death Certificate. Courtesy: Natasha Terrones

When asked about the discrepancy, Sgt. Hippen, the lead investigator on the Burnside case, told me: "The Polk County Medical Examiner's office had to send for an additional toxicology panel partly because U47700, being a novel substance at the time, didn't show

up on even an enhanced toxicology panel unless a [test] for specifically U47700 was requested.”

The Polk County Medical Examiner confirmed that Tashara’s most up-to-date death records does include a mention of U-447700, although an updated death certificate was never issued to Natasha, Tashara’s next of kin.

In Tashara’s case, Sgt. Hippen had a distinct advantage that many drug overdose investigators do not. He was able to easily trace the upstream supply chain for the drugs that killed Tashara, right back to the original Chinese vendor.

According to court documents, Sadie had told the police that she and Tashara had used U4 on Dec. 9. Sgt. Hippen was able to use Sadie’s testimony and her text messages with her dealer to push for further forensic testing to identify U4 in Tashara’s system.

But not all investigators have that advantage. And the lack of accurate overdose numbers hurts counter-narcotics efforts.

Dante Sorianello, the Assistant Special Agent in Charge at the San Antonio DEA offices, said that many coroners, state and local public health agencies that his office coordinates with don’t necessarily provide accurate data. “A lot of times, [coroners] look at it as — I hate to say it — just another drug addict gone and they don’t go into the real detailed

testing. So it's very hard to get an accurate reporting on the cause of death. Cause of death will just be 'Overdose by Cocktail Mixture of Drugs.'”

Indeed, in Bexar County, where San Antonio is located, officials from the medical examiner’s office said they do not track causes of death by specific drug, in response to a July 2021 records request from the Houston Chronicle.⁵⁹ The Bexar County Medical Examiner could not be reached for comment on whether this is still their official practice, despite repeated attempts.

The absence of a specific drug on a death certificate means that at the state and federal level, that death is not counted towards the fatal impact of that narcotic, which in turn affects DEA response on tracking the drug’s circulation numbers, the distribution networks involved, and the policy response to that particular chemical substance.

Consider the CDC’s WONDER API, which is the source of the overdose data that the Commission on Combating Synthetic Opioid Trafficking⁶⁰ used to measure the impact of various drug classes across different population demographics. The WONDER API is a query tool for retrieving mortality data across the United States. The report written by the RAND Corp. based on this data will inform United States drug policy-making for years.

⁵⁹ Goñi-Lessan, Ana, and St John BARNED-Smith. 2021. “Fentanyl Deaths Are Soaring in Texas, and Officials Aren’t Taking Key Steps to Stop Them.” Houston Chronicle. July 29, 2021. <https://www.houstonchronicle.com/news/investigations/article/Fentanyl-deaths-soaring-texas-key-steps-16349531.php>.

⁶⁰ This is the commission behind the February 2022 RAND report on synthetic opioids trafficking, cited previously. Its members come from the United States Senate, the United States House of Representatives, the Office of National Drug Control Policy, the Drug Enforcement Administration, the Department of Homeland Security, the Department of Defense, the Department of the Treasury, the Department of the State, the Office of the Director of National Intelligence, and RAND Corp.

“The data that is on the WONDER platform comes from the National Vital Statistics System,” said Margaret Warner, a senior epidemiologist at the National Center for Health Statistics. Her role, she said, was to help improve the quality and timeliness of death certificate data, by working with the medical examiner and coroner community. She focuses on sudden deaths, like drug overdoses.

“Sometimes people call it death certificate data, sometimes people call it CDC data, some people call it WONDER... but it's all the same data, just different ways of accessing it,” said Warner. “The way we get the information from the National Vital Statistics System is it has to be included on the death certificate.” She says the original source for the cause of death information comes from the medical examiner, coroner or physician who filled out the death certificate. The demographic information comes from the funeral director. “That information is sent to the state vital registration system and then on to the [CDC’s] National Center for Health Statistics to be coded according to ICD-10.”⁶¹

Warner notes that in the last three to five years, her team has done a lot of work at the CDC and with the National Association of Medical Examiners to improve drug specificity in the death certificates issued for overdose cases.⁶² She points to an improvement in the percentage of drug overdose deaths that identified multiple, specific

⁶¹ ICD-10 is the 10th revision of the International Statistical Classification of Diseases and Related Health Problems, a medical classification list by the World Health Organization.

⁶² Warner, Margaret, Leonard J. Paulozzi, Kurt B. Nolte, Gregory G. Davis, and Lewis S. Nelson. “State Variation in Certifying Manner of Death and Drugs Involved in Drug Intoxication Deaths.” *Academic Forensic Pathology* 3, no. 2 (June 2013): 231–37. <https://doi.org/10.23907/2013.029>.

drugs.⁶³ That percentage hovered between 75 to 79 percent from 1999 through 2013 and then increased to 81 percent in 2014 and now to 94 percent in 2020.

James Gill, the chief medical examiner of Connecticut, also said there had been a big push to get certifiers to include the specific drugs on the death certificates. “If you want to know how the opioid crisis is changing, you want this granular data,” he told me.

“Using ‘multidrug intoxication’ just doesn’t cut it anymore and does not meet professional standards. These samples need to undergo forensic toxicology testing at an accredited forensic toxicology lab. These labs are able to identify many of the Fentanyl analogs and quantitate them.”

Dr. Gill also noted a scientific limitation in identifying all the drugs with specificity during a cause of death investigation: “There are always new substances coming on the market and so sometimes there may be a lag until they develop the test for that substance.”

There does exist a recommended standard for how death investigations should be conducted and reported in cases involving opioids and other drugs.⁶⁴ This standard is espoused by the National Association of Medical Examiners. And very recently, in

⁶³ Center for Disease Control. “Products - Data Briefs - Number 428 - December 2021.” 2021. [www.cdc.gov](https://www.cdc.gov/nchs/products/databriefs/db428.htm). December 28, 2021. <https://www.cdc.gov/nchs/products/databriefs/db428.htm>.

⁶⁴ Davis, Gregory G., Amy B. Cadwallader, Corinne L. Fligner, Thomas P. Gilson, Emma R. Hall, Kent E. Harshbarger, Robert Kronstrand, et al. 2020. “Position Paper: Recommendations for the Investigation, Diagnosis, and Certification of Deaths Related to Opioid and Other Drugs.” *The American Journal of Forensic Medicine and Pathology* 41 (3): 152–59. <https://doi.org/10.1097/PAF.0000000000000550>.

December 2021, the AAFS Standards Board issued a general standard for medicolegal death investigation.⁶⁵

But one of the biggest barriers to ensuring that every county strives for specificity in their “cause of death” reporting is that medicolegal death investigation in the United States itself is not uniform. There are more than 2,000 jurisdictions, and the person in charge of cause of death reporting can vary widely: elected coroners, physician medical examiners, sheriff-coroners, justices of the peace, state systems, counties, among others. “Some counties are better funded and supported than others,” Dr. Gill says. “Each of these types of death investigation systems is governed by varying local and state laws.”

An Emerging New Class of Synthetic Opioids

The wide-reaching 2019 controls on Fentanyl-class substances in China that diverted the Fentanyl supply chain to Mexico also left a void in the synthetic opioid market.

“Nitazenes have filled the void that was left behind by Fentanyl analogs,” said Dr. Alex Krotulski, the associate director at Center for Forensic Research Science and Education (CFRSE). Dr. Krotulski’s team does toxicology testing for hundreds of law enforcement agencies in the U.S. In this capacity, they come across some of the earliest victims of a novel synthetic opioid when it first arrives in the country.

⁶⁵ “ANSI/ASB Standard 125, First Edition 2021 Organizational and Foundational Standard for Medicolegal Death Investigation.” n.d. Accessed April 14, 2022.
https://www.aafs.org/sites/default/files/media/documents/125_Std_e1.pdf.

By doing a per-capita extrapolation from the early overdose samples that CFSRE received, Dr. Krotulski estimates that between 3 to 5 percent of the roughly 104,000 drug overdoses in 2021 in the United States involved Nitazene analogs, which include Isotonitazene, Protonitazene and Metonitazene, among others. The assertion is backed up by peer-reviewed research dating back to 2019⁶⁶ and reports from the D.C. Department of Forensic Sciences that found the opioids on used syringes last fall.⁶⁷

“That's a significant number,” Dr. Krotulski said. “Up to 5,000 people dying from a Nitazene analog.”

But data on these deaths is murky at best. New classes of synthetic opioids are easier to overlook in possible overdose deaths. “The problem,” said Dr. Krotulski, “is that the CDC, the DEA, none of them are going to have any good data, because they rely on labs ... but only a very, very small subset of forensic labs in the U.S. are actually testing for Nitazenes.”

It’s not difficult to adapt existing toxicology testing practices to also test for Nitazenes, Dr. Krotulski insisted, but he chalked the low rate of screens for Nitazenes in drug overdose autopsies up to a few different reasons: “Forensic testing in the United States is

⁶⁶ Vandeputte, Marthe M., Katleen Van Uytanghe, Nathan K. Layle, Danielle M. St. Germaine, Donna M. Iula, and Christophe P. Stove. 2021. “Synthesis, Chemical Characterization, and μ -Opioid Receptor Activity Assessment of the Emerging Group of ‘Nitazene’ 2-Benzylbenzimidazole Synthetic Opioids.” *ACS Chemical Neuroscience* 12 (7): 1241–51. <https://doi.org/10.1021/acscchemneuro.1c00064>.

⁶⁷ Jamison, Peter. “New Opioids, More Powerful than Fentanyl, Are Discovered in D.C. Amid Deadly Wave of Overdoses.” *Washington Post*. November 29, 2021. https://www.washingtonpost.com/local/dc-politics/new-opioids-more-powerful-than-Fentanyl-are-discovered-in-dc-amid-deadly-wave-of-overdoses/2021/11/29/680afb2c-4d43-11ec-94ad-bd85017d58dc_story.html

not standardized,” he said, echoing the comments of Dr. James Gill, the chief medical examiner of Connecticut. “Most labs now are all testing for Fentanyl just because of how prevalent Fentanyl is in the US.”

Dr. Krotulski also mentioned one other motivation for some medicolegal death investigators to not test for novel synthetic opioids: “When Fentanyl is identified [in a death investigation], some medical examiners will stop testing. They won’t look for anything else because they already have something that can be used to rule as the cause of death.” Nitazenes are often mixed with other drugs, including Fentanyl, leading to their undercounting in such overdose cases.

“The other part,” Dr. Krotulski added, “is it can sometimes be about money. Some laboratories may only be able to afford a couple hundred dollars to do a test for Fentanyl. They may not be able to afford several more hundred dollars to do more comprehensive testing.”

RAND’s Bryce Pardo backed up Dr. Krotulski’s observations.

“Since 2019, we also started to see the emergence of the benzimidazole class series — the Nitazenes — in both [drug] seizure data, some early overdose death analyses, and then also in the online space,” he said.

“My guess is that you have people...who are going online, getting access to some bitcoin, going on to the crypto markets, or in some cases, the clearnet and then importing these more novel synthetic opioids to cut them into retail distribution for local markets,” Pardo theorized. “And then you have this other kind of major vector, which is the traditional DTOs. Five years ago, they were moving Heroin. Now they're moving Fentanyl through the same pipelines, the same mechanisms more or less, using the same kind of distribution networks.”

That certainly could be one potential future for Nitazenes.

It is important to note, however, that the data sources on the Pardo and the RAND report's findings on Nitazenes were restricted to DEA seizure data and Health Canada's Drug Analysis Service.⁶⁸

⁶⁸ The Drug Analysis Service (DAS) provides scientific and technical services to help Canadian law enforcement agencies in their activities involving illegal drugs.
<https://www.canada.ca/en/health-canada/services/health-concerns/controlled-substances-precursor-chemicals/drug-analysis-service.html>



SOURCE: Analysis of data from the Drug Analysis Service (Drug Analysis Service, Health Canada, "Drug Analysis Service," modified December 7, 2021b).

NOTE: Q1 = quarter 1. Q3 = quarter 3.

Figure 10: Number of Fentanyl analogs and Benzimidazoles, by Quarter.

Chart by: RAND Corp.⁶⁹

In the absence of reliable death records, and knowing the limitations of RAND's online monitoring efforts, I sought to find additional nuance on Nitazene sales through the Hikari API. It was surprising to observe that darknet marketplaces had once again

⁶⁹ Commission on Combating Synthetic Opioid Trafficking. "Technical Appendices". Appendix B. Figure B.44. "Number of Fentanyl analogs and Benzimidazoles, by Quarter" Rand Corp (2022). February 8, 2022. https://www.rand.org/pubs/external_publications/EP68839.html

become a major source of synthetic opioid listings. I found more than 200 unique product listings offering Nitazenes, delivered in both capsule and powder form. The listings, which first appeared in the last quarter of 2018, increased rapidly in frequency throughout 2021.

Unique DNM Listings for Nitazenes

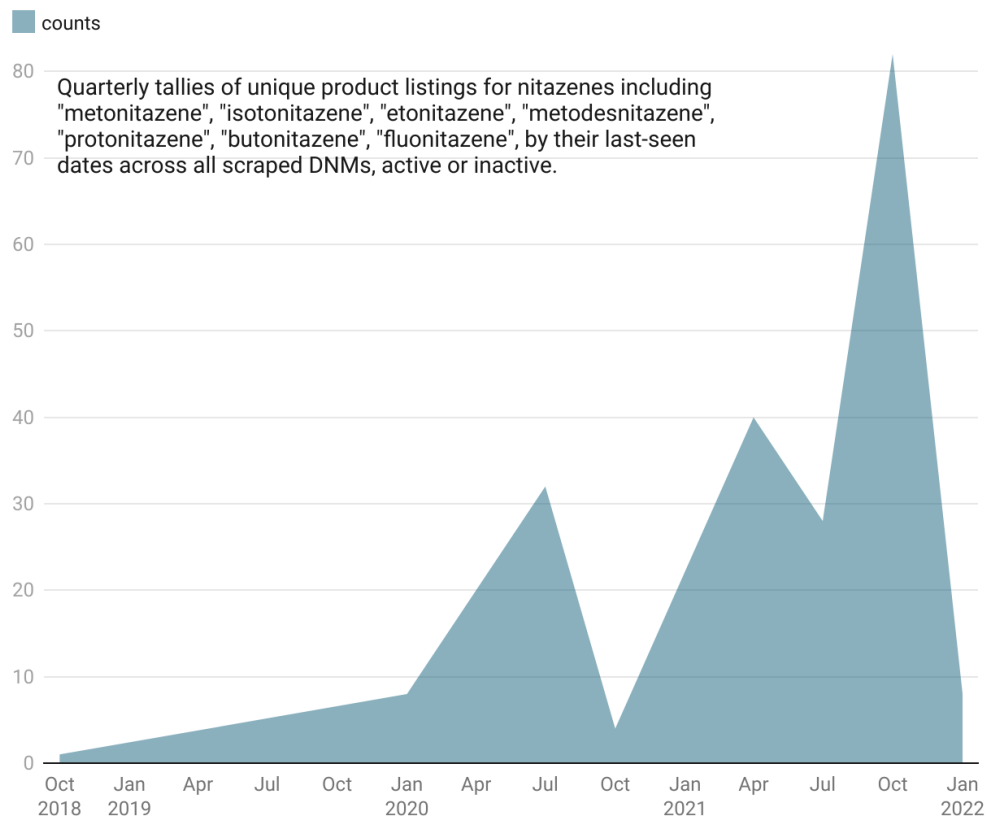


Chart: Mohar Chatterjee • Source: Hikari API • Created with Datawrapper

Figure 11: *Unique DNM Listings for Nitazenes (known analogs) by Quarter. 2018 Q4 - 2022 Q1 (partial). Chart By: Mohar Chatterjee*

Nearly half of these listings were self-reported as originating from China. Just four vendors, identified by their online handles, were responsible for over three quarters of the

unique listings, whose advertised quantities range from just a few milligrams to hundreds of grams. The vendor driving the bulk of this increase goes by the online handle “MicroDroper” — the largest darknet marketplace seller of Nitazenes. They first appeared in December 2018 on Dream Market, listing just one Nitazene product: an Etonitazene they claimed was “1,500 times stronger than Morphine.” A vendor by a similar handle “microdroper1” popped up in April 2021, this time on the now-defunct Dark0de, listing a “Isotonitazene- 2.5x more potent of Fentanyl” for sale, shipped from China.

| Vendor | counts |
|----------------------|--------|
| MicroDroper | 65 |
| mastermeds | 29 |
| MasterMeds | 27 |
| eurovalzz | 17 |
| TheGratefulChemicals | 14 |
| cindicator | 7 |
| HappyDrugs | 6 |
| TGC-RC | 6 |
| drsmack | 5 |
| topquality | 5 |
| microdroper | 4 |
| DLab | 3 |
| costco | 2 |
| happydrugs | 2 |
| microdroper1 | 2 |
| rudeboy5002 | 2 |

>Table 1: *Every DNM vendor who posted more than one Nitazene class drug listing, sorted by the number of such unique listings attributable to them.*

Analysis by: Mohar Chatterjee.

Data source: Hikari API

Among the first and one of the more potent Nitazene analogs to emerge was Isotonitazene, both Dr. Krotulski and Bruce Pardo agreed, which matches the scraped DNM data from the Hikari API. These Nitazenes, along with a few other analogs, were placed on a Schedule I controlled substances list in the U.S. only last December.⁷⁰ As before with the Fentanyl class regulations, that decision by the United States government to federally control seven synthetic Benzimidazole-opioid substances lined up with the peak we see in Nitazene listings in the fourth quarter of 2021.

I also replicated RAND's methodology to scour the clearnet in 2022 for Nitazene listings. I found two such product advertisements. One was an old, supposedly inactive listing for O-desalkyl Isotonitazene on the research chemical website EChem.com⁷¹.

I looked up the vendor profile on EChem.com — Emu Trading Co LLC —and sent them an email asking if their listing was still active. They quickly responded, sending me price quotations for N-desethyl Isotonitazene instead, for quantities ranging from 50 grams to 1 kilogram.

Just a gram of most types of Nitazenes are almost certain to be a fatal dose.

⁷⁰ Drug Enforcement Administration. 2021. *Schedules of Controlled Substances: Temporary Placement of Butonitazene, Etodesnitazene, Flunitazene, Metodesnitazene, Metonitazene, Npyrrolidino Etonitazene, and Protonitazene in Schedule I*. Vol. Federal Register / Vol. 86, No. 232 / Tuesday, December 7, 2021 / Proposed Rules. <https://www.govinfo.gov/content/pkg/FR-2021-12-07/pdf/2021-26263.pdf>

⁷¹ "About EMU TRADING LLC." n.d. [www.echemi.com](https://www.echemi.com/shop-us20210706234646261/company.html). Accessed April 14, 2022. <https://www.echemi.com/shop-us20210706234646261/company.html>.

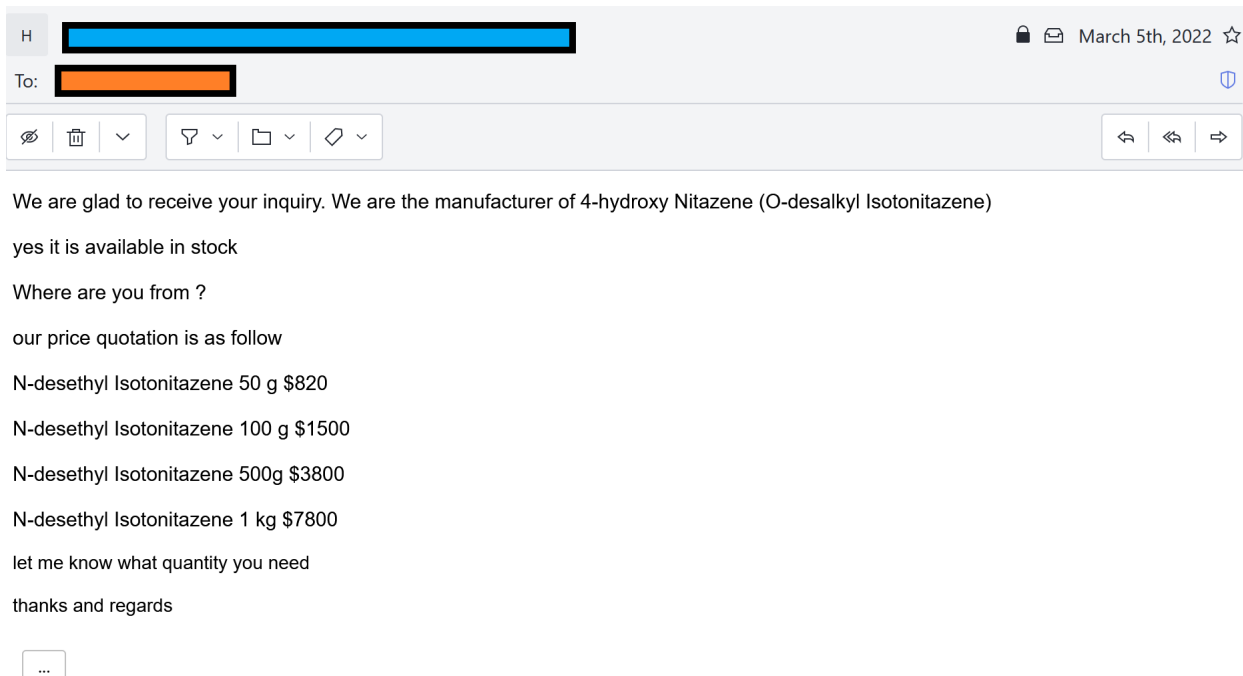


Figure 12: *Email from Emu Trading Co, a self-reported N-Desethyl Isotonitazene Vendor*

That last wholesale price for N-Desethyl Isotonitazene comes out to just \$8 per gram.

"Based on available in vitro data, Isotonitazene is about 8 times more potent than Fentanyl," said Dr. Krotulski. "N-desethyl Isotonitazene is a main metabolite of Isotonitazene and it is about 2-3 times more potent than Isotonitazene."

On EChemi.com, the vendor's address is listed as 915 Main Street, Suite 2, Hopkins, Minnesota. This address is registered to a coworking space in the Minneapolis suburb of Hopkins. But the LLC I found for Emu Trading Co, filed in Delaware —par for the course for many quickly set up limited liability corporate entities — cites an unassigned registered agent with a postal code in Santa Clara, California. Emu Trading Co filed for LLC status on May 7, 2019 — just as listings for Nitazenes were picking up on the dark

web, and nearly a full year before Health Canada’s Drug Analysis Service reported any Benzimidazole observations. For context, the Emu Trading Co’s listed address in Hopkins, Minnesota is roughly 5 hours away by car to the Canadian border.

The screenshot shows the Delaware.gov website for the Division of Corporations. The header features the 'State of Delaware' logo and a banner image of a waterfront building. Below the header, the page is titled 'Department of State: Division of Corporations'. The main content area is divided into a 'HOME' sidebar and a 'Entity Details' section. The 'Entity Details' section displays information for 'EMU TRADING CO LLC', including its File Number (7407317), Incorporation Date (5/7/2019), Entity Kind (Limited Liability Company), and State (DELAWARE). A red warning message states 'THIS IS NOT A STATEMENT OF GOOD STANDING'. Below this, the 'REGISTERED AGENT INFORMATION' section shows 'UNASSIGNED AGENT' as the agent, with fields for Name, Address, City, State, and Phone. The State field is set to 'NullValue'. At the bottom, there is a section for 'Additional Information' with a fee of \$10.00 for Status and \$20.00 for Status, Tax & History Information. The 'Status, Tax & History Information' option is selected, and a 'Submit' button is present.

| Entity Details | |
|--|---------------------------|
| THIS IS NOT A STATEMENT OF GOOD STANDING | |
| File Number: | 7407317 |
| Incorporation Date / Formation Date: | 5/7/2019 (mm/dd/yyyy) |
| Entity Name: | EMU TRADING CO LLC |
| Entity Kind: | Limited Liability Company |
| Entity Type: | General |
| Residency: | Domestic |
| State: | DELAWARE |
| REGISTERED AGENT INFORMATION | |
| Name: | UNASSIGNED AGENT |
| Address: | |
| City: | |
| County: | |
| State: | NullValue |
| Postal Code: | 95050 |
| Phone: | |
| Additional Information is available for a fee. You can retrieve Status for a fee of \$10.00 or more detailed information including current franchise tax assessment, current filing history and more for a fee of \$20.00. | |
| Would you like <input type="radio"/> Status <input checked="" type="radio"/> Status, Tax & History Information | |
| <input type="button" value="Submit"/> | |

Figure 13: *Emu Trading Co LLC Delaware Division of Corporations Filing*

I also searched online for the newest, as yet unregulated Nitazene analog: N-Pyrrolidino Etonitazene, more commonly known as Etonitazepyne. “N-Pyrrolidino Etonitazene is potentially 20 times more potent than Fentanyl,” Dr. Krotulski said.

On the same clearnet website (EChem.com), I found a listing for Etonitazepine, this time from the Typu Group, whose admin offices are located at Changjiang Avenue, High-tech Development Zone, Shijiazhuang City, Hebei Province, China. I spoke with their representative over phone and by email. While I asked about their shipping practices, I was promised express shipping for the pharmaceutical to any U.S. city.

The screenshot shows the EChem.com website interface. At the top, there is a search bar with the text "Please enter chemical name, CAS NO." and a magnifying glass icon. To the right of the search bar are links for "Sign in" and "Join free", and a language selector showing "EN" and "CHN". Below the search bar is a navigation menu with categories: "Categories", "Wholesale", "Encyclopedia", "Local Mall", "Market Price & Insight", "Trade Data" (marked with a "NEW" badge), "Exhibition", "News", "For Buyers", and "For Suppliers".

The main content area displays a product listing for Etonitazepine. On the left is a photograph of a yellowish, granular substance. To the right of the image, the text reads: "Etonitazepine is an opioid drug, an analgesic of the benzimidazole class". Below this, the following specifications are listed:

| | |
|----------------------|------------------------|
| Unit Price: | \$2.53 /G EXW |
| Grade: | Medical Grade |
| Content: | 98.5% |
| Port: | Shanghai |
| Packaging: | 1kg/ aluminum foil bag |
| Price valid (until): | 2022-10-29 |

At the bottom of the product details section are two buttons: "Contact Supplier" and "Chat Now".

On the right side of the page, there is a sidebar for the supplier, TYPUGROUP.CO.,LTD. It includes the company logo (a green circle with "TP" inside), the company type "Manufactory", location "China", and qualification "VIP". The main products are listed as "chemical". At the bottom of the sidebar are links for "Favorite" and "Visit Store".

Figure 14: *Etonitazepine (N-Pyrrolidino Etonitazene) Listing.*

Retrieved from EChem.com on 03/07/2022

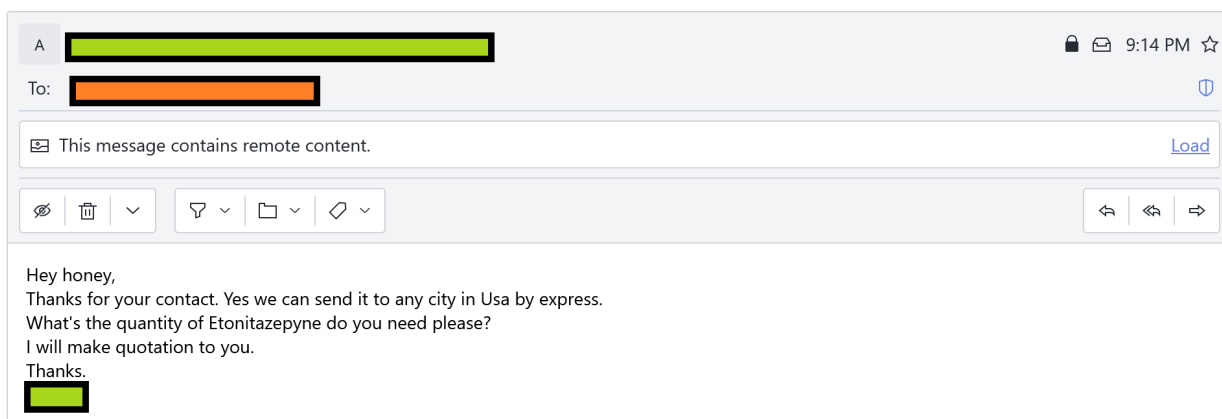


Figure 15: *Email from Typu Group Representative, a self-reported N-Pyrrolidino Etonitazene Supplier*

Nicole Cook, the C4ADS analyst, confirmed that the Typu Group, or any common Chinese permutations of its name, with any known suffixes, did not match to any companies in either the mainland Chinese corporate registry or the Hong Kong corporate registry.

Cook noted that it is somewhat common for online vendors claiming to be Chinese companies to obscure or not provide a Chinese-language name for themselves on any available associated material. She described two possibilities for why an individual company might be this way:

1. The vendor exists but is operating under a possibly fictitious name — for example, an individual dealer might choose to advertise under a "company name" in order to lend an air of credibility, or a company may totally obfuscate their actual Chinese name in order to better hide the activity.

2. It's also possible that companies with no identifiable corresponding registered entity are scams.

But between the burgeoning darknet listings and the eager clearnet vendors, it is clear that like its predecessors, Nitazenes already promise a troubling ease of acquisition, especially for seasoned synthetic opioid traffickers.

On the ground in the United States, Dr. Krotulski noted that the majority of Nitazene overdoses his team saw seemed to be centered around the Midwest. “Cook County in Chicago would probably be the best example,” he said, but also flagged Knox County, Tennessee, as well as West Virginia.

But it was from Ames, Iowa, that I received a call on April 1, 2022. On the other end of the line was Sgt. Hippen.

“We just got a drug chemistry analysis,” he began. “We had some counterfeit Oxycodone pills that we expected to have contained Fentanyl or a Fentanyl analog. But it was actually this other substance.” He stumbled a little on the name, then sounded it out slowly.

“N-Pyrrolidino Etonitazene. You mentioned that name the other day, and I hadn't heard of it at the time. But that's apparently cropping up here. This is the first case we've seen in our county of that stuff.”

Learning from Supplier Responses to Regulatory Crackdowns

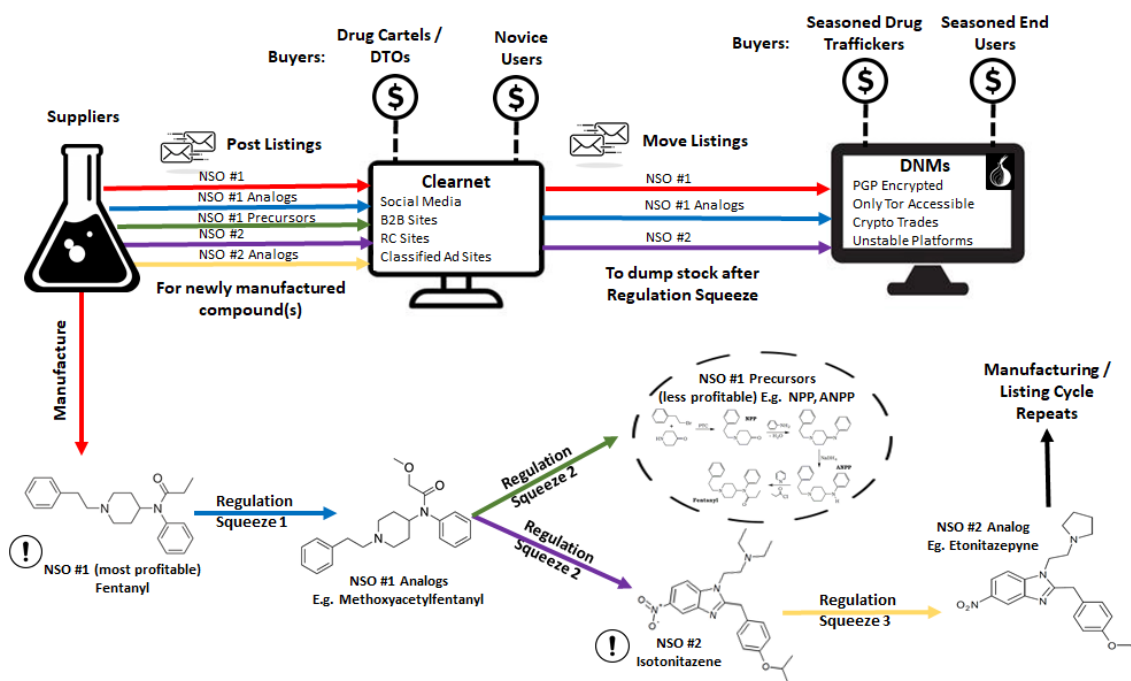


Figure 16: *Diagram depicting manufacturing and subsequent online advertisement practices of major actors in the synthetic opioid supply chain in response to increasing regulatory restrictions. Figure By: Mohar Chatterjee.*

The diagram above represents the most likely evolution of the manufacturing and online advertising practices of synthetic opioids suppliers in response to increasing regulatory restrictions, based on all the evidence I have presented thus far.

Suppliers have two notable actions available to them: manufacturing new synthetic opioids (NSOs) and posting advertisements of the manufactured compound(s). When a supplier first manufactures an NSO, they post advertisements for the compound on clearnet websites, including social media sites like Pinterest, bespoke

business-to-business sites, research chemical sites, and obscure classified ad sites, in order to maximize profits.

On the clearnet, the buyers who are able to view these advertisements include standard drug trafficking organizations (DTOs) such as the Sinaloa and CJNG cartels, and novice users who might have their own downstream distribution networks.

When the original version of the NSO becomes a tightly controlled substance, suppliers switch to producing analogs of the NSO instead, and move their listings to darknet marketplaces (DNMs) to dump their remaining, illegal stock, so long as it is profitable to do so and the risk of law enforcement scrutiny on these platforms remains low (not a given, since DNMs go through their own booms and busts).

The buyers who can access this risky stock are seasoned drug traffickers and end users. The number of people viewing listings on the darknet are smaller and self-selecting, compared to the number of people who are able to view listings on the clearnet.

When both the original NSO and its analogs become tightly controlled, suppliers switch to selling the precursor chemicals necessary to manufacture the NSO. So long as these precursors remain largely unregulated, suppliers see no need to move their advertisements off the clearnet.

Selling a finished NSO is more profitable, however, so suppliers also begin manufacturing a structurally different synthetic opioid that is not covered under existing regulations, and the cycle begins once more.

Conclusion and Future Work

In the earliest days in the life-cycle of a novel synthetic opioid, before its presence in the ground supply of dangerous narcotics grows intractable, the digital activity of its vendors can be used to link different parts of a vast distribution network together. It is at this stage that real-time analysis of clearnet and darknet platforms can be used to focus the scrutiny of law enforcement officials and regulatory authorities, and lay the basis for stronger, cross-border criminal investigations.

Future work in this field should be conducted to confirm whether Nitazenes are following the same life-cycle on the open market as their lethal forerunner, Fentanyl. Much of my work relies on temporal analysis, so research should focus on monitoring when advertisements for new Nitazene analogs, and possibly Nitazene precursors, appear and how they fluctuate on both clearnet platforms and darknet markets as a result of substances regulation constrictions.

Another promising avenue of work would be to gauge whether there exists an appreciable signal among the historical DNM listings collected by Hikari Labs for any novel synthetic opioids that might subsequently show up in drug overdose autopsies and early

forensic toxicology testing conducted by labs like CFSRE. This would allow for further confidence that darknet markets, despite their unstable nature as a trading platform, could function as an early warning system of sorts to aid counter narcotics efforts.

And finally, given what we know about the alarming rise of synthetic opioid-involved overdose cases in the United States over the last 10 years, it is clear that a strong, internationally coordinated regulatory response targeting the core chemical substances involved in the synthesis process of these deadly narcotics will be critical in stopping the rising death toll of synthetic opioids.

Primary Source List

1. Nicolas Christin, PhD (Co-Founder of Hikari Labs; Associate Research Professor at Carnegie Mellon University, jointly appointed in the School of Computer Science and in Engineering & Public Policy), interviewed by Mohar Chatterjee, October 4, 2021.
2. Bryce Pardo (Associate Director, Drug Policy Research Center; Policy Researcher, Washington Office, RAND Corporation; Principal Investigator on 2022 RAND Report produced by Commission on Combating Synthetic Opioid Trafficking), interviewed by Mohar Chatterjee, Jan 20, 2022 and February 9, 2022.
3. Nicole Cook (Analyst, C4ADS; Co-Author on 2019 Synthetic Opioids Report “Lethal Exchange: Synthetic Drug Networks in the Digital Era”), interviewed by Mohar Chatterjee, February 11, 2022.
4. F. Dante Sorianello (Assistant Special Agent in Charge of DEA Division Offices in San Antonio, Texas), interviewed by Mohar Chatterjee, January 14, 2022 and February 14, 2022.
5. Lead Investigator, DEA, on the synthetic opioids case involving Mohammed Alaa Allawi (Special Agent in DEA Division Offices in San Antonio, Texas), interviewed by Mohar Chatterjee, February 14, 2022.
6. Jeffrey Todd Scott (Special Agent in Charge of DEA Division Offices in Louisville, Kentucky), interviewed by Mohar Chatterjee, February 10, 2022.

7. James Gill, MD (Chief Medical Examiner, State of Connecticut), interviewed by Mohar Chatterjee, February 28, 2022.
8. Alex Krotulski, PhD (Associate Director at Center for Forensic Science Research & Education; Forensic Toxicology and Forensic Chemistry Researcher; Program Manager for NPS Discovery — the CFSRE’s drug early warning system and flagship program for the identification and characterization of new and emerging synthetic drugs), interviewed by Mohar Chatterjee, March 4, 2022.
9. Sara Walton (Forensic Toxicologist, Center for Forensic Science Research & Education, NPS Program), interviewed by Mohar Chatterjee, March 4, 2022.
10. Steven Campman, MD (Chief Medical Examiner, San Diego), interviewed by Mohar Chatterjee, March 21, 2022.
11. Cole Hippen (Police Sergeant, Police Department, City of Ames, Iowa), interviewed by Mohar Chatterjee, March 23, 2022 and March 31, 2022.
12. Administrators at Polk County Medical Examiner’s Office (jurisdiction over Mercy Medical Center in Des Moines, Iowa), interviewed by Mohar Chatterjee, April 4, 2022.
13. Margaret Warner, PhD (Epidemiologist in the Mortality Statistic Branch, Division of Vital Statistics, National Center for Health Statistics, Centers for Disease Control and Prevention), interviewed by Mohar Chatterjee, March 29, 2022.
14. Shekita (Kiki) McBroom (mother of Jayla McBroom), interviewed by Mohar Chatterjee, March 24, 2022.
15. Natasha Terrones (mother of Tashara Brielle Burnside), interviewed by Mohar Chatterjee, March 21, 2022.

16. Death Certificate of Tashara Brielle Burnside. 114-2016-028744. Iowa Department of Public Health. Date Filed: January 6, 2017.
17. LLC Filing, Emu Trading Co. 7407317. Delaware Department of State: Division of Corporations. Date Filed: May 7, 2019.
18. Emu Trading Co LLC email address listed on Echemi.com. 'Isonitazene availability?'. Email, March 5, 2022.
19. Typu Group email address listed on Echemi.com. 'Etonitazepyne availability?'. Email. March 4, 2022.

Postscript

The work for this thesis actually began in the first quarter of 2021, when I was working on a story about trends in Fentanyl fatalities in certain California counties with KQED's Julie Small.⁷² This is when I first began to comprehend the colossal death toll of drug overdoses in the U.S. Synthetic opioids, in particular, seemed like a relentless assassin, cutting across individuals, families, and population demographics.

Later, in October 2021, I was crawling through the darknet social media forum called Dread when I came across an unusual announcement. The administrators of a profitable darknet marketplace, Whitehouse Market or WHM, were “retiring”. Intrigued by the market dynamics that would incentivize such a decision, I reached out to an expert in the field — CMU professor, Nicolas Christin — to write an article on the aftermath of WHM's closure.⁷³ This is how I first became aware of the Hikari API.

As I tried to estimate what portion of the global illicit drug trade was conducted on the darknet for the WHM article, I realized that both the United Nations Office of Drugs and Crime⁷⁴ and the European Monitoring Center for Drugs and Drug Addiction⁷⁵ used data

⁷² Julie Small, Mohar Chatterjee. “Fentanyl Is Killing More People during the Pandemic. In Santa Clara County, Victims Are Getting Younger.” KQED. May 24, 2021. <https://www.kqed.org/news/11874651/Fentanyl-is-killing-more-people-in-the-pandemic-in-santa-clara-county-victims-are-getting-younger>.

⁷³ Mohar Chatterjee, “The Demise of White House Market Will Shake up the Dark Web.” *Wired*. November 1, 2021. <https://www.wired.com/story/white-house-market-dark-web-drugs-goes-down/>.

⁷⁴ UNODC. 2021. “GLOBAL OVERVIEW: DRUG DEMAND DRUG SUPPLY.” https://www.unodc.org/res/wdr2021/field/WDR21_Booklet_2.pdf.

⁷⁵ EMCDDA. 2019. “Analysis of the supply of drugs and new psychoactive substances by Europe-based vendors via darknet markets in 2017-18”. https://www.emcdda.europa.eu/system/files/attachments/12104/EDMR2019_BackgroundReport_Darknet.pdf.

from the Hikari Labs to back up their published analysis. So I decided to go straight to the source. Through a data use agreement between Hikari Labs and the Brown Institute, where I was employed part-time, I was able to gain access to the Hikari data from November 17, 2021 to Feb 28, 2022.

I gathered all the data on synthetic opioid listings and vendors that I could think of in this time period, and conducted my analysis on it within this time period. The API was still in beta-mode, so my queries were slow-going at times, and were used to beta-test the API and help the Hikari team improve their data tool.

In addition, I conducted an extensive literature survey to better formulate my hypothesis based on exploratory analysis of the darknet data I had retrieved. I soon reached out to other experts at RAND and C4ADS whose work had been seminal in understanding the global trafficking of synthetic opioids to get their insights on my hypotheses, as well as what to look out for in the data I was retrieving.

I spoke to DEA Special Agents across the country (not many would give me an interview on the record) to better understand the narcotics supply situation on the ground, as well as their investigative process. I chose the DEA divisions to reach out to based on numerous Department of Justice indictments that identified the areas of operations of indicted members who were part of known drug trafficking organizations.

Based on statements from the DEA agents I spoke with, I also reached out to medical examiners, forensic toxicology experts and health statisticians to better understand the challenges of early detection of new synthetic opioids when it entered the narcotics supply in an area.

Through it all, I reformulated and refined my core hypotheses with the help of my advisors until I reached the analysis and conclusions you see in this thesis. Please refer to the methodology notes detailed in the thesis for more information.

Finally, I reached out to family members of synthetic opioid victims who had previously spoken to the press (and hence left a verifiable trail of statements). I cross-referenced the family's statements with that of county medical examiners and local police investigators. I chose one family's story to frame some of the narrative within this thesis, but I hope this work benefits countless other victims of synthetic opioid overdoses.