

Exploitation of supply chain monitoring loopholes fueled US opioid epidemic, study finds

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New research from the Indiana University Kelley School of Business explains how pharmaceutical companies were able to saturate the

country with massive quantities of opioids, despite efforts by the Drug Enforcement Administration to regulate their supply.

The research identifies a loophole in the DEA's monitoring system exploited by some [pharmaceutical companies](#), leading to an oversupply of opioid drugs in communities. The hallmark of this activity was high supply chain complexity, such as pharmacies with dozens of distributors across the country.

[The paper](#), "Hiding Behind Complexity: Supply Chain, Oversight, Race, and the Opioid Crisis," appears in the journal *Production and Operations Management*.

The same research also documents how the opioid epidemic—commonly regarded as a national public health crisis among white Americans—had a much deeper impact in Black communities, where overdose deaths tripled from 2014 to 2020.

"We believe we are the first to uncover insights into the supply chain mechanisms that were used to evade the DEA and fuel the [opioid crisis](#)," said Jonathan Helm, professor of operations and decision technologies and the W.W. Grainger Inc. Faculty Fellow at the Kelley School. "Up until now, the focus has been on each of the pharmaceutical companies individually, ignoring the huge impact of the broader supply chain."

"No one was looking at it from a supply chain perspective," added Iman Attari, a Kelley School doctoral candidate in operations and decision technologies and the paper's corresponding author.

Attari, Helm and Jorge Mejia, an associate professor in the Kelley School, analyzed information in the 2019 release of the DEA's Automation of Reports and Consolidated Orders System—commonly known as the ARCOS database—which tracked each shipment in the

U.S. opioid supply chain from 2006 to 2014.

The researchers uncovered how supply chain complexity may have facilitated the influx of large quantities of opioids into the market, undetected by the DEA. Their research combined ARCOS data about pharmacies' opioid dispensing and supply chain structures with county-level demographics and socioeconomic factors.

Using a fixed-effect model, they found that a one-unit increase across three dimensions of supply chain complexity was associated with a 16% increase in opioid dispensing.

DEA monitoring involves using ARCOS to collect data on all shipments of controlled substances, and requiring manufacturers and distributors to report suspicious orders of unusual size and frequency.

"The issue was that pharmacies wanting to have large shipments were very smart about it," Attari said. "Instead of placing an order for a large shipment from one single distributor, they broke down that large order across multiple distributors. They got smaller shipments from different distributors; when added up, it was a huge order. Each distributor is only going to see the data from the [pharmacy](#) that links themselves to it, and not to shipments from other distributors."

As a result, the DEA monitoring system failed. By using more suppliers, pharmacies were able to evade detection.

Another factor they studied was the location of distributors. Because of the DEA's structure, with 23 often independently operated field divisions spread across the U.S., the researchers found that a lack of coordination and aggregation of information among them was another factor in overlooking potentially suspicious activity.

"Even if a supplier reports a suspicious order in one division, other divisions that the pharmacy orders from are unlikely to be informed," they wrote.

"It cannot be just 'business,' because when you look at it from a business standpoint, it makes more sense to work with one distributor because you benefit from economy of scale," Attari said. "It is expected for a pharmacy to have one or two distributors, or at most three distributors of opioid drugs.

"When we saw pharmacies in the data set with 25 distributors—all over the U.S.—that was a strong indication that they were trying to mess with the monitoring system."

The research found that supply chain complexity had a stronger association with the increase in opioid dispensing in non-white communities. A 10% increase in the non-white proportion of the population yielded a 3.39% increase in the overall dispensing by pharmacies with high supply chain complexity.

"Communities of color have been historically under-resourced and neglected by many government and social services," the researchers wrote. "In the context of the opioid crisis, it appears that the DEA has spent more effort arresting non-White drug users than on regulating the flow of opioids from pharmaceutical companies into non-White communities."

To be certain that their analysis was distinguishing between legitimate medical use and non-medical, recreational demand, they compared statistics for the reformulated OxyContin, which was redesigned to prevent abuse.

"In a novel approach, we leverage the fact that different pharmacies

received their first shipment of reformulated OxyContin at different times and use a difference-in-differences model to estimate the heterogeneous effect of the shock on dispensing," they wrote.

"As the reformulated OxyContin stifled (non-medical) demand, high-complexity pharmacies experienced a 15.31% greater reduction in dispensing compared to lower-complexity pharmacies, suggesting that their excess dispensing was indeed satisfying non-medical/recreational demand."

As a follow-up to this paper, the researchers are investigating the dynamics between major chain pharmacies and their distributors, and how they may facilitate the oversupply by pharmacies.

Their initial findings suggest that the pharmacies' practice of self-distribution, where they distribute opioids from their own distribution centers, combined with their close ties to large distributors, also may have led to excessive opioid dispensing without adequate oversight by the DEA.

More information: Iman Attari et al, Hiding Behind Complexity: Supply Chain, Oversight, Race, and the Opioid Crisis, *Production and Operations Management* (2024). [DOI: 10.1177/10591478241242126](https://doi.org/10.1177/10591478241242126)

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