

# QUANTIFYING THE CONTRIBUTION OF FENTANYL TO NON-FATAL AND FATAL OVERDOSES IN SAN DIEGO, CALIFORNIA, 2020-2024: A MODELING STUDY

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## Background:

The opioid overdose crisis in the San Diego-Tijuana border region worsened as fentanyl penetrated unregulated drug supplies during the COVID-19 pandemic. We quantified the contribution of fentanyl to non-fatal and fatal overdoses among people who inject drugs (PWID) in San Diego from 2020 to 2024.

## Methods:

A deterministic compartmental model simulated opioid use and overdose dynamics, calibrated using epidemiological data from a binational longitudinal cohort of PWID from San Diego and Tijuana, Mexico, restricted to San Diego residents. The model was calibrated to fentanyl use prevalence (51.0% in 2021 and 62.4% in 2024) and the percentage who experienced a recent (past 6-months) non-fatal overdose among PWID using fentanyl (38.5% in 2021, 19.1% in 2023) and those not using (6.0% in 2021, 9.1% in 2023). Key parameters included time-varying annual rates of repeat overdoses, transitions between fentanyl use states, increased overdose risk associated with fentanyl use (Relative Risk (RR) = 5.97 from 2020-2021 and 4.19 from 2022-2024), and increased risk of fatal overdose after a recent non-fatal overdose (RR=1.17). The PWID size estimate for San Diego was 24,991. We simulated a counterfactual analysis, where the impact of fentanyl on overdose risk is removed, to quantify fentanyl's contribution to non-fatal and fatal overdoses from 2020 - 2024.

## Results:

Model simulations estimated that 41,453 non-fatal and 2593 fatal overdoses occurred among PWID in San Diego from 2020-2024, and fentanyl use accounted for 62.3% and 37.0%, respectively. Without fentanyl, 25,825 non-fatal and 959 fatal overdoses could have been averted.

## Conclusion:

Fentanyl penetration contributed substantially to the overdose burden among PWID in San Diego. Public health and policy interventions, including community drug-checking services, safe supply, and regulation of illicit drug markets, are needed to curb this crisis.

## Disclosure of Interest Statement:

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