

EXPLORING POTENTIAL UNDERESTIMATES IN FATAL OVERDOSE MORTALITY ACROSS MAJOR METROPOLITAN AREAS IN MEXICO BETWEEN 2005-2019

Authors: Bejarano-Romero R¹, Arredondo Sánchez-Lira J², Rafful C³, Pitpitan EV⁴, Esparza-Méndez LE⁵, Poimboeuf M⁶, Shover CL⁶, Goodman-Meza D⁷.

Affiliations:

- 1) SDSU-UCSD Joint Doctoral Program in Interdisciplinary Research on Substance Use, San Diego, CA, United States
- 2) School of Public Health and Social Policy, University of Victoria, BC, Canada
- 3) Faculty of Psychology, National Autonomous University of Mexico, Coyoacan, Mexico City, Mexico & Global Mental Health Research Center, National Institute of Psychiatry, Tlalpan, Mexico City, Mexico
- 4) School of Social Work, San Diego State University, San Diego, CA, United States
- 5) Forensic Services and Forensic Sciences Directorate of the State of Chihuahua, Chihuahua, Mexico
- 6) Department of Medicine, David Geffen School of Medicine at UCLA, Los Angeles, CA, United States
- 7) Kirby Institute, University of New South Wales, NSW, Australia (D Goodman-Meza PhD).

Background: In Mexico, low numbers of overdose deaths reported by government agencies, coupled with evidence of increased substance use in certain regions, suggest underreporting of overdose mortality. We explored the potential miscoding and underreporting of overdose deaths.

Methods: We assembled a mortality and treatment dataset using a combination of publicly available data and freedom of information requests to Mexican state jurisdictions. Using data from post-mortem toxicology analyses, we identified proxy International Classification of Diseases (ICD)-10 codes for causes of death that were statistically significantly more common (using $p < 0.05$ as a threshold) in decedents with positive toxicology for opioids, methamphetamine, cocaine, or benzodiazepines compared to decedents with negative toxicology for these substances. We then estimated annual crude overdose mortality rates, for individuals aged 20 to 39 with both standard overdoses-specific codes (i.e., X40-44, X60-64, X85, and Y60-64), and derived proxy ICD-10 codes. Lastly, we fitted linear regression to evaluate correlation between proxy overdose mortality rates and treatment admission rates for substance use disorder.

Results: We identified acute myocardial infarction (I21), acute pulmonary edema (J81), and acute respiratory failure (J96) as proxy ICD-10 codes for potential overdose deaths. Using these codes, the estimated crude overdose mortality rate per 100,000 aged 20 to 39 in Mexico increased from 4.14 in 2005 to 6.92 in 2019, compared to estimates of 0.31 to 0.37 using standard overdose codes for the same period. Regression models demonstrated positive associations between the estimated crude overdose mortality rates and drug treatment admission rates in the most populous metropolitan areas for the years 2005, 2010, and 2019 (all significant at $p < 0.05$).

Conclusion: Our findings suggest a potential underestimate of overdose deaths due to misclassification and underscore the critical need for improved forensic capabilities to more accurately identify overdose deaths.

Disclosure statement: David Goodman-Meza and Raul Bejarano received funding from the U.S. National Institutes of Health related to this work.