



THE UNIVERSITY *of* EDINBURGH

Edinburgh Research Explorer

Re: Estimation of opioid misuse prevalence in New York State counties, 2007-2018. A Bayesian spatio-temporal abundance model approach

Citation for published version:

Bradley, H, Nguyen, T, Sharifi Far, S, Jordan, AE, Kamanu, V, King, R, Li, L, Luisi, N, Mack, S, Udo, T & Rosenberg, ES 2024, 'Re: Estimation of opioid misuse prevalence in New York State counties, 2007-2018. A Bayesian spatio-temporal abundance model approach', *American Journal of Epidemiology*.

Link:

[Link to publication record in Edinburgh Research Explorer](#)

Document Version:

Peer reviewed version

Published In:

American Journal of Epidemiology

General rights

Copyright for the publications made accessible via the Edinburgh Research Explorer is retained by the author(s) and / or other copyright owners and it is a condition of accessing these publications that users recognise and abide by the legal requirements associated with these rights.

Take down policy

The University of Edinburgh has made every reasonable effort to ensure that Edinburgh Research Explorer content complies with UK legislation. If you believe that the public display of this file breaches copyright please contact openaccess@ed.ac.uk providing details, and we will remove access to the work immediately and investigate your claim.



Re: Estimation of opioid misuse prevalence in New York State counties, 2007-2018. A Bayesian spatio-temporal abundance model approach

Authors: Heather Bradley¹, Trang Nguyen^{2,3}, Serveh Sharifi Far⁴, Ashly E. Jordan⁵, Vivian Kamanu², Ruth King⁴, Lanxin Li⁴, Nicole Luisi¹, Stephanie Mack², Tomoko Udo³, Eli S. Rosenberg^{2,3}

¹ Emory University, Rollins School of Public Health, Department of Epidemiology

² New York State Department of Health, Office of Science and Technology

³ University at Albany School of Public Health, SUNY

⁴ University of Edinburgh, School of Mathematics

⁵ New York State Office of Addiction Services and Supports

Word limit: 600 words; word count: 635 words

To the Editor:

We read with interest the paper by Santaella-Tenorio, Hepler, et al., in which the authors estimate opioid misuse (OM) prevalence in New York State (NYS) counties using complex modeling techniques and publicly-releasable, summarized surveillance data. As the opioid crisis continues in the U.S., estimating the burden of substance use and sequelae is essential for monitoring trends and disparities and for informing resource allocation and interventional strategies. However, as a group of NYS public health epidemiologists, who report on and respond to NYS' opioid epidemic, together with academic partners, we have several concerns with OM prevalence estimates presented in this article.

First, the definition for emergency department (ED) visits for opioid overdose, a key model input, is incorrectly described. The underlying data source for this measure is the Statewide Planning and Research Cooperative System, which utilizes ICD-10-CM codes starting from October 1, 2015. The definition for opioid overdose using ICD-10-CM codes should only include T codes for specific substances (T40.0, T40.1, T40.2, T40.3, T40.4, and T40.6); X and Y ICD-10 codes (X40–44, X60–64, X85, Y10–14), which indicate death due to poisoning, should not be included. Furthermore, for ED visits where these T codes are indicated, a principal diagnosis indicating an “adverse effect” or “sequela” (denoting a subsequent visit to an initial overdose visit) should be excluded.¹⁻² Second, the primary input for the model, which essentially defines the statewide abundance, is the OM prevalence estimate from the National Survey on Drug Use and Health (NSDUH). NSDUH is an annual national survey of sampled households that collects self-reported substance use information including OM. Resulting OM estimates are therefore likely biased by under-representation of persons experiencing homelessness or incarceration, disproportionate non-response among persons with substance use disorder, and reluctance to self-report OM.³⁻⁶ Third, annual statewide OM prevalence estimates from the model are consistently lower than the sum of county-level estimates, while one would expect the sum of county-level estimates to be centered around NSDUH estimates. Providing convergence diagnostics and goodness of fit statistics would have helped readers to understand this aspect of the model output and others. Last, age ranges for county-level model inputs were not described. If the summed county-level OM prevalence estimates included persons aged <12 years, this may have contributed to the lower statewide prevalence estimates compared to NSDUH statewide estimates, which only includes persons aged ≥ 12 years.

This manuscript is part of a larger body of work estimating OM and opioid use disorder (OUD) prevalence in U.S. states.⁷⁻¹¹ Such modeling efforts have moved the field forward in the absence of robust empirical data. However, we recommend such approaches be conducted in collaboration with state public health and substance use agency partners, who can provide guidance on use of surveillance data, including their limitations, and may also provide more granular data for improved model inputs. An example of such a public health-academic partnership can be seen in the recent publication by Wang et al., who estimated OUD prevalence using an updated capture-recapture analysis, or multiple systems estimation (MSE), of Massachusetts' administrative data.⁶ This approach has successfully been used to estimate burden substance-related conditions in many settings outside the U.S. However, it requires person-level linkage across multiple data systems, which may be limited by state regulatory requirements and logistically difficult given fragmented health systems. To date, Massachusetts and Kentucky are the only U.S. states that have used administrative health data for MSE.⁶⁻⁸

Public health-academic partnerships are needed to improve modeled estimation of substance use outcomes. Public health partners may provide important guidance on data use and more granular administrative data for models where possible. These partnerships will require substantial investments on the part of both public agencies and academic partners but have potential to yield better measurement of substance-related conditions, which would ultimately contribute to improved responses to the opioid crisis.

References

1. New York State Department of Health. Opioid-related data in New York State. Accessed June 11, 2024. <https://www.health.ny.gov/statistics/opioid/>.
2. New York State Department of Health. Statewide Planning and Research Cooperative System (SPARCS). Accessed July 11, 2024. <https://www.health.ny.gov/statistics/sparcs/>.
3. Bradley H, Rosenthal EM, Barranco MA, Udo T, Sullivan PS, Rosenberg ES. Use of Population-Based Surveys for Estimating the Population Size of Persons Who Inject Drugs in the United States. *J Infect Dis* 2020; 222(Suppl 5): S218-S229.
4. Keyes KM, Rutherford C, Hamilton A, Barocas JA, Gelberg KH, Mueller PP, Feaster DJ, El-Bassel N, Cerdá M. What is the prevalence of and trend in opioid use disorder in the United States from 2010 to 2019? Using multiplier approaches to estimate prevalence for an unknown population size. *Drug Alcohol Depend Rep* 2022; 3:100052.
5. Mojtabai R. Estimating the Prevalence of Substance Use Disorders in the US Using the Benchmark Multiplier Method. *JAMA Psychiatry* 2022; 79(11):1074-1080.
6. Reuter P, Caulkins JP, Midgette G. Heroin use cannot be measured adequately with a general population survey. *Addiction* 2021; 116(10):2600-2609.
7. Wang J, Bernson D, Erdman EA, Villani J, Chandler R, Kline D, White LF, Barocas JA. Intersectional inequities and longitudinal prevalence estimates of opioid use disorder in Massachusetts 2014-2020: a multi-sample capture-recapture analysis. *Lancet Reg Health Am*. 2024;32: 100709.
8. Barocas JA, White LF, Wang J, Walley AY, LaRochelle MR, Bernson D, Land T, Morgan JR, Samet JH, Linas BP. Estimated Prevalence of Opioid Use Disorder in Massachusetts, 2011-2015: A Capture-Recapture Analysis. *Am J Public Health* 2018; 108(12): 1675-1681
9. Thompson K, Barocas JA, Delcher C, Bae J, Hammerslag L, Wang J, Chandler R, Villani J, Walsh S, Talbert J. The prevalence of opioid use disorder in Kentucky's counties: A two-year multi-sample capture-recapture analysis. *Drug Alcohol Depend* 2023;242: 109710.

10. Hepler SA, Kline DM, Bonny A, McKnight E, Waller LA. An integrated abundance model for estimating county-level prevalence of opioid misuse in Ohio. *J R Stat Soc Ser A Stat Soc* 2023; 186(1): 43-60.
11. Wang J, Doogan N, Thompson K, Bernson D, Feaster D, Villani J, Chandler R, White LF, Kline D, Barocas JA. Massachusetts Prevalence of Opioid Use Disorder Estimation Revisited: Comparing a Bayesian Approach to Standard Capture-Recapture Methods. *Epidemiology* 2023; 34(6): 841-849.