

# **A narrative minireview of the spatial epidemiology of substance use disorder in the United States: Who is at risk and where?**

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## **RESPONSE TO REVIEWERS' COMMENTS**

We appreciate the opportunity to review our work submitted to the journal. We would like to thank the reviewers and the editor for assessing our work and for their valuable feedback and suggestions that have improved our manuscript. Please find below a point-by-point reply that addresses each of the reviewers' comments. We have also incorporated these suggestions in the revised manuscript as noted below.

### **COMMENTS TO THE AUTHOR:**

#### **Reviewer #1:**

Scientific Quality: Grade A (Excellent)

Language Quality: Grade A (Priority publishing)

Conclusion: Accept (General priority)

Specific Comments to Authors: The review by Cuadros DF, et al., discussed the recent update on spatial epidemiology of substance use disorder (SUD) in U.S.A. This can help us with understanding SUD' spatial epidemiological features, and thus is an interesting report.

- [We thank the reviewer for assessing our work and for the positive feedback provided.](#)

#### **Reviewer #2:**

Scientific Quality: Grade A (Excellent)

Language Quality: Grade A (Priority publishing)

Conclusion: Accept (High priority)

Specific Comments to Authors: the manuscript reviewed the current records of the spatial distribution of the SUD epidemic in the U.S. across different periods, revealing the spatiotemporal patterns that had preceded the occurrence of outbreaks. By analyzing the epidemic of SUD related deaths, the authors also described the epidemic behavior in areas with high incidence of cases. Furthermore, the authors described the demographic factors to target for public health strategies and discussed future challenges in the study and control of the SUD epidemic in the U.S.. The review is very detailed and comprehensive, describing the current situation and providing reference for more accurate public health prevention and control policies in the future.

- We thank the reviewer for the thorough review of our work and the positive feedback. We agree with the reviewer about the importance of studying spatiotemporal patterns of the SUD epidemic for health prevention and control of this epidemic in the future.

### Reviewer #3:

Scientific Quality: Grade C (Good)

Language Quality: Grade B (Minor language polishing)

Conclusion: Major revision  
General comments: The authors attempt to address an important and timely topic (the opioid crisis in the USA), and how spatial epidemiology has the potential to play a vital role in identifying hotspots and aiding mitigation efforts. However, some major revisions are needed before this paper can be published. The review type is unclear (it should be stated in the title) – narrative/literature, scoping, or systematic (in the Discussion, the authors refer to the paper as a study). However, this paper falls short as a narrative

- We have followed the reviewer's recommendation and include "narrative minireview" to specify the type of review in the title of the revised manuscript.

literature review summarizing the body of literature. It mainly reports previous work/studies carried out by the authors (which is very good(!), but not the only examples). It might be possible to restructure it (perhaps as a mini-review), but the review should include more findings from other researchers, identify gaps or inconsistencies in existing literature, develop research questions or identify new research streams or patterns of usage. It states in the paper that the challenges and future implementation of spatial epidemiology will be discussed, but where are these points? The authors state there is a shortage of geospatial analysis in tackling the SUD crisis, but is this supported by the literature? Were opportunities missed (chronological assessment of the use of geospatial analysis in the literature)? Please show evidence based on findings from a more comprehensive literature review.

- We have followed the reviewer's recommendation and clarified that we conducted a minireview that includes our findings along with recent literature discussing the use of spatial epidemiology to understand the SUD epidemic in the U.S. We also have included more information relevant to the topic discussed in our review to address the main points included by the reviewer (**pages 10, 12, 15, 18, 19 and 20 of the marked document**). However, we want to highlight that the main focus of our review was to include a brief introduction of the different geospatial methods currently used in epidemiology that could be powerful tools for understanding the SUD epidemic, particularly in the U.S. This is a relatively new topic and many of our potential readers might not be completely familiar with these geospatial techniques. For that reason, we tried to include a relatively detailed summary of these geospatial techniques in epidemiology and public health, followed by the discussion of some few examples the current implementations of these methods in the study of the SUD epidemic.

The methods are missing (databases searched, terms used, timeframe, etc.). Grey literature is included, so this should be noted. Please include the type of software used to create the figures.

- As we have clarified in previous comments, we conducted a narrative minireview, and different to a systematic review, in which the main objective is to formulate a well-defined question and provide a quantitative and qualitative analyses of the relevant evidence, the selection criteria for inclusion of the articles in narrative reviews may not be specified explicitly, and Methods section is not mandatory (<https://www.tandfonline.com/doi/abs/10.1179/2047480615Z.000000000329>).

We have followed the reviewer's recommendation regarding the type of software used to create the figures and include the name of the software used in the caption of each figure.

Clear definitions are needed - substance use disorder or opioid use disorder – it seems like the review is focused on the latter but is using the former term. In addition, the review is too broad in terms of topics (lessons from malaria and HIV are helpful but should be limited and those figures deleted), and too much is written about basic GIS / spatial epidemiology (should be shortened).

- We thank the reviewer for noticing this inconsistency. We focused on the SUD epidemic, but opioids are related in about 70% of the SUD cases. We have clarified this and highlighted that we focused on the opioid epidemic, particularly in Ohio because the high relevance of these substances in the SUD epidemic (*first paragraph in page 16 in the marked document*).

Specific comments: The English writing style is good, but some minor revisions are needed: naloxone is not a brand (please use lower case), basic instead of basal health, comorbidities (delete "adverse health" – repetitive), 22 million not 22,000,000. Delete figure 1A 1B – relevance to a review on SUD in USA? Discussion of these cases is useful but there's too much emphasis with these figures. These could be included in supplemental material, though. References need improvement – error message (11), incomplete citation (46) , repeat citations (32, 41), and incomplete literature search.

- We have followed the reviewer's suggestion and removed these figures from the revised version of the manuscript. We also have included more studies in our review and corrected the errors in the citations. Also, the revised manuscript has been revised again by the two authors who are native English speakers for language correctness.

Below are examples of potential papers identified from a PubMed search – “geospatial” AND “opioids”:

Kline D, Hepler SA. Estimating the burden of the opioid epidemic for adults and adolescents in Ohio counties. *Biometrics*. 2021 Jun;77(2):765-775. doi: 10.1111/biom.13295. Epub 2020 Jun 2. PMID: 32413155; PMCID: PMC7666653.

Anwar T, Duever M, Jayawardhana J. Access to methadone clinics and opioid overdose deaths in Georgia: A geospatial analysis. *Drug Alcohol Depend*. 2022 Sep 1;238:109565. doi: 10.1016/j.drugalcdep.2022.109565. Epub 2022 Jul 7. PMID: 35839618.

Tighe P, Modave F, Horodyski M, Marsik M, Lipori G, Fillingim R, Hu H, Hagen J. Geospatial Analyses of Pain Intensity and Opioid Unit Doses Prescribed on the Day of Discharge Following Orthopedic Surgery. *Pain Med*. 2020 Aug 1;21(8):1644-1662. doi: 10.1093/pm/pnz311. PMID: 31800063; PMCID: PMC7530566.

Cobert J, Lantos PM, Janko MM,

Williams DGA, Raghunathan K, Krishnamoorthy V, JohnBull EA, Barbeito A, Guler P. Geospatial Variations and Neighborhood Deprivation in Drug-Related Admissions and Overdoses. *J Urban Health*. 2020 Dec;97(6):814-822. doi: 10.1007/s11524-020-00436-8. PMID: 32367203; PMCID: PMC7704893. Peterman NJ, Palsgaard P, Vashi A, Vashi T, Kaptur BD, Yeo E, Mccauley W. Demographic and Geospatial Analysis of Buprenorphine and Methadone Prescription Rates. *Cureus*. 2022 May 30;14(5):e25477. doi: 10.7759/cureus.25477. PMID: 35800815; PMCID: PMC9246456. Dworkis DA, Weiner SG, Liao VT, Rabickow D, Goldberg SA. Geospatial Clustering of Opioid-Related Emergency Medical Services Runs for Public Deployment of Naloxone. *West J Emerg Med*. 2018 Jul;19(4):641-648. doi: 10.5811/westjem.2018.4.37054. Epub 2018 May 15. PMID: 30013698; PMCID: PMC6040905. Stewart K, Cao Y, Hsu MH, Artigiani E, Wish E. Geospatial Analysis of Drug Poisoning Deaths Involving Heroin in the USA, 2000-2014. *J Urban Health*. 2017 Aug;94(4):572-586. doi: 10.1007/s11524-017-0177-7. PMID: 28639058; PMCID: PMC5533669. Hallas D, Klar RT, Baldyga JA, Rattner I, Waingortin R, Fletcher J. Traditional and Nontraditional Collaborations to Improve Population Health Using Geospatial Information System Maps: Analysis of the Opioid Crisis. *J Pediatr Health Care*. 2019 May-Jun;33(3):309-322. doi: 10.1016/j.pedhc.2018.10.006. Epub 2019 Mar 20. PMID: 30902507. Stoicea N, Costa A, Periel L, Uribe A, Weaver T, Bergese SD. Current perspectives on the opioid crisis in the US healthcare system: A comprehensive literature review. *Medicine (Baltimore)*. 2019 May;98(20):e15425. doi: 10.1097/MD.00000000000015425. PMID: 31096439; PMCID: PMC6531094.

- We thank the reviewer for taking the time to identify other studies that could be relevant for our minireview. We have included some of these studies along with several other studies that we consider were relevant to our manuscript and addressed the concerns from the reviewer. However, we did not include several of the studies mentioned by the reviewer because they were redundant or focused more on the statistics rather than in the epidemiology of SUD.