

# The Uses and Applications of the Area Deprivation Index

Amelia Becerra, COL '26 and Zion Abebe, COL '26

Faculty Advisor: Harald Schmidt, PhD

Department of Medical Ethics and Health Policy, Perelman School of Medicine, University of Pennsylvania

## Introduction

- The COVID-19 pandemic exposed healthcare inequities regarding race, ethnicity, and income.<sup>1</sup>
- NASEM\* recommended the use of the Social Vulnerability Index (SVI), a disadvantage index from the CDC, for equitable allocation of COVID-19 vaccines.<sup>2</sup>
- Disadvantage indices (DIs), like SVI and the Area Deprivation Index (ADI), measure socioeconomic disadvantage through variables like income and education.<sup>3</sup> ADI scores range from 1-100 with higher values indicating greater disadvantage.
- Quick adoption and implementation of DIs resulted in a lack of understanding of their impact on reducing structural racism and discrimination.
- The purpose of our study was to extract the uses of SVI and ADI in published, peer-reviewed literature. This section of the study looks at ADI.

## Methods

- On PubMed, we ran a search for “Area Deprivation Index” in ALL FIELDS and filtered results by Most Recent (circa May 19<sup>th</sup>, 2023) and Full Text.
- An average of ten papers were analyzed weekly, with specific components of each being recorded based on the listed categories.
- Once both individuals completed their own data extraction, a “battleship” exercise took place to reconcile differences. End results were added to the ADI Master Extraction Sheet.
- Each paper was sorted on a Canva board using broad categories based on Columns O-S. The categories were further divided based on the primary area ADI was used in (or specific application).

## Results

- As of now, we have looked at 80 papers but our research is ongoing.
- In the broad categories, we found:
  - 0 papers in “Natural Disaster”
  - 27 papers in “Other Public Health”
  - 5 papers in “COVID-19”
  - 40 papers in “Clinical Care”
  - 5 papers in “Methods”
  - 3 papers in “Other”
- We determined that 23 papers explicitly used ADI to look at racial disparities.

Source and Citation	article type 1= original research, 2=other	1 = US 0 = non-US	Express intention to use ADI as part of analysis of racial disparities (as per title, abstract) yes =1, No =0	Objectives Verbatim Text	Methods Verbatim Text	Results Verbatim Text	Conclusion Verbatim Text
27 Meenan J, Grohman WA, Hase DM, Yee LM, Wu J, McNeil B, Wu J, Meyer B, Simhan H, Reddy U, Silver R, Parry S, Saade G, Lynch CD, Venkatesh KK. Association of Neighborhood Socioeconomic Disadvantage and Postpartum Readmission. <i>Obstet Gynecol</i> . 2023 May 1;141(5):967-970. doi: 10.1097/AOG.0000000000005151. Epub 2023 Apr 5. PMID: 37026732; PMCID: PMC10147577.		1	1	0 We assessed whether neighborhood socioeconomic disadvantage, as measured by the Area Deprivation Index (ADI), was associated with an increased risk of postpartum readmission.	This is a secondary analysis from nuMoM2b (Nulliparous Pregnancy Outcomes Study: Monitoring Mothers-To-Be), a prospective cohort of nulliparous pregnant individuals from 2010 to 2013. The exposure was the ADI in quartiles, and the outcome was postpartum readmission; Poisson regression was used.	Among 9,061 assessed individuals, 154 (1.7%) were readmitted postpartum within 2 weeks of delivery. Individuals living with the most neighborhood deprivation (ADI quartile 4) were at increased risk of postpartum readmission compared with those living with the lowest neighborhood deprivation (ADI quartile 1) (adjusted risk ratio 1.80, 95% CI 1.11-2.93).	Measures of community-level adverse social determinants of health, such as the ADI, may inform postpartum care after delivery discharge.

Key finding (ADI SCORE): High ADI groups have/are... (copy&paste from pdf, include ONLY if statistically significant, and, include point estimates, ranges p values etc, as provided. Indicate at the end	Key finding (ADI SCORE): High ADI groups have/are... SHORT form of extract from column to the left, no statistics, only add scale increment (eg: "continuous", best vs worst-off tertile")	Policies/actions identified by authors to address inequity, using ADI SPECIFICALLY, OR BY CLEAR IMPLICATION (verbatim)	Policies/actions identified by authors to address inequity using ADI, (summary)	(General Topic in sentence format) i.e. Health Condition,
Individuals living with the most neighborhood deprivation (ADI quartile 4) were at increased risk of postpartum readmission compared with those living with the lowest neighborhood deprivation (ADI quartile 1) (adjusted risk ratio 1.80, 95% CI 1.11-2.93).  (quartiles)	increased risk of postpartum readmission (quartiles)	Measures of neighborhood disadvantage, such as the ADI, could potentially be used to inform postpartum care after delivery discharge. Such measures account for community-level social determinants that affect health outcomes and could be integrated into care pathways. Health care professionals and health care systems may also consider providing additional monitoring, counseling, and services to postpartum individuals who experience a higher burden of adverse social determinants of health.	ADI should be used to inform postpartum care after delivery discharge.	postpartum readmission

natural disaster 1=yes 0 no	other public health 1=yes 0 no	covid 19 1=yes 0 no	Clinical care Hospital/primary c	Methods Paper? 1=yes 0=no	Notes (i.e. did sensitivity analysis, justified choice of index)	Journal/academic Paper (yes:1, no:0)	peer reviewed 1= yes, 0=no	Online Ahead of Print (yes:1, no:0)	Poster/Conference Abstract (yes:1, no:0)	Other (yes:1, no:0)
0	1	0	1	0	did not center or directly measure race	1			0	0

Above: a completed entry about postpartum readmission in our ADI Extraction Tool.



Above: our Canva board with the sorted ADI papers, a separate category emphasizing racial disparities. The papers that provide direct interventions are marked by an asterisk.

## Conclusion

- It seems to be a common practice to use ADI in the clinical care or public health setting, as opposed to the other settings like natural disasters and COVID-19 where SVI is mostly used.
- Although race is not a variable directly measured by ADI, many studies use the disadvantage index to help capture racial and ethnic disparities.
- There was a significant increase in the use of ADI when looking at income or racial disparities over the past few years (even within the ten-week research period). This indicates the potential use of ADI in reducing structural racism and discrimination.

## References

- Yearby R, Mohapatra S. Law, structural racism, and the COVID-19 pandemic. *J Law Biosci*. 2020;7(1):Isaa036. Published 2020 Jun 29. doi:10.1093/jlb/Isaa036
- National Academies of Sciences, Engineering, and Medicine; Health and Medicine Division; Board on Population Health and Public Health Practice; Board on Health Sciences Policy; Committee on Equitable Allocation of Vaccine for the Novel Coronavirus, Kahn B, Brown L, Foege W, Gayle H, eds. *Framework for Equitable Allocation of COVID-19 Vaccine*. Washington (DC): National Academies Press (US); October 2, 2020.
- Srivastava T, Schmidt H, Sadecki E, Kornides ML. Disadvantage Indices Deployed to Promote Equitable Allocation of COVID-19 Vaccines in the US: A Scoping Review of Differences and Similarities in Design. *JAMA Health Forum*. 2022;3(1):e214501. Published 2022 Jan 21. doi:10.1001/jamahealthforum.2021.4501

## Acknowledgements

- We would like to thank Dr. Harald Schmidt for his amazing mentorship and for the opportunity to work on this research project.
- We would like to acknowledge the Penn Undergraduate Research Mentorship (PURM) coordinators and the Center for Undergraduate Research and Fellowships (CURF) for funding this project and providing us with this invaluable experience.
- Lastly, we would like to thank our fellow student researchers - Max Brody and Aayush Kapri.

\*National Academies of Science, Engineering, and Medicine