

“Redlining” to “Hot Spots”: The Impacts of a Continued Legacy of Structural and Institutional Racism and Bias on Asthma in Children



Bridgette L. Jones, MD, MS^{a,b}, Mark Hoffman, PhD^{a,c}, and Natalie Kane, PhD^d *Kansas City, Mo*

Grunwell et al¹ describe the results of their study that evaluated the potential contributions of composite social determinants of health (SDOH) on pediatric intensive care unit (PICU) admissions for asthma among schoolage children in the metropolitan Atlanta, Georgia, area. Using address-geocoded patient records, they identified geographic “hot spots” census tracts with a PICU asthma admission rate in the greater than or equal to 90th percentile and compared the Social Vulnerability Index (SVI) and the Childhood Opportunity Index (COI) domains between children who were admitted to the PICU for asthma exacerbation and lived in a “hot spot” compared with those who did not. Of 1403 children with at least 1 PICU admission for status asthmaticus between January 1, 2015, and April 16, 2020, 16.3% lived in a defined neighborhood hot spot. The COI and SVI domain scores for children who lived in the hot spot areas differed significantly from those of children living outside the hot spots. These indices, which describe social and structural factors that impact the opportunity for good health and risk for poor health, provide insight into the relationship between pediatric asthma and the SDOH at the neighborhood level.

This study reveals important findings that require a nuanced discussion of SDOH, social vulnerability, child opportunity, and “hot spots.” These concepts are now widely discussed and investigated in the health disparities literature. However, the complexity of these factors requires deeper consideration by researchers, health care providers, and policymakers.²

SDOH are defined by the World Health Organization as “the conditions in which people are born, grow, live, work, and age,” which impact an individual’s opportunity for health versus another person (eg, health equity). These determinants are

influenced by economic, political, and social factors. Commonly discussed and investigated SDOH include education, housing and/or living environment, income and its distribution, access to food, and access to transportation. Additional determinants have been suggested, which include sex, sexual orientation, cultural or social norms, stigma and discrimination, rule of law, racialized legal status, and immigration status.² Racism was described as a core SDOH for children by Trent et al.³ They state that “Racism is a core social determinant of health that is a driver of health inequities.” They further characterized the interpersonal, structural, and institutional concepts of racism on the health of all children.³ Authors have also advocated that “time” is a SDOH, given that healthy behavior, accessing health services, resting, and caring all require time.⁴ The amount of time one can use for health-related activities is socially patterned and could therefore be a source of health inequalities. For example, the coronavirus disease 2020 pandemic revealed catastrophic disparities among those least able to control time in ways to protect their health preceding and during the pandemic.⁵ These more recently identified SDOH highlight the complex and expansive impact of “conditions in which people are born, grow, live, work, and age” on health, which further leads to complexity in how we assess these factors, measure their impact, and design interventions to effectively address them.

The SVI, which was used in the Grunwell et al¹ article as an index of SDOH, was developed by the Centers for Disease Control and Prevention and the Agency for Toxic Substances and Disease Registry to help emergency response planners and public health officials identify and map communities that will most likely need support before, during, and after a hazardous event (eg, natural disasters and disease outbreaks). The Centers for Disease Control and Prevention states that “a number of factors, including poverty, lack of access to transportation, and crowded housing may weaken a community’s ability to prevent human suffering and financial loss in a disaster. These factors are known as social vulnerability.”⁶ Although the SVI was developed to allow government agencies to respond to natural disasters most effectively within socially vulnerable communities, many have used this index as a tool to better understand how social factors contribute to disease and condition risk and outcomes. Similarly, the COI, which is designed to capture relative advantage or disadvantage in terms of the resources and opportunities related to healthy developmental outcomes, has been used in health effects research for a wide range of conditions. COI has previously been associated with general asthma morbidity.⁷ Although SVI, COI, and other common indices are not explicitly designed to measure SDOH and fail to capture their complexities such as the concepts of time and racism, they provide insight into

^aDepartment of Pediatrics, University of Missouri—Kansas City School of Medicine, Kansas City, Mo

^bDivision of Pediatric Pharmacology and Therapeutic Innovation, Section of Allergy, Asthma, and Clinical Immunology, Children’s Mercy, Kansas City, Mo

^cDepartment of Biomedical and Health Informatics, Children’s Mercy, Kansas City, Mo

^dmySidewalk, Kansas City, Mo

Conflicts of interest: B. L. Jones receives support from the National Institutes of Health (grant no. 1R01HD100545, PI Jones; grant no. 2UG1OD024943, co-PI Jones; and grant no. 1R01MD015409, co-investigator Jones) and is a paid contributor for Merck manuals. M. Hoffman receives support from Merck. N. Kane is a paid employee of mySidewalk.

Received for publication February 2, 2022; accepted for publication February 2, 2022.

Corresponding author: Bridgette L. Jones, MD, MS, 2401 Gillham Rd, Kansas City, MO 64108. E-mail: bljones@cmh.edu.

J Allergy Clin Immunol Pract 2022;10:992-3.
2213-2198

© 2022 Published by Elsevier Inc. on behalf of the American Academy of Allergy, Asthma & Immunology

<https://doi.org/10.1016/j.jaip.2022.02.003>

common patterns that can impact population health outcomes and drive health disparities.

The disparity in asthma risk at the population level is mirrored in the sample demographic characteristics. Grunwell et al suggest that the baseline comparison of demographic characteristics between children living inside and those living outside of hot spots did not reveal differences by race or ethnicity. However, of the children included in the analysis, 20% of Black children and 16% of Hispanic children reside in a hot spot, whereas only 6% of White children reside in these areas. Furthermore, “minority” status and limited English status were individual indicators within the SVI composite. Domain scores differed significantly between children residing in a hot spot versus not, with a higher percentage of children of “minority” and limited English status in hot spot areas. The authors point out that the percentage of households below poverty and unemployment contributed the most to disparity between children residing in hot spots versus non-hot spot areas. However, race and ethnicity are inextricably linked with opportunity for wealth and risk of poverty in the United States. It must be considered that disadvantaged populations and communities are not inherently “vulnerable.” Vulnerability is caused by intentional acts, institutional policies, and linkage of inequitable systems within society.

The practice of “redlining” is one example of legalized and policy-driven institutional racism within the United States with lasting effects on health. During the Great Depression, the federal government passed the Homeowners’ Loan Corporation Act. The act created standardized criteria for determining creditworthiness for neighborhoods in American urban centers. Creditworthiness was highly dependent on the racial makeup of a particular neighborhood. White neighborhoods were designated as the “best” areas for investment, whereas non-White areas were disproportionately designated as “hazardous” or risky areas for investment. Cities developed geographic residential Security Maps that graded neighborhoods. Black neighborhoods often received the lowest grade and were shaded red on the map, hence the term “redlining.” These “redlined” areas on maps can now be superimposed onto maps of urban cities that are deemed today’s “hot spots” for numerous health disparities, including those areas identified by Grunwell et al.^{8,9}

Comprehensive theoretical frameworks are required to understand and address health disparities within the United States. Federico et al¹⁰ described in the *Journal of Allergy and Clinical Immunology: In Practice* a framework based on Maslow’s hierarchy of needs for addressing SDOH impacting asthma outcomes

and pragmatic steps that must be taken at the patient, health system, and advocacy levels in working toward health equity. An even more nuanced framework is discussed, adapted from the World Health Organization, by Magana et al,¹¹ which describes the immediate circumstances of living, while also considering the broader context that generates these circumstances. The Grunwell et al article provides methods that can be applied to characterize the impact of institutionalized inequity and discrimination on underserved and disadvantaged populations as a critical first step toward closing health disparity gaps. Understanding the root structural and institutional contributions to the ways that people “grow,” “live,” “work,” and “age” is the essential next step to developing effective strategies and interventions to mitigate drivers of health inequity.

REFERENCES

1. Grunwell JR, Opolka C, Mason C, Fitzpatrick AM. Geospatial analysis of social determinants of health identifies neighborhood hot spots associated with pediatric intensive care use for life-threatening asthma. *J Allergy Clin Immunol Pract* 2022; 10:981-91.
2. Islam MM. Social determinants of health and related inequalities: confusion and implications. *Front Public Health* 2019;7:11.
3. Trent M, Dooley DG, Douge J, Section on Adolescent Health; Council on Community Pediatrics; Committee on Adolescence. The impact of racism on child and adolescent health. *Pediatrics* 2019;144:e20191765.
4. Strazdins L, Welsh J, Korda R, Broom D, Paolucci F. Not all hours are equal: could time be a social determinant of health? *Sociol Health Illn* 2016;38:21-42.
5. Paremoer L, Nandi S, Serag H, Baum F. Covid-19 pandemic and the social determinants of health. *BMJ* 2021;372:n129.
6. US Department of Health and Human Services. CDC/ATSDR Social Vulnerability Index. Updated April 28, 2021. Accessed January 19, 2021. <https://www.atsdr.cdc.gov/placeandhealth/svi/index.html>
7. Beck AF, Huang B, Wheeler K, Lawson NR, Kahn RS, Riley CL. The Child Opportunity Index and disparities in pediatric asthma hospitalizations across one Ohio metropolitan area, 2011-2013. *J Pediatr* 2017;190:200-206.e1.
8. Nardone A, Casey JA, Morello-Frosch R, Mujahid M, Balmes JR, Thakur N. Associations between historical residential redlining and current age-adjusted rates of emergency department visits due to asthma across eight cities in California: an ecological study. *Lancet Planet Health* 2020;4:e24-31.
9. Collin LJ, Gaglioti AH, Beyer KM, Zhou Y, Moore MA, Nash R, et al. Neighborhood-level redlining and lending bias are associated with breast cancer mortality in a large and diverse metropolitan area. *Cancer Epidemiol Biomarkers Prev* 2021;30:53-60.
10. Federico MJ, McFarlane AE II, Szeffler SJ, Abrams EM. The impact of social determinants of health on children with asthma. *J Allergy Clin Immunol Pract* 2020;8:1808-14.
11. Magana J, Contreras MG, Keys KL, Risse-Adams O, Goddard PC, Zeiger AM, et al. An epistatic interaction between pre-natal smoke exposure and socioeconomic status has a significant impact on bronchodilator drug response in African American youth with asthma. *BioData Min* 2020; 13:7.