

Integrating climate and environmental justice into patient care: A case study

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Received date: 24 April 2024; **Accepted date:** 03 May 2024; **Published date:** 09 May 2024

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Citation: Alisa Adhikari, P. Murali Doraiswamy. Integrating climate and environmental justice into patient care: A case study. *Journal of Medical and Clinical Case Reports* 1(2). <https://doi.org/10.61615/JMCCR/2024/MAY027140509>

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Introduction

As environmental challenges exert an increasing influence on public health, there is growing recognition of the need to remedy the effects of environmental injustices and to integrate climate change into healthcare [1-5]. At the recent COP28, a climate change conference hosted by the United Nations, countries signed a declaration highlighting their apprehension regarding the adverse effects of climate change on health. They also acknowledged the health benefits stemming from “deep, rapid, and sustained” decreases in emissions of greenhouse gas, encompassing “just transitions, lower air pollution, active mobility, and shifts to sustainable healthy diets” [2]. This is particularly relevant to the most vulnerable populations, who often bear the greatest brunt of environmental and climate injustices. The goal of the environmental justice movement is to ensure “equitable access to a healthy, sustainable, and resilient environment in which to live, play, work, learn, grow, worship, and engage in cultural and subsistence practices” [6].

Public health agencies and hospitals are actively addressing this challenge, and recent surveys indicate that physicians, who play a vital role in patient care and education, are also supportive and eager to find solutions [3-5]. For example, in a 2020 multinational survey of 4,654 health professionals (physicians and nurses across 6 WHO health regions), the majority of respondents indicated that their country's populace had already experienced adverse health effects as a result of climate change [3]. Specifically, 77% of clinicians felt climate change would cause a moderate or a great degree of harm to their patients, and approximately 60% noted that this would become more frequent or severe over the next 10 years [3]. The survey highlights the potential to involve a significant number of physicians in the initiative to integrate environmental concerns into routine clinical care.

However, there are many barriers that prevent clinicians from acting on their intentions. The most prominent include time constraints, insufficient understanding of how climate change impacts specific health conditions, lack of expertise in evaluating environmental risks for particular patients, and inadequate means to influence policy [3-5]. The same surveys have also suggested that this intention-action gap can be bridged by providing more resources, such as continuing education programs, patient education materials, and guides on how to effectively discuss the issue with patients [3, 4]. Many of these professionals also showed interest in understanding how to

make their own homes and workplaces more sustainable [3].

In this evolving landscape, the interconnectedness of climate change, environmental hazards, social disparities, and health outcomes necessitates the integration of disparate measures of climate and environment-related variables to better enable clinicians to assess health impacts in their patient populations and communities [7]. The Environmental Justice Index (EJI), launched in 2022, is one such effort to integrate 40 environmental and social vulnerability measures at a national census tract level [6, 8]. This tool uses data from the U.S. Census Bureau, the U.S. Environmental Protection Agency, the U.S. Mine Safety and Health Administration, and the U.S. Centers for Disease Control and Prevention, among others [8]. The EJI indicators include measures of air and water pollution, access to recreational spaces, proximity to coal or lead mines, proximity to potentially hazardous and toxic sites, access to transportation, household characteristics, and poverty for each census tract in the U.S. [8]. Each of the indicators is given a percentile ranking from 0 to 1, with higher percentiles denoting greater levels of deprivation along that particular measure and 0.50 being the national median for each [6]. The EJI has already been used by policymakers and researchers in federal emergency management efforts (e.g., hurricanes) to identify vulnerable areas as well as to identify communities with disproportionate risks for cancer and respiratory disorders [6]. We illustrate here the potential for the EJI to also be linked to patient care.

Case Study

A 65-year-old subject presented with multiple chronic illnesses, including dysthymia, PTSD, hypertension, asthma, heart disease, mild cognitive impairment, diabetes, fatty liver disease, coronary artery disease, and hyperlipidemia. A standard medical and social history also revealed the subject had been employed in low-skilled occupations, was not financially stable, and had undergone past traumatic events. Clinical labs were non-contributory, except to report high hemoglobin A1C and borderline high cholesterol levels. The subject was receiving standard medical care for her conditions and was enrolled in a clinical research study for memory loss following written informed consent.

As part of the study, we used the EJI to evaluate the subject’s neighborhood for 40 environmental burden and social vulnerability metrics, many of which would not be available through a routine clinical history. The EJI yielded two

main scores – an environmental burden rank (EBR) (Figure 1a) and a social vulnerability rank (SVR) (Figure 1b)

Figure 1: Characterization of the Subject’s Neighborhood using the Environmental Justice Index.

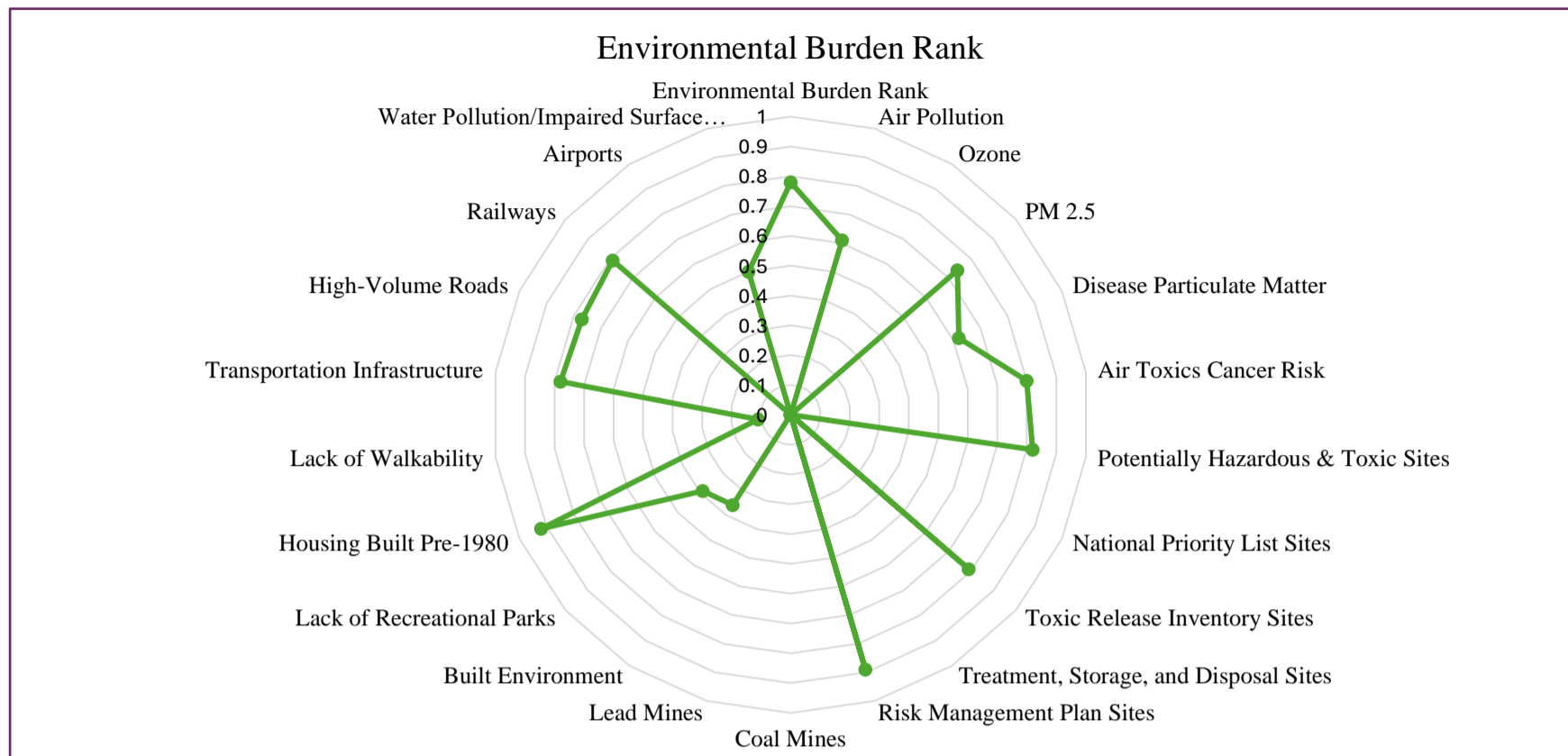


Figure 1a. This figure depicts the overall Environmental Burden rank (EBR) of the subject’s census tract as well as the individual component ranks. The overall EBR rank of 0.78 indicated that it was in the worst 22% of the nation’s census tracts with regard to environmental hazards. This neighborhood also has elevated ranks for air pollution, high volume roads and railways, and proximity to potentially hazardous and toxic sites.

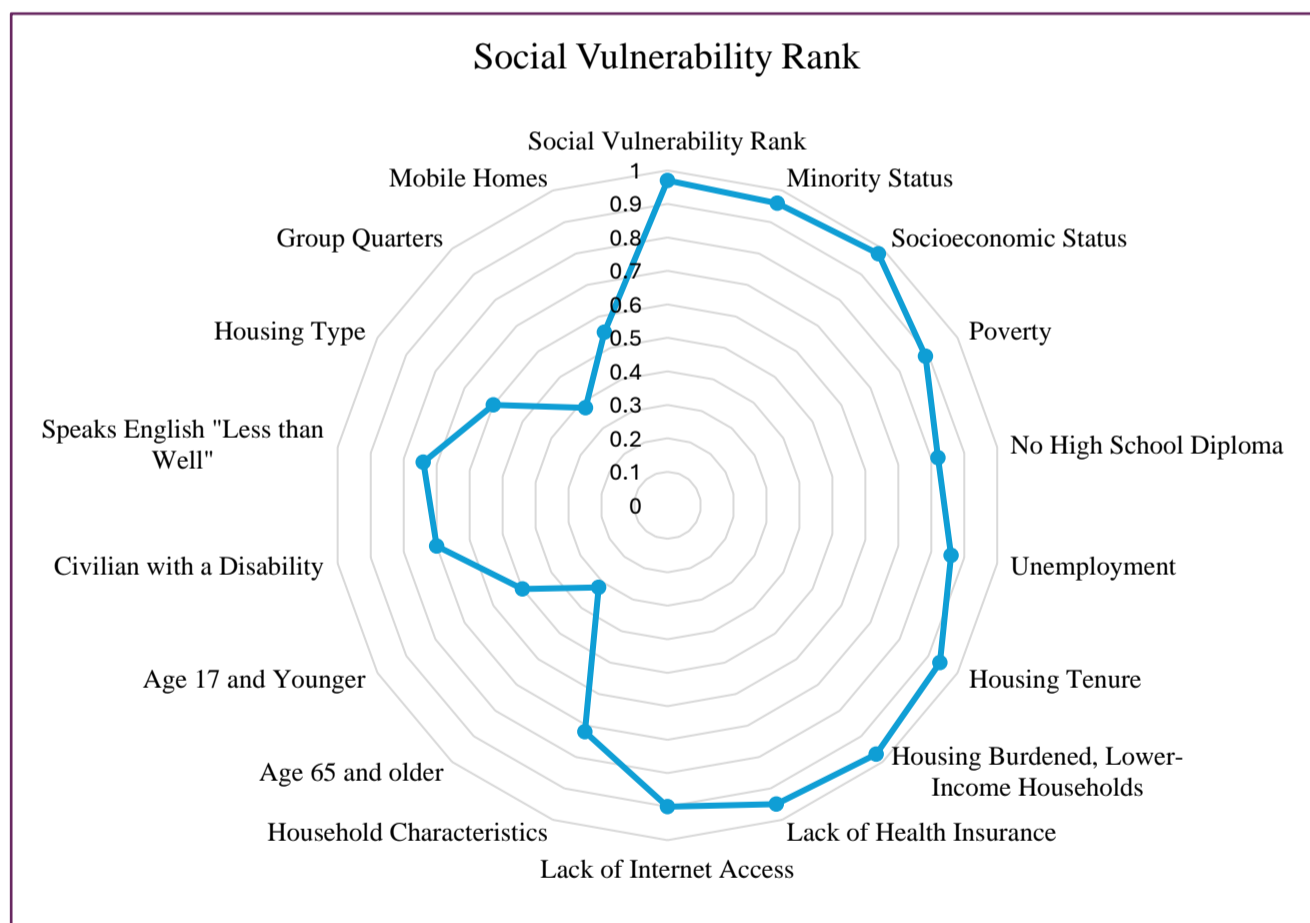


Figure 1b. This figure depicts the overall Social Vulnerability Rank (SVR) of the subject’s census tract as well as the individual component ranks. The overall SVR rank of 0.97 indicated that it was in the worst 3% of the nation’s census tracts with regard to socioeconomic disparities. This neighborhood has high rates of poverty, unemployment, and lack of health insurance, as well as internet access.

The subject’s census tract EBR score of 0.78 indicated that it was in the worst 22% of census tracts nationally. The EBR scores depict higher than average exposure to air pollution, including PM 2.5 particulate matter and air toxics cancer risk. Furthermore, they were in close proximity to potentially hazardous and toxic sites, such as risk management plan sites and toxic release inventory sites. Increased exposure to lead is also indicated by the high value of houses built before 1980. The SVR of 0.97 shows the subject lived in the worst 3% of neighborhoods nationally for social vulnerability.

More specifically, they lived in an area where many people were poor and unemployed and less likely to have health insurance as well as a high school diploma.

At follow-up, the subject reported that they were forced to move to an even worse neighborhood due to financial constraints and are now surrounded by streets with high crime, where multiple shootings and robberies have occurred. They also noted that their neighbors were alcoholics or drug dealers who let trash litter the ground and smoke to pollute the air. As a



result, the subject noted worsening anxiety and PTSD symptoms as well as hypertension and suffering a second heart attack. The subject's memory problems are potentially also exacerbated by stress.

Multiple environmental hazards are likely contributing to the subject's health problems since factors such as air pollution and toxic waste have been linked to several medical conditions. The subject also found it difficult to comply with a healthy lifestyle due to the unsafe neighborhood and had to come up with creative solutions like using a local Walmart to get 30 minutes of walking exercise inside the store. Due to the nature of government housing and poor credit, the subject does not have many good options but would like to move to a better neighborhood as soon as an opportunity presents itself.

Discussion

There is great interest in climate medicine and in integrating different streams of environmental data into clinical care and public health [1-9]. As this case illustrates, the convergence of heightened environmental burden and pronounced socioeconomic vulnerability forms a challenging backdrop for which physicians may have no good solutions. These intertwined factors likely contribute synergistically to the exacerbation of the patient's health conditions, creating a scenario where they contend not only with the direct effects of their diagnosed ailments but also with the compounding impact of an unfavorable environment and social circumstances.

Addressing their health challenges comprehensively would necessitate a holistic approach that considers both medical interventions and targeted strategies to mitigate the environmental and socioeconomic determinants influencing their well-being and ability to comply with a healthy lifestyle. Even if clinicians lack the power to change their patients' economic and environmental situations, the first step is to understand their patients' living situations. Insights, such as the environmental indicators of the EJI, could help physicians better recognize their patient's needs and potentially lead to a more holistic, empathetic, and impactful care plan.

For such environmental data to be useful in the clinical setting, databases must be updated in real-time by the various government agencies that contribute to the data collection and must then be integrated into the electronic health record (EHR) for easy extraction of information. The EJI was developed for community-level action rather than clinical use [6]. Hence, there is a need for indices or wearable sensors that can quantify environmental hazards at an individual subject level, both at any given time and cumulatively over a lifetime. In the future, such indices can supplement a thorough clinical evaluation with quantitative environmental insights that cannot be obtained by a clinical history alone.

Clinicians often cite lack of time as a primary barrier for feeling unable to integrate climate medicine into their practice [3-5]. To save time, one option could be the use of at-home, self-rated surveys to obtain a more detailed environmental history for lifetime exposures. Educational programs could be developed to train healthcare staff on how to link environmental and climate change data to specific medical concerns [4-6]. For example, the Heat Risk Dashboard, Heat Risk Forecast Tool, and Clinical Guidelines, recently launched by the CDC, offer clinicians and patients a 7-day forecast of when temperatures can become harmful to health and what to do about it [9].

More important is the question of how physicians should manage environmental hazards in their patients. At an individual patient level, the options include patient education, laboratory tests to evaluate for toxins, social worker consultations, lifestyle changes, and advocating on behalf of the patient to relevant public authorities as needed. To address climate medicine at a societal level will need substantial economic resources to remedy social and environmental inequities faced by more than half the world. Collaborative efforts between medical societies, health systems, funders, community organizations, and policymakers are essential for these reforms to be successful.

It is our opinion that clinicians and medical societies should play a vital role in addressing environmental injustice by combining individual actions with advocacy and education. The Royal College of Edinburg has recommended 10 steps clinicians can take against climate change [10]. For example, they can advise patients on adopting healthier lifestyles that contribute to lower waste while also setting an example through energy-efficient clinics [10]. Other guidelines report that advocacy efforts should span from local initiatives promoting home insulation to global support for equitable carbon entitlement frameworks [11]. Actively engaging in professional networks can enhance collective influence, ensuring that climate change remains a priority in healthcare discussions and actions [11].

Disclosures

The subject's age was minimally changed, and gender was obscured to preserve anonymity. PMD has received grants and research funding from various companies for other projects. PMD and AA were supported in part by the NIA for their work on the EJI.

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