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Social Injustice in Environmental Health: A Call for Fortitude

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Where we live, work, play, and attend school will influence our health. As such, economic status and literacy are highly correlated with our health and well-being, our ability to access health care and the quality of the water we drink and the air we breathe. When communities exposed to a combination of poor environmental quality and social inequities display heightened rate of sickness and disease compared to wealthier communities, we experience a social malady, namely, *social injustice*.

Relationships between social injustice and environmental health have been well documented with multiple examples pertaining to water availability and contamination, air pollution, soil and food contamination, as well as exposures to toxic substances, such as lead, asbestos, mercury, and persistent organic pollutants, to name a few. Our days, COVID-19 lays bare how social injustice disproportionately impacts the health of poorer communities. While mortality rates from heart disease, breast cancer, and stroke decreased in the black population between 1990 to 2005, the gap between black and white mortality rates actually increased in the same time period. (https://www.commonwealthfund.org/publications/newsletter-article/2018/sep/focus-reducing-racial-disparities-health-care-confronting). The

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health inequity of COVID-19 is quite impressive (Resnick et al., 2020; Dorn et al., 2020) and cross-resonating with inequity in chemical exposures (Lerner, 2010). For example, the National Health and Nutrition Examination Survey (NHANES) showed significantly higher blood and urine lead (Pb) among low-income, non-Hispanic blacks (Belova et al., 2013). Nguyen et al. (2020) comparing women of different ethnicities in the US, found strongest differences for non-Hispanic Black, Mexican American, Other Hispanic, and Other Race/ Multi-Racial women with higher levels of pesticides and their metabolites, including 2,5-dichlorophenol, o,p'-DDE, beta-hexachlorocyclohexane, and 2,4-dichlorophenol. Neurological diseases, which are often associated with viral infections as triggers, are similarly unequally distributed: for example, for Alzheimer's disease, the Alzheimer's Association states: *"Older African Americans are about two times more likely than older whites to have Alzheimer's or other dementias. Older Hispanic Americans are about one and one-half times more likely than their white peers to have dementias. Almost two-thirds of older Americans with Alzheimer's dementia are women. At age 65, women without Alzheimer's have more than a one in five chance of developing Alzheimer's dementia during the remainder of their lives, compared with a one in nine chance for men*".

As noted above, a persistent social injustice confronting societies globally remains Pb exposure. Admittedly, we have seen reductions in environmental lead after its removal from gasoline and paint. Nonetheless, today, in 2020, millions of children continue to be exposed to high levels of lead-based paint in inner city homes. For example, in Manhattan, NY, 289 children were poisoned with lead in 2018 and 213 in 2019. In the Bronx, 819 children were lead-poisoned in 2018 and 670 in 2020 (https://www.bxtimes.com/torres-demands-federal-investment-for-nycha-lead-abatement-and-removal/). Yes, in 2020! And this is not unique only to big metropolis areas.

Consider, Flint, Michigan, and its recent water crisis. Between April 25, 2014–October 15, 2015, approximately 99,000 residents of Flint were exposed to lead when drinking water source was switched from the Detroit Water Authority to the Flint Water System. The majority of the victims were poor and disproportionately African American or Hispanic (Whitehead and Buchanan, 2019). As stated by the authors "*these conditions depict a modern day environmental justice issue likely facing similar communities and households struggling with compounded challenges of inadequate housing, unemployment, lack of access to health care, improper nutrition, and many other quality-of-life (QOL) issues that pose as risk factors for lead poisoning*".

At the US national level, young African American children have the highest average blood lead levels (BLL) compared to white or Hispanic children. Black race is also the second strongest predictor for increased BLL during early childhood (Yeter et al., 2020). Furthermore, Black racial disparity continues to significantly persist within each examined risk factor for early childhood blood lead levels related to housing conditions, socio-economic status, and younger age. These significant racial disparities persist even after controlling for other risk factors (Yeter et al., 2020). Another resounding example of social injustice comes from Africa. An outbreak of acute lead poisoning among poor children aged <5 years was observed in six villages from Zamfara, Nigeria, resulting from the processing of lead-rich gold ore (breaking, crushing and ore drying) inside family compounds. Ninety

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seven percent of the children surveyed had BLL above ≥45 μg/dL, and 118 (26%) of them died (http://www.cdc.gov/mmwr/preview/mmwrhtml/mm5927a3.htm).

And we must recognize this malady is not only lead related nor inherent to a select number of countries. Indeed, social injustice remains a global issue. Consider, Brazil! Over the last 3 years, two major environmental tragedies encompassing mining dams occurred in the State of Minas Gerais, leaving incalculable social and environmental impacts. The collapse of the iron ore tailings dam in January 2019, resulted in approximately 270 deaths, among company employees and nearby communities, along with catastrophic contamination of the Paraobeba River, where 29 municipalities were affected (https://en.unesco.org/sites/default/files/melo_0.pdf; Vergilio et al., 2020). Another earlier environmental accident, in November 2015, resulted in 19 deaths and the contamination of the Doce River, affecting thousands of families in the Doce River Valley (Segura et al., 2016). The last phrase of a poem written by Angelica, resident in a small rural village destroyed by the disaster, encapsulates her feelings on social injustice: *"That's why I cry. I feel affected by not knowing how to be an affected person"* (Zhouri et al., 2017).

Achieving environmental justice necessitates greater awareness of the costs of environmental hazards, recognizing that prevention is far cheaper than the cure, and admitting its societal impact, not only on monetary savings, but also on health and the competitivness of nations.

Consider the eloquent example advanced by Professor Bernie Weiss, one of the forefathers of Behavioral Neurotoxicology. In this example (Weiss, 1988), he argued that in a population of 100 million individuals with mean IQ of 100, 2.3 million would score above 130 IQ based on a bell-shaped distribution. A mere reduction in the same size population of 5 IQ points, namely to a mean of 95 will translate to 990 000 individuals with scores above 130. The dereliction of social justice will therefore transcend to increased health care costs, deteriorated health, increased crime, and all that goes with social injustice, including the inability to secure safe drinking water and safe air to breathe.

While a Congressional ban on lead paint enacted in 1978 had a significant impact on lead exposures, lead-containing paint in older housing continues to affect the health of our children. Astonishingly, it has been estimated that for every dollar spent controlling lead hazards, at a minimum $17 would be returned in health benefits, increased IQ, higher lifetime earnings, tax revenues, lower special education costs and reduced criminal activity. Cost-benefits of lead abatement have been estimated to range from $181 to $269 billion, encompassing savings in health care costs, IQ and lifetime earnings losses, decreased demand for special education needs and attention deficit hyperactivity disorder, and behavior problems including violent crime (The Pew Trust; https://www.pewtrusts.org/~/media/assets/2010/02/22/063_10_paes-costs-of-lead-poisoning-brief_web.pdf).

Attention to duty and heedfulness of social justice and environmental health issues requires that our politicians harness the will and courage to mitigate exposures to hazardous chemicals, investing in epidemiologic research, and reforming organizations and institutions. Policies and laws should be enacted to eliminate discrimination against vulnerable populations and to protect future generations from being harmed by a never-ending cycle of

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social and economic neglect. We must demand and challenge the current political system for appropriate policies for a more equitable society, and acknowledge that we as scientist must channel our collective experience to drive and achieve a change. While slow, it is possible, for the betterment of all that make the fabric of our society. It all starts with antagonizing those who attempt to subvert science and its role in ensuring social justice in health.

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Highlights

- Where we live, work, play, and attend school will influence our health
- Relationships between social injustice and environmental health have been well documented
- Significant racial disparities persist even after controlling for other risk factors
- Achieving environmental justice necessitates greater awareness of the costs of environmental hazards
- Attention to duty and heedfulness of social justice issues requires that our politicians harness the will and courage to mitigate exposures to hazardous chemicals