COMMENTARY

Environmental racism and the need for private well protections

Anne E. Nigra[a,1]

The health effects of racism are so well established that the American Public Health Association launched a National Campaign Against Racism in 2015 (1). Racial disparities in adverse environmental exposures reflect underlying structural and institutional racism ingrained in land use patterns, development policy, facility siting, and municipal zoning decisions, which influence community proximity to environmental hazards and prevent equitable access to essential public health services including regulated public water supplies (2, 3). Childhood lead poisoning is a prominent example of racial disparities in hazardous exposures: 5.6% of non-Hispanic Black children have blood lead levels exceeding the Centers for Disease Control and Prevention's (CDC's) action limit of 5 μg/L compared to 2.4% of non-Hispanic White children (4). In PNAS, MacDonald Gibson et al. evaluated blood lead monitoring records for 59,483 children in North Carolina from 2002 to 2015 and compared blood lead concentrations for children reliant on private wells versus those reliant on regulated public water systems (5). Their primary finding—that children using private wells had significantly elevated blood lead concentrations compared to children using regulated public water systems—highlights the inadequacy of current regulatory policy to protect the most highly exposed and susceptible communities and underscores the need for immediate public health interventions to reduce water contaminant exposures for households reliant on private wells. These findings also illuminate how long-standing structural racism results in environmental disparities affecting our most susceptible populations.

Child Lead Exposure and Unregulated Private Wells

Although the US Environmental Protection Agency (EPA) has regulated lead in public drinking water systems since 1991 through the Lead and Copper Rule (LCR), private well owners are not subject to any EPA regulations. Over 40 million US residents using private wells are solely responsible for testing their water for an assortment of contaminants, installing appropriate treatment systems, and maintaining those treatment systems over time (6). Surveys indicate that private wells in the United States often exceed health-based standards for at least one contaminant (7, 8). Socioeconomic disparities in water contaminant exposure exist even among private well users and reflect, in part, the prohibitive cost of installing and maintaining appropriate treatment systems (9).

MacDonald Gibson et al. estimated that average blood lead concentrations were 20% higher (95% CI, 15%, 25%; P trend < 0.001) among children using private wells compared to those using regulated public water systems. The odds of exceeding the CDC's action limit for lead exposure were also higher for children using private wells (odds ratio, 1.25; 95% CI, 1.06, 1.48). The authors adjusted for child characteristics, neighborhood demographics, and value and construction year of the child's house (useful for characterizing lead exposure from paint and dust, typically the primary source of lead exposure for US children).

These findings must be contextualized within the history of segregation and racism in North Carolina. Municipal underbounding, the intentional gerrymandering of municipal boundaries to exclude Black communities and thus limit political participation, is well documented in North Carolina and other southern states (10, 11). Consequently, households in unincorporated communities were not connected to essential municipal public health services including public sewage and regulated public water systems. It is therefore not surprising that the authors also documented higher lead exposure among children living outside of municipal boundaries, in census blocks with the lowest household income, and in census blocks with a higher proportion of African American residents. These results can be understood as one quantifiable manifestation of structural environmental racism.

To assess potential disparities in child lead exposure by household water source while accounting for potential lead exposures from other household sources, MacDonald Gibson et al. merged clinical blood lead monitoring records for children in Wake County, North Carolina, with residential property records. This

[a]Department of Environmental Health Sciences, Mailman School of Public Health, Columbia University, New York, NY 10032

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[1]Email: aen2136@cumc.columbia.edu.

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approach allows the authors to characterize the contributions of child housing and community characteristics, child sociodemographic characteristics, and domestic water source to child lead exposure, and should be replicated across the United States. Counties and local health departments should engage public health researchers and provide appropriate access to de-identified child blood lead records. Local disparities in childhood lead exposure can then be characterized and eliminated through proactive primary prevention efforts. Otherwise, entire communities will continue to be needlessly harmed.

Although elevated lead exposure in children from North Carolina was associated with private well use, current LCR regulations for public water systems are also inadequate for protecting child health and reducing racial exposure disparities. The current LCR action level is based on water system feasibility and is not health-based. Moreover, drinking water lead concentrations are highly variable within water distribution systems, and current LCR requirements for household tap monitoring fail to capture the most highly exposed households (12, 13). Bias in the selection and reporting of these monitored households have also been extensively reported (14). EPA's proposed revisions to the LCR, which include important initiatives to prioritize the sampling of households served by leaded service lines and stronger efforts to replace leaded lines, are a step in the right direction but still fail to establish a health-based standard. More aggressive actions aimed at eliminating racial disparities in public drinking water lead exposure are necessary. We must also anticipate that racism and classism, which seep into regulatory sampling and reporting practices for the LCR, will persist even in a more aggressive regulatory environment. Although the mechanisms driving disparities in lead exposure likely differ for children using public water systems versus private wells, disparities for both populations are rooted in structural racism.

Critical Need for Aggressive Public Health Action

There is no safe level of lead in children's blood. Lead is a potent neurotoxicant, associated with permanent neurological damage, reduced IQ, and mental health disorders in children; these associations persist even at the lowest quantifiable concentrations of blood lead. Elevated lead exposure in US adults is associated with premature mortality and cardiovascular disease and contributes meaningfully to all-cause mortality (15, 16). Racial disparities in lead exposure begin in utero and persist across the life span, reflecting multigenerational structural racism in housing and living environments, and impact entire communities across generations (17).

Given that the current US federal administration has been disastrous for environmental health, municipalities, counties, and states must act to implement regulatory policies that address the specific needs of their constituents and the underlying causes of racial and socioeconomic disparities in safe drinking water access. To ensure long-term success, regulations must protect the most susceptible groups, contend with the myriad mechanisms by which racism impacts health, and incorporate community input. At least one survey indicates that the majority of sampled well users in North Carolina would utilize municipal water or sewage systems if connected at no cost (8).

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These households should be connected and their tap water should be rigorously monitored. For residents who remain on private wells, several successful initiatives provide useful starting models, including the New Jersey Private Well Testing Act and interest-free loans for treatment systems (9). Public health experts have already suggested strategies specific to the state of North Carolina and free, nationwide private well testing (18, 19). These initiatives must remove financial and technical barriers to testing, treatment, and maintenance.

Social scientists and epidemiologists have long understood that racism is a fundamental cause of disease that operates through complex, ever-changing mechanisms (20). To adequately protect our children's health, we should follow guidance from the American Public Health Association and adopt an explicitly antiracist regulatory agenda that 1) identifies the impacts of historical and contemporary environmental racism on health, 2) engages in aggressive primary prevention efforts to protect our most highly exposed and susceptible communities, and 3) anticipates how racism may continually evolve new mechanisms to create disparities in environmental exposures (1). The findings of MacDonald Gibson et al. indicate that ongoing disparities in childhood lead exposure by water source are indeed rooted in structural racism. Taken together with extensive research on other contaminants, it is clear that private well users in the United States are not afforded one of the most basic public health protections: safe drinking water.

Disparities in childhood lead exposure and the presence of childhood lead poisoning in the United States is unacceptable in 2020. Many leading public health experts have noted that eliminating lead exposure in US children is entirely possible. The benefits for health and economic development will be long-lasting. Adopting an explicitly antiracist regulatory agenda is our most powerful path to get there.

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