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Poor water quality disproportionately affects socially vulnerable communities

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IOP PUBLISHING

A new study published in IOP Publishing's journal ***Environmental Research Letters*** examines the links between drinking water quality violations and social vulnerability in the United States, revealing that these violations disproportionately affect the most vulnerable communities. Approximately 70% of the population affected ranked in the highest social vulnerability category, with many different social parameters, beyond income, linked to different drinking water quality violations.

IMAGE: CLEAR GLASS OF WATER BEING FILLED
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The study, led by researchers from the Jackson School of Geosciences, University of Texas in Austin, used new water quality data that reflect actual water distribution, not administrative boundaries, along with improved definitions of disadvantaged communities and social vulnerability. The improved model identifies more than three times the number of affected people than predicted by current federal environmental justice assessment tools.

While most Americans have access to safe drinking water, around one in ten people were exposed to a health-based water quality violation between 2018 and 2020. In the United States, supplying high quality water is increasingly challenging, due to an aging and underfunded drinking water infrastructure. The largest causes of health-based violations in community water systems are disinfectants and byproducts related to water treatment, followed by naturally occurring contaminants (such as arsenic and radionuclides) and human-caused contaminants such as nitrates.

In assessing which communities and groups are most affected by water violations, previous research has been limited by data sets that are based on state and administrative boundaries that hide the cross border nature of water distribution, and by federal environmental justice assessment tools that have focused primarily on household income as an indicator of social vulnerability, potentially neglecting key, data-available aspects of vulnerability. This study instead looked at data based on community water systems across the whole country in relation to an improved measure of social vulnerability, the mSVI, developed from a tool from the Center for Disease Control, and informed by more recent literature and data

analytics.

Proposed federal drinking water infrastructure funding requires individual states to allocate over 49% of the funding to disadvantaged communities (DACs). However, states have substantial discretion in defining DACs, resulting in large variations in definitions across the US. This study suggests that a broader definition of DACs, beyond household income, should be considered, as mSVI captures three times more of the affected population than household income alone.

Bridget Scanlon, Senior Research Scientist for The Bureau of Economic Geology at The University of Texas, says: "Our detailed analysis of the linkages of drinking water quality violations to social vulnerability can help inform guidance for effectively distributing infrastructure funding and designing interventions to ensure more equitable drinking water quality nationally."

Dr Scanlon published her research through a transformative agreement between IOP Publishing and The University of Texas System. This agreement enables corresponding authors at the university to publish their work in more than 70 IOP journals at no cost to them. Articles published under a transformative agreement are immediately available and free for everyone to read.

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Drinking water quality and social vulnerability linkages at the system level in the United States

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