

Study investigates socioeconomic disparities in nitrate levels in US drinking water

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The first nationwide investigation of potential socioeconomic disparities in nitrate concentrations in US drinking water is reported in the open access journal *Environmental Health*. The authors, from Silent Spring Institute, note that understanding the extent of current exposures—particularly among vulnerable communities—is critical for developing effective strategies to reduce exposure.

The authors found that 99% of community [water](#) systems (CWSs) in the United States do not exceed the maximum contaminant level for nitrate specified by the Environmental Protection Agency (10 milligrams per liter). The majority of average nitrate concentrations were below 1 mg/L, the level at which nitrate occurs naturally in aquatic systems. However, out of 39,466 CWSs examined in this study, 1,647 had nitrate concentrations of above 5 mg/L, a level which may be associated with adverse health outcomes, such as cancer, [birth defects](#), and preterm birth, according to previous research. These 1,647 CWSs serve 5.6 million Americans.

The authors found that the West and the Midwest were the regions with the highest proportions of high nitrate CWSs. Hispanic residents more often lived in areas serviced by CWSs that had average nitrate concentrations of 5 mg/L or above.

Dr. Laurel Schaider, lead author of the study said: "We hypothesized that Hispanic Americans might have higher nitrate in their [drinking water](#) because many US farmworkers are Hispanic, and agriculture is a major source of nitrate pollution. However, we saw these associations even after we adjusted our statistical model to take into account agricultural land use. These results suggest that there may be additional reasons why Hispanic residents in the US have higher nitrate in their drinking water."

Dr. Schaider added: "Our findings suggest that programs intended to help low-income and small public water supplies may not be adequately assisting communities with higher proportions of Hispanic residents, who are more likely to live in areas with high nitrate and thus may be at greater risk of the associated harmful health effects."

The authors found that a 1% higher proportion of non-Hispanic black residents was associated with a 1.3% decrease in nitrate concentrations and a 4.4% decrease in the likelihood of high nitrate. An increase in the proportion of people with incomes below the poverty line was associated with small decreases in nitrate concentrations and in the likelihood of high nitrate. Systems relying on groundwater had higher nitrate concentrations compared to systems relying on surface water and were more likely to have high levels of nitrate.

In order to gain a better understanding of nitrate exposure and whether it may be associated with specific demographic factors, the authors compiled nitrate data on 616,591 samples collected from 39,466 CWSs across the United States between 2010 and 2014. They linked those results with demographic information, including race, ethnicity, and income.

The authors caution that nitrate concentrations may vary at different times of the year, so depending on when nitrate samples were collected within each year, the true average nitrate [concentration](#) may not have been captured. As some residents may rely on bottled water, nitrate levels in CWSs may not accurately reflect exposure.

The authors suggest that previous evidence of possible health effects associated with nitrate concentrations of 5 mg/L and above in drinking water raises concerns for the 5.6 million Americans

served by public water supplies with average [nitrate concentrations](#) above this level. The federal [nitrate](#) standard of 10 mg/L of drinking water may need to be re-evaluated, the authors conclude.

More information: Laurel A. Schaider et al, Environmental justice and drinking water quality: are there socioeconomic disparities in nitrate levels in U.S. drinking water?, *Environmental Health* (2019). [DOI: 10.1186/s12940-018-0442-6](https://doi.org/10.1186/s12940-018-0442-6)

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