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Health-based drinking water violations: A human body organ systems approach to understanding health impacts

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The conventional approach to understanding the health effects of drinking water in the United States is based on the Environmental Protection Agency's National Primary Drinking Water Regulations (NPDWR), established under the Safe Drinking Water Act of 1974. The NPDWR, except for the recent passage of the Final PFAS NPDWR, associates single contaminant exposure with a potential health outcome. Public health departments often identify community-level adverse health effects associated with drinking water contaminants that do not meet NPDWR standards through surveillance systems that identify drinking water as the source of acute illnesses (e.g., diarrhea). Our study takes a different approach by expanding the research on drinking water and health to include the potential association between drinking water contaminants that do not meet NPDWR and chronic illnesses. We do so by using a human body organ systems (HBOS) approach. We assessed the adverse effects on HBOS using the NPDWR potential health effects from long-term exposure above the maximum contaminant level. We used a county-level unit of analysis because public health departments often function at the county level to rank health-based violations in the US drinking water supply (2016-2022) along with contaminants and which HBOS were burdened. The top three counties were Lubbock, Texas; Kern, California; and Okmulgee, Oklahoma; renal was the most burdened HBOS. This novel approach expands our understanding of the relationship between health and drinking water contaminants and has practical implications for public health policy and practice.

Primary authors: MCDONALD, Yolanda (Vanderbilt University); Mr BOZORGMEHR, Christopher (Vanderbilt University); FERNANDO, Minoli (Vanderbilt University); Ms SPIRIDELLIS, Kaitlin (Vanderbilt University); Ms JONNAKUTI, Sriya (Vanderbilt University)

Presenter: MCDONALD, Yolanda (Vanderbilt University)

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