Drinking water guidelines in the US vary widely from state to state

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In response to the growing problem of drinking water contaminated with per- and poly-fluoroalkyl substances (PFAS), a new analysis shows that many states are establishing their own guideline levels for two types of

PFAS—PFOA and PFOS—that differ from federal guidelines. The new study appears in the *Journal of Exposure Science & Environmental Epidemiology*, which is published by Springer Nature. According to Alissa Cordner of Whitman College in the US, the study's lead author, the findings highlight the need for enforceable federal standards and more health protective limits on these contaminants in drinking water to safeguard the health of millions of people whose water supplies have been contaminated.

PFOA (perfluorooctanoic acid) and PFOS (perfluorooctane sulfonate) are widely-used chemicals found in a range of products such as non-stick coatings, stain repellents, and firefighting foam. They have been in use since the 1950s. When it became clear the substances were linked to a variety of diseases, manufacturing of products containing PFOA and PFOS ceased in the US.

However, both contaminants are very persistent in the environment and the human body. They are also extremely mobile in the environment and so have contaminated drinking water supplies serving millions of Americans. Although the chemicals are no longer produced in the US, they are still used in many products manufactured outside the country. Companies have been replacing PFOS and PFOS with other PFAS substances, however studies show these replacement chemicals share many of the same chemical properties.

In this study, the research team identified state agencies that have guidelines regarding the levels of PFOA and PFOS chemicals that are allowed in drinking water without causing adverse health effects, and the remedial action to be taken if these contaminants are found in water sources. These guidelines were compared with the US Environmental Protection Agency (EAP) health advisories for the same chemicals.

As part of the assessment, Cordner and her colleagues at Silent Spring

Institute and Northeastern University gathered information released in June 2018 by the Interstate Technology and Regulatory Council. The researchers also sourced documents from state websites and contacted state environmental and health agencies.

Their analysis shows that seven states so far have adopted or proposed their own water guideline levels for PFOA and/or PFOS, and three states have set levels of the contaminants that are lower than those set by EPA. In some cases, states developed the guideline levels after specific incidents of contamination. The state water guideline levels also vary dramatically. While EPA has released a health advisory level of 70 nanograms per liter for PFOA and PFOS combined, state guideline levels for the two chemicals range from 13 nanograms per liter (in New Jersey) to 1,000 nanograms per liter (in North Carolina). Some states are also developing guildeline levels for other PFAS.

The researchers identified multiple scientific factors that influenced the guideline levels, including the choice of toxicological endpoints and assumptions about drinking water consumption. Social, economic and political pressures all influenced the establishment of guidelines by states, for instance in response to community concerns or discovery of contamination incidents.

"Assessments by multiple states and academic scientists suggest that EPA's health advisory for drinking water is not sufficiently protective," explains Cordner. Previous studies in children exposed to PFOS have shown effects on immune function at lower exposures than EPA's drinking water advisory levels. The most sensitive toxicological endpoints—altered mammary gland development and suppressed immune function—were not the basis for EPA's health advisories but were used by a small number of states.

"There are currently no federal drinking-water standards for PFOA and

PFOS, despite widespread drinking water contamination, ubiquitous population-level exposure, and toxicological and epidemiological evidence linking it to various diseases. Because of this, public water entities are not required by law to routinely test whether contaminant levels in water exceed EPA's health advisory and state agencies are not empowered to enforce cleanup," she explains.

The researchers stress that lack of federal standards may create or exacerbate public health disparities because not all states have the resources to develop their own guideline levels or ensure cleanup of contaminated supplies.

More information: Alissa Cordner et al, Guideline levels for PFOA and PFOS in drinking water: the role of scientific uncertainty, risk assessment decisions, and social factors, *Journal of Exposure Science & Environmental Epidemiology* (2019). DOI: 10.1038/s41370-018-0099-9

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