

Drinking water in several Chinese cities contains high levels of persistent chemicals

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Drinking water in several cities and regions in China contains high levels of perfluoroalkyl and polyfluoroalkyl substances (PFASs), according to a study published in *Environmental Sciences Europe*. The findings, from a

team of researchers at Tsinghua University, Beijing, China, suggest that elimination of these chemicals from drinking water in affected cities and regions in China is urgently needed and that PFAS released from industries and other sources need better control and reduction.

PFASs are a group of chemicals used to make coatings and products that resist heat, oil, stains, and grease, such as clothing, adhesives, food packaging, and heat-resistant non-stick cooking surfaces. They are highly durable and the widespread presence of PFASs in the environment and related exposures and [adverse health effects](#) such as impaired lipid metabolism, thyroid hormone levels and the immune system which have been shown in animals, have received increased attention in recent years. However, PFASs are not routinely monitored in [drinking water](#) in many parts of the world, including China.

To better understand the current status of PFAS contamination and the potential for human exposure, the researchers reviewed evidence from 30 available research studies on PFASs in Chinese drinking [water](#), including 526 drinking water samples across 66 cities in China with a total of approximately 452 million inhabitants.

Dr. Jun Huang, the corresponding author said: "Although several PFASs especially perfluorooctanoic acid (PFOA) and perfluorooctanesulfonic acid (PFOS), have been gradually phased out in North America and Europe since 2002, some Asian countries, especially China, still produce these chemicals. As a result, there is a potential risk of ground- and surface water contamination associated with PFAS being released into the environment. This raises concerns regarding the presence of PFASs in drinking water, direct exposure to humans and potential toxic effects."

The authors found that populations in East China and the Southwest regions were at relatively higher risk from PFAS exposure, compared to other regions. Some cities in the Yangtze River basin such as Zigong,

Jiujiang and Lianyungang exceeded health-based guidelines issued by EU and US agencies.

Zigong (502.9 ng/L), Lianyungang (332.6 ng/L), Changshu (122.4 ng/L), Chengdu (119.4 ng/L), Wuxi (93.6 ng/L) and Hangzhou (74.1 ng/L) were the cities with the highest PFAS concentrations in drinking water.

Dr. Huang said: "The total concentrations of PFOS and PFOA in these cities are well in excess of the non-enforceable 70 ng/L health advisory published by the the U. S. Environmental Protection Agency in 2016. Individual US States have set maximum contaminant levels that are even more stringent than the federal guidelines, such as Vermont, which set a maximum contaminant level of 20 ng/L for five PFASs (PFOA, PFOS, PFHxS, PFHpA, and PFNA, individually or combined) in 2019."

The authors also found that the drinking water in more than 40% of the studied cities exceeded the notification levels of 5.1 ng/L for PFOA and 6.5 ng/L for PFOS issued by the US state of California in 2019.

Exposure to these PFOA and PFOS has been associated with adverse health outcomes including increased incidence of testicular and kidney cancer, reduced fertility and fecundity, immune suppression and thyroid disorders in animal studies.

The authors suggest that the high levels of PFASs in some cities and regions investigated in China are mainly due to intensive industrial activities, specifically fluoropolymer (PTFE) production and high population density in those regions.

The authors also investigated the potential daily exposure to PFASs via drinking water for the Chinese population, using the average and maximum concentrations of PFOA and PFOS previously recognized as posing a health concern.

The authors found that compared with a standard proposed in 2018 by the US Agency for Toxic Substances and Disease Registry (ATSDR) of a tolerable intake of 3 ng/kg per single day, PFOA intake for the Chinese population exceeds 3 ng/kg per single day in Zigong, Jiujiang, Lianyungang, Foshan, Suzhou, Wuxi, Haining, Changshu, Shijiazhuang, Zibo and Shanghai. These levels are also in excess of the new tolerable weekly intake of 4.4 ng/kg for the sum of PFOA, PFOS, PFHxS and PFNA, which was established by the European Food Safety Authority (EFSA) in 2020. The authors also found that the risk of PFAS intake is higher for infants, due to their relatively higher water consumption.

Dr. Huang said: "While there are currently no guidelines for PFASs in drinking water in China, in 2019, a Chinese health advisory first suggested values of 85 ng/L for PFOA and 47 ng/L for PFOS in China. Our results indicate that PFASs in drinking water in some Chinese cities have exceeded these levels, and most of the cities have exceeded stringent international guideline levels. Therefore, further monitoring as well as control and treatment measures are urgently needed."

The authors caution that more research is needed to understand the possible health effects associated with long-term exposure in cities and regions with high levels of PFAS, especially in areas with PFASs-related manufacturing plants. Moreover, better monitoring of PFASs in drinking water is needed in remote areas, to provide a full overview of PFAS contamination in Chinese [drinking](#) water.

More information: Liquan Liu et al, Per- and polyfluoroalkyl substances (PFASs) in Chinese drinking water: risk assessment and geographical distribution, *Environmental Sciences Europe* (2021). [DOI: 10.1186/s12302-020-00425-3](https://doi.org/10.1186/s12302-020-00425-3)

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