

Food is the Largest Source of PFAS Exposure for Most People

Much attention nationally has focused on per- and polyfluoroalkyl substance (PFAS) exposure from contaminated drinking water. This is a major concern for good reason, and individuals drinking contaminated water are likely to have increased levels of PFAS in their blood. Yet, biomonitoring studies have shown that nearly every person in the US, including newborns, have PFAS in their bloodstream.ⁱ For the typical person, diet is likely to be the single largest exposure pathway.

Known Human Exposure Pathways to PFAS

The federal government has identified five primary pathways of exposure to PFAS:ⁱⁱ

- Drinking contaminated municipal water or private well water
- Eating fish caught from water contaminated by PFAS (PFOS, in particular)
- Accidentally swallowing contaminated soil or dust
- Eating food that was packaged in material that contains PFAS
- Using some consumer products such as non-stick cookware, stain resistant carpeting, and water repellent clothing.

Dietary Exposures Dominate

- Domingo & Nadal (2017) reviewed evidence of dietary exposure to PFAS reported since a prior review in 2012. They reaffirmed their prior conclusion that, "...in most countries, for which information on the dietary intake of PFASs was available in the scientific literature, food intake was the most important source of exposure to these compounds..."ⁱⁱⁱ
- Trudell, et al. (2008) estimated consumer exposure to two PFAS, PFOA and PFOS, using data from a large number of studies. They concluded, "...the intake of contaminated food is the major pathway leading to exposure to PFOS and PFOA in the general public."^{iv} Their model included drinking water contaminated with no more than 6 ppt PFOS and 20 ppt PFOA.
- Fromme, et al (2009) estimated total exposure to PFAS from air, dust, drinking water and food. They stated, "...we can cautiously conclude that dietary exposure is the dominant intake pathway, responsible for 91% (PFOS) and 99% (PFOA) of the total intake of the general population using mean intake data."^v
- Harada & Koizumi (2009) estimated daily intake of two PFAS, PFOA and PFOS, from multiple studies in Japan. They found, "The estimated exposure through food was predominant for both PFOA and PFOS... Among the estimates, exposure via food consumption was the major source, followed by tap water and indoor dust."^{vi} Based on their data, between 66% and 96% of the PFAS originated from food, depending upon the chemical and region.

ⁱ See ATSDR summary, pages 596-605: Agency for Toxic Substances and Disease Registry (ATSDR). 2018. [Toxicological profile for Perfluoroalkyls](#). (Draft for Public Comment). Atlanta, GA: U.S. Department of Health and Human Services, Public Health Service.

ⁱⁱ Agency for Toxic Substances and Disease Registry (ATSDR). 2018. "How Can I be Exposed to PFAS?" <https://www.atsdr.cdc.gov/pfas/pfas-exposure.html> Accessed April 14, 2019.

ⁱⁱⁱ Domingo J., & M Nadal. "Per- and Polyfluoroalkyl Substances (PFASs) in Food and Human Dietary Intake: A Review of the Recent Scientific Literature." *J. Agric. Food Chem.*, 2017, 65 (3), pp 533-543

^{iv} Trudel D., et al. "Estimating consumer exposure to PFOS and PFOA." *Risk Anal.* 2008 Apr;28(2):251-69.

^v Fromme, et al. "Perfluorinated compounds-Exposure assessment for the general population in western countries." *Int J Hyg Environ Health.* 2009 May;212(3):239-70

^{vi} Harada, KH & A Koizumi. "Environmental and biological monitoring of persistent fluorinated compounds in Japan and their toxicities." *Environ Health Prev Med.* 2009 Jan;14(1):7-19.