

Perfluoroalkyl and Polyfluoroalkyl Substances (PFAS) in the U.S. Population

Most people in the United States have been exposed to PFAS and have PFAS in their blood, especially perfluorooctane sulfonic acid (PFOS) and perfluorooctanoic acid (PFOA).

Since 1999, the National Health and Nutrition Examination Survey (NHANES) has measured blood PFAS in the U.S. population. NHANES is a program of studies designed by the Centers for Disease Control and Prevention (CDC) to evaluate the health and nutrition of adults and children in the United States.

Since 2002, production and use of PFOS and PFOA in the United States have declined. As the use of some PFAS has declined, some blood PFAS levels have gone down as well.

- From 1999 to 2014, blood PFOS levels have declined by more than 80%.
- From 1999 to 2014, blood PFOA levels have declined by more than 60%.

However, as PFOS and PFOA are phased out and replaced, people may be exposed to other PFAS.

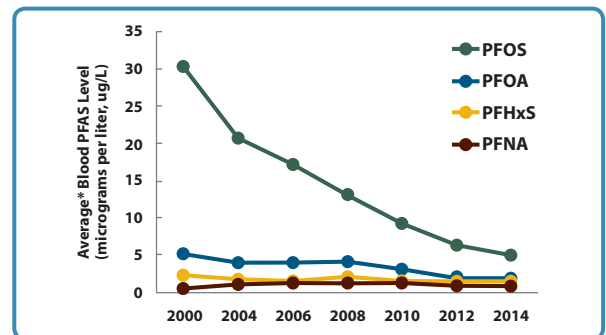
Blood PFAS levels decreased in people exposed to PFAS in drinking water after a water filtration system was installed.

In the mid-2000s, water sampling found PFAS contamination in municipal drinking water sources east of St. Paul, Minnesota. In 2006, a water filtration system was installed to reduce PFAS levels. PFOS and PFOA were reduced in the drinking water below the current EPA health advisory level for PFOS+PFOA of 70 parts per trillion.

In 2008, 2010, and 2014, the Minnesota Department of Health measured blood PFAS levels in people who had been exposed to PFAS in their drinking water before installation of the filtration system.

- PFOS, PFOA, and PFHxS blood levels went down in long-term residents after a water filtration system was installed.

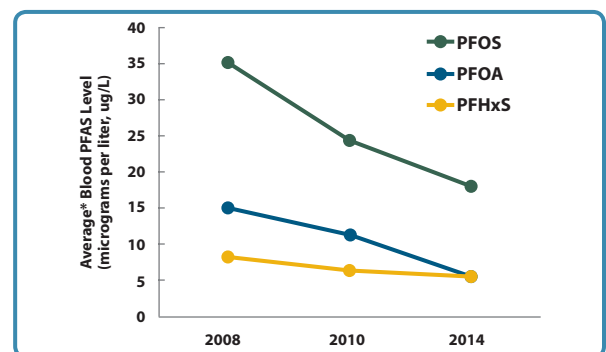
Blood Levels of the Most Common PFAS in People in the United States from 2000-2014



* Average = geometric mean

Data Source: Centers for Disease Control and Prevention. Fourth Report on Human Exposure to Environmental Chemicals, Updated Tables, (January 2017). Atlanta, GA: U.S. Department of Health and Human Services, Centers for Disease Control and Prevention.

Average Blood Level of Some PFAS after Installing a Water Filtration System



* Data shown are geometric means

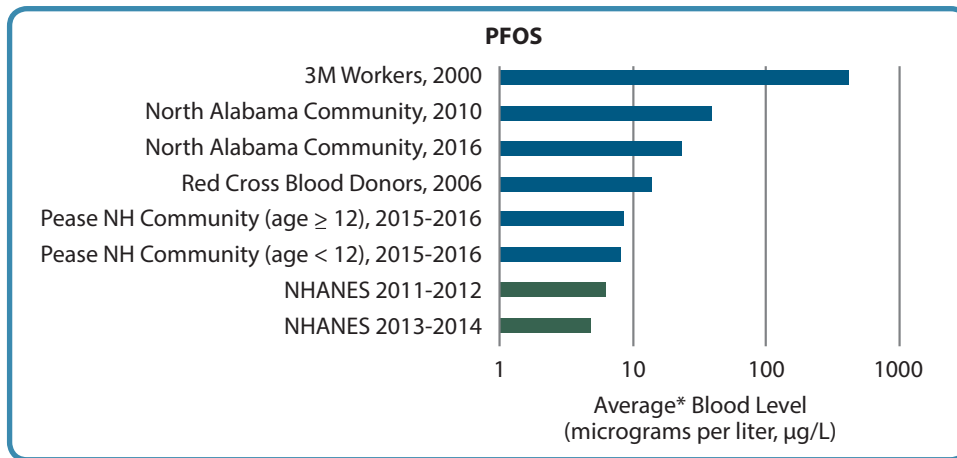
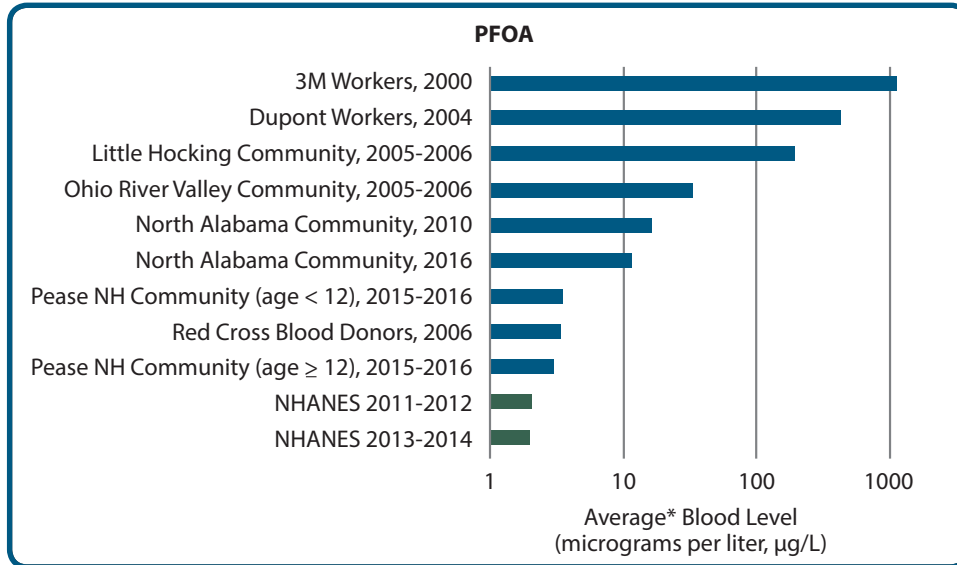
Data Source: Minnesota Department of Health, Environmental Tracking and Biomonitoring. East Metro PFC3 Biomonitoring Project, December 2015 Report to the Community.

Biomonitoring Studies have measured PFAS levels in other groups:

- Workers in PFAS manufacturing facilities,
- Communities with contaminated drinking water, and
- The general U.S. population.

The figures below show PFOA and PFOS levels measured in different exposed populations, compared to levels CDC measured in the general U.S. population in 2011-2012 and 2013-2014.

Blood Levels in People Who Were Exposed to PFAS



* Average = geometric mean

References:

- www.cdc.gov/exposurereport
- https://www.atsdr.cdc.gov/HAC/pha/BiologicalSampling/Biological_Sampling_of_Substances_in_Alabama_EI%20Report_11-28-2016_508.pdf
- <http://www.dhhs.nh.gov/dphs/documents/pease-pfc-blood-testing.pdf>

PFOS – Perfluorooctane sulfonic acid

PFOA – Perfluorooctanoic acid

PFHxS – Perfluorohexane sulfonic acid

PFNA – Perfluorononanoic acid