

Washington Environmental Biomonitoring Survey

Biomonitoring

measures the amount of environmental chemicals or their breakdown products (called metabolites) in human blood, urine, hair or other body tissues.

Summary of Activities and Findings

In 2009, the Centers for Disease Control and Prevention (CDC) awarded the Washington State Department of Health a 5-year biomonitoring grant. This funding improves the capability of our Public Health Laboratories to test biomonitoring samples and assess exposure to chemicals.

The goals of the Washington Environmental Biomonitoring Survey (WEBS) are to:

- Understand amounts of environmental chemicals in our bodies—for the general population and those at high risk of exposure in Washington.
- Compare our levels to U.S. levels.
- Use this information to help reduce exposures.

Activities: 2009–2014

Statewide General Population Study

From May 2010 to June 2011, WEBS staff collected urine samples from 1,422 people living in Washington State. This was a random sample of residents age six and older. Our laboratory tested urine samples for total and speciated arsenic, and 12 metals (antimony, barium, beryllium, cadmium, cesium, cobalt, lead, molybdenum, platinum, thallium, tungsten and uranium). Our laboratory tested urine samples for metabolites of the pesticide chlorpyrifos and a group of commonly used pyrethroid insecticides. They are also testing a subset of samples for bisphenol A (BPA) and phthalates. These results are expected by summer 2014.

WEBS staff also collected drinking water samples from 498 households participating in the statewide study starting in July 2010. Our laboratory tested water samples for arsenic, cadmium, lead, thallium, uranium and manganese. Washington Tracking Network funded the drinking water testing.

Major findings:

- Urine levels of total arsenic were higher in Washington (median 11.9 µg/g creatinine) compared to U.S. levels reported by CDC (7.9 µg/g creatinine). About 11 percent of WEBS participants had urine levels above CDC's reporting level of 50 µg/L.
- Arsenic from seafood contributed to the higher levels. People who ate shellfish, fish, kelp or sushi in the previous three days had higher urine levels of arsenic—arsenic compounds in food occur naturally and have low toxicity.
- In Washington, median urine levels were higher for cadmium and cobalt, and lower for cesium, lead and thallium compared to the entire U.S.
- Almost all drinking water samples met Environmental Protection Agency (EPA) standards. Most water samples (76 percent) came from large public water systems.
- In Washington, median urine levels were similar for pyrethroids and chlorpyrifos compared to U.S. levels.
- Pyrethroid levels were higher in people who reported recent use of home insecticides and were lower in people who reported eating organic fruits and vegetables.

For more information

Denise Laflamme
WEBS Field Study Manager
denise.laflamme@doh.wa.gov
360-236-4345
www.doh.wa.gov/biomonitoring

WEBS biomonitoring data
Washington Tracking Network
www.doh.wa.gov/WTN

Arsenic is found naturally in seafood and some groundwater. Arsenic is also found in soils because of industrial activities or the use of certain pesticides.

Pyrethroid pesticides are used in agriculture and are popular residential insecticides. They are found in products that kill ants, fleas, spiders, cockroaches and other pests.

Chlorpyrifos is a pesticide that is widely used in agriculture to kill insects. It was banned for home use in the U.S. in 2001.

Bisphenol A (BPA) is a chemical compound used to make hard plastics and epoxy resin. BPA is commonly found in the lining of food and drink cans.

Phthalates are chemicals added to plastics to make them more flexible and durable. They are used in many consumer products, including toys, food packaging, building materials and perfumes.

High Arsenic Area Study: South Whidbey Island

In some areas of the state, natural underground deposits of arsenic cause contamination in drinking water wells. South Whidbey Island is one area of the state known to have high, naturally-occurring arsenic in groundwater.

From July to September 2011, WEBS staff collected urine and drinking water samples from residents on private wells or small water systems (less than 15 connections). We pre-screened tap water with a test kit. Then we invited households with arsenic at or above EPA's drinking water standard to participate. A total of 172 residents from 82 households participated in this study.

Major findings:

- Urine levels of total arsenic were higher for South Whidbey (28.4 µg/g creatinine) compared to statewide and national levels.
- 28 percent of participants had urine arsenic levels above CDC's reporting level.
- 54 percent of water samples retested at the laboratory were above the EPA's standard.
- Arsenic from seafood and tap water contributed to higher arsenic levels in urine.

Pyrethroid Exposure Survey and Testing (PEST) Study

In 2012, WEBS staff measured pyrethroid pesticides in urine collected from licensed pesticide applicators living in King, Pierce, Snohomish, Clark, and Thurston Counties. The purpose was to learn how work practices affect the amount of pyrethroids that get into the body. A total of 56 licensed applicators participated for up to six work days. For each work day, participants collected three urine samples after work and filled out a questionnaire about their pyrethroid use and work practices that day. In 2014, we are partnering with WSU to use study findings to improve pesticide safety education.

Major findings:

- Urine levels of most pyrethroids were higher for pesticide applicators compared to statewide levels.
- Levels of some pyrethroids were lower in applicators who reported wearing all of their required protective gear.
- Pyrethroid levels were higher in applicators who used backpack sprayers.

Low Income Survey and Testing (LIST) Study

From May 2013 to April 2014 WEBS staff collected urine samples from 585 people living in subsidized housing in King County to compare with statewide and U.S. levels. Our laboratory is testing urine samples for pyrethroid and chlorpyrifos pesticides, bisphenol A and phthalates.

Next steps:

- We expect LIST study results by fall 2014.
- We will share results with our partners who can help communities reduce exposure to these chemicals.