

The Washington Environmental Biomonitoring Survey



Washington Environmental
Biomonitoring Survey (WEBS)

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- CDC awarded biomonitoring grants to 3 states in 2009 (NY, CA and WA)
 - 5 year grant, yearly noncompetitive renewals
- Goals of Grant:
 - Increase biomonitoring capacity at public health labs
 - Provide state-level biomonitoring data to compare to national data
 - Conduct surveillance of analytes important to state and local exposure prevention efforts

General Population Survey (Grant Years 1 and 2)

Objectives of the WEBS Project

- In the General Population measure levels of
 - total arsenic
 - speciated arsenic
 - metabolites of organophosphate
 - pyrethroid pesticides
- Compare to national levels from NHANES
- Measure levels of other selected metals in urine and drinking water

Other Activities

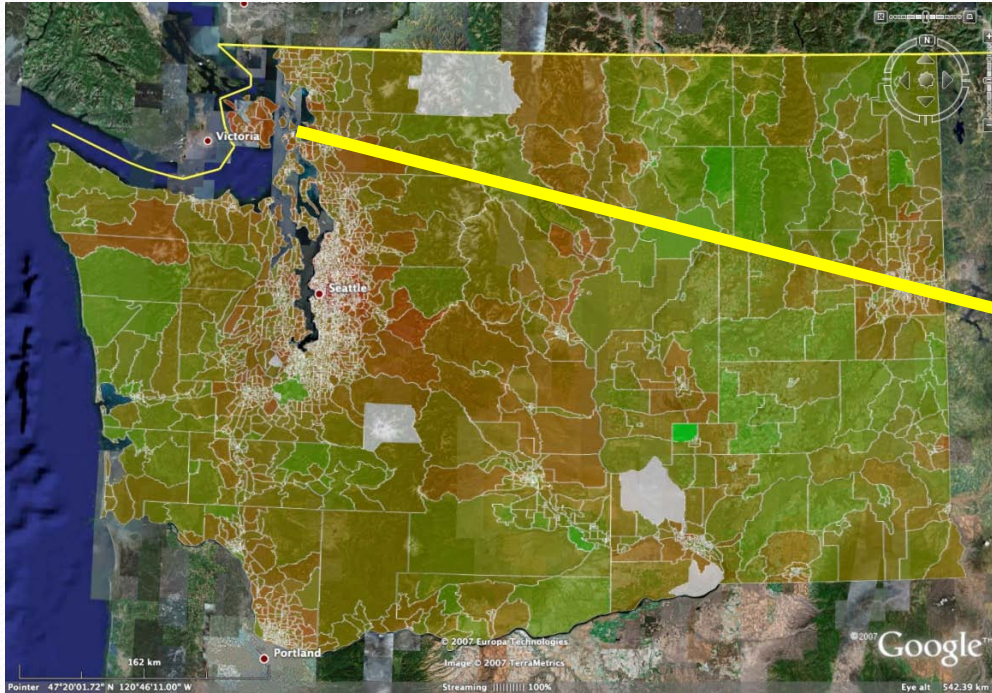
- Establish an Advisory Committee
- Identify and develop add-on projects

WEBS Staff

- Public Health Laboratories -
 - PI
 - Chemist 3 and Chemist 1
 - WEBS laboratory coordinator
- IT – FTE hours to adapt lab LIMS and create databases in EPI
- Non-infectious Conditions Epidemiology (NICE) – Study design, IRB applications, manages field work, sends results letters, and statistical analysis:
 - 2-3 field management staff
 - Sr. Epidemiologist
 - Statistician
 - CSTE epidemiology fellow
 - Clerical support
- Division of Environmental Health – Develops and consults on projects, answers questions from participants, works with Advisory Committee:
 - 2 Toxicologists

General Population Survey

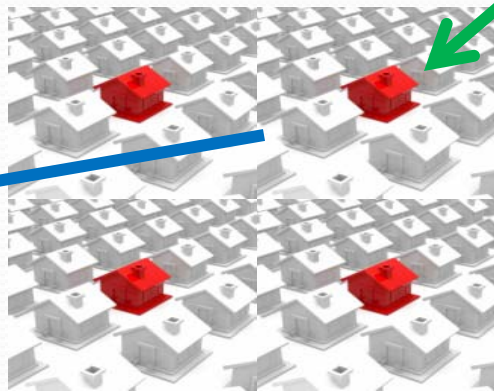
Participant Selection: 2-stage sampling



Stage 1
Select 70 Block Groups
(40 Year 1, 30 Year 2)



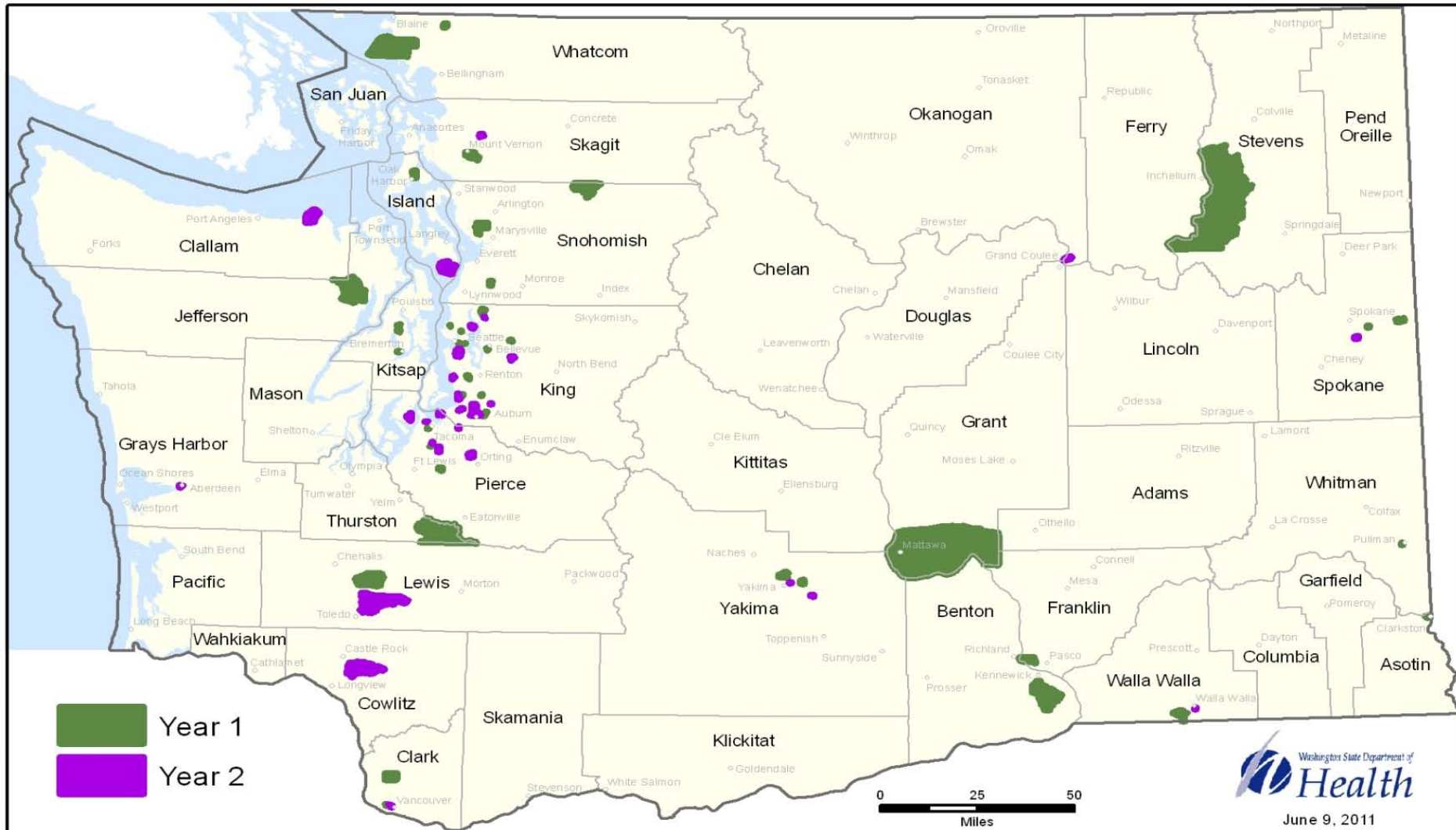
Stage 2
Select 27 Housing Units



All residents
Age 6+

General Population Sample: selected block groups

Samples collected May, 2010 – June, 2011



General Population Survey

Recruitment

- Introductory letter from **local health department**
- Field team visits household, enrolls participants, administers household questionnaire and collects water sample
- Field team returns to pick up frozen urine sample and self-administered questionnaires
- Spanish speaking field staff and translators available for other languages
- Procedures/protocols approved by WA State Institutional Review Board

General Population Survey

Sample and Data Collection

- One time urine sample
- Drinking water sample from each household (Tracking Network collaboration)
- Two Questionnaires
 - Household questionnaire asks about use of pesticides around home, source of drinking water, household income
 - Self-administered questionnaires asks about recent diet, occupation, personal pesticide use, and demographics
- Archived urine samples stored for up to 5 years, **with permission.**

General Population Survey

Laboratory Testing

- DOH WEBS lab staff trained at CDC
 - Requirement of grant to use the same methods as CDC
 - Goal of grant to compare results to NHANES
- Urine and drinking water samples analyzed at DOH Public Health Laboratories
- Field staff trained in collection and shipping by WEBS trainers

Laboratory Testing

- Total metals testing is a known quantity
- Speciated metals are edge of the envelope – more difficulties
- CDC is still perfecting pesticide metabolite methods
- Our laboratory developed its own creatinine capability



General Population Survey

Participant Feedback

- Results sent to participants within 8 weeks, if possible
- Reportable values:
 - Total As (reported to all participants)
 - Pb reported only if > urine Pb equivalent to blood lead screening values
 - 4 metals reported only if > occupational values (Cd, Co, Tl, U)
 - Water: 6 metals (As, Cd, Pb, Tl, U and Mn) compared to EPA drinking water standards
- Pesticides
 - Results compared to 95th percentiles of NHANES national data – no health cutoff values
- Toll-free number for participants to call with questions

General Population Survey Results

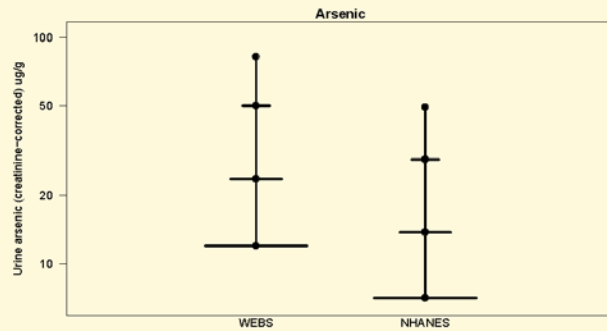


Figure 1: Median and other quantiles for arsenic. Each figure shows the median, 75th percentile, 90th percentile, and 95th percentile, for the WEBS survey (2010–2011) and the 2007–2008 NHANES survey.

The medians of the creatinine-corrected urinary metals measurements are compared in [Figure 3](#). This figure excludes the metals for which the median was lower than the LOD (antimony, beryllium, and platinum). The WEBS medians appear to be significantly higher than the NHANES 2007–2008 medians for arsenic, cadmium, and cobalt, while the NHANES medians are higher for cesium, lead, and thallium.

[Figure 5](#) shows another way to plot the percentiles.

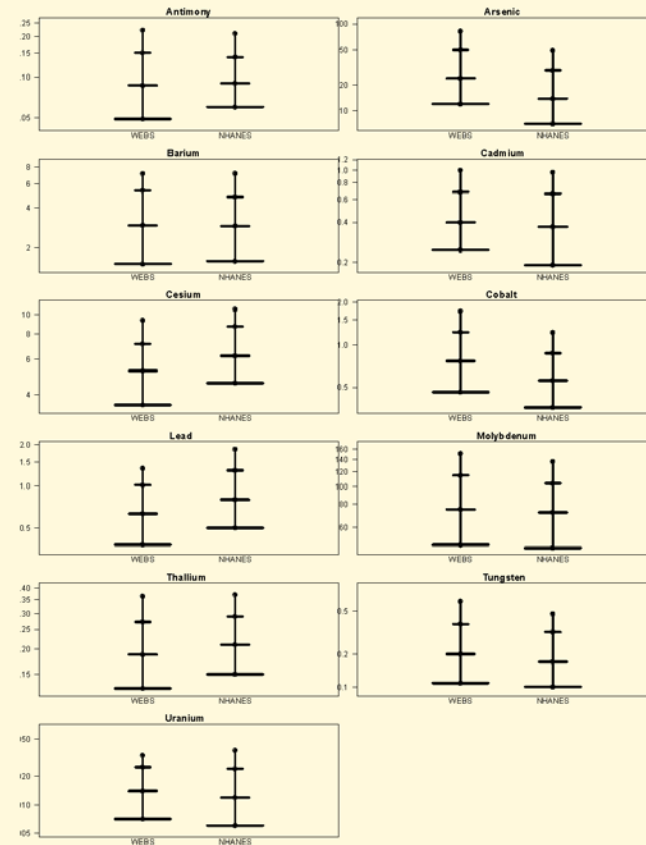
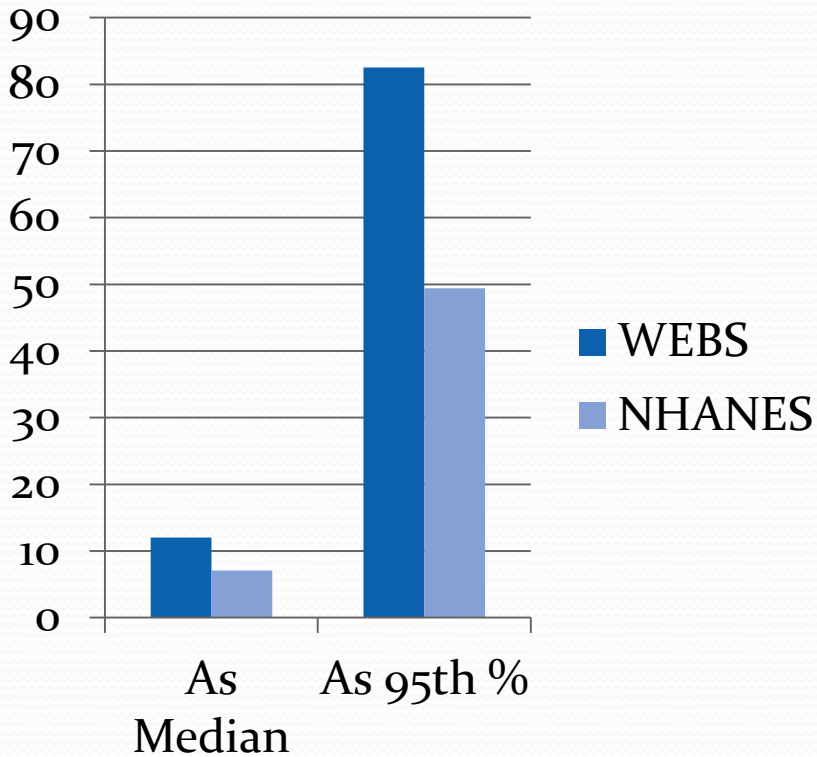


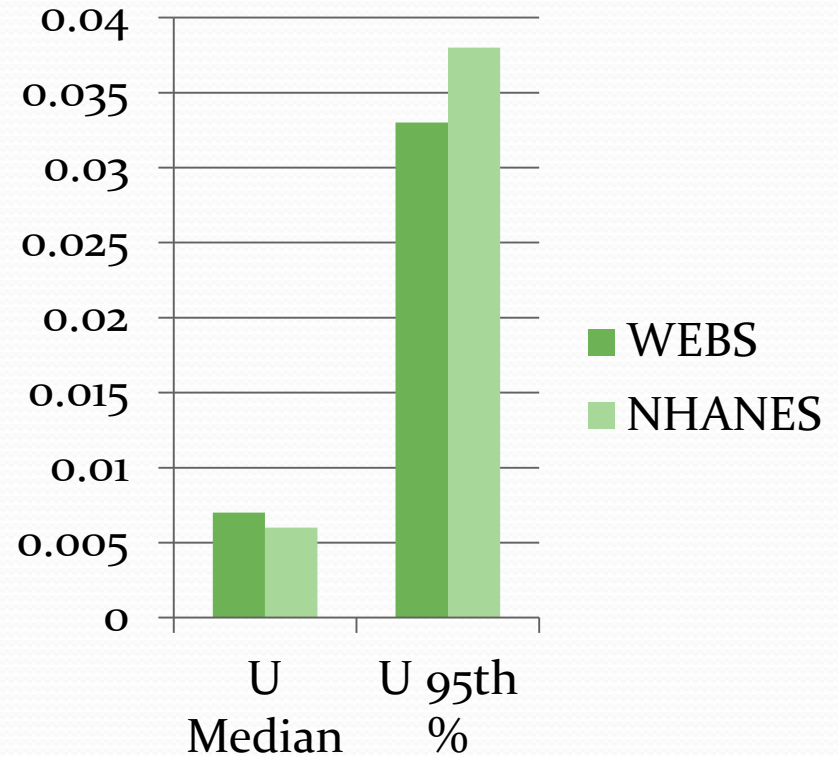
Figure 2: Median and other quantiles for each of the metals. Each figure shows the median, 75th percentile, 90th percentile, and 95th percentile, for the WEBS survey (2010–2011) and the 2007–2008 NHANES survey.

General Population Survey Results

Total Arsenic



Uranium



General Population Survey

Data Analysis

- **1422 urine samples and 502 drinking water samples**
- **Household volunteer rate : 37%**
- **Urine results creatinine-corrected....**
 1. Compare results to NHANES (2627 samples)
 2. Use questionnaire data to identify high risk activities
 3. Make at least tap water data available on Washington Tracking Network Portal

High Risk Population Studies – Years 2 and 3

- General population samples are collected
 - Pyrethroid pesticide method is in validation
 - OP pesticide method is in development
 - Other general population studies are in discussion
- High risk population studies have begun
 - High Arsenic groundwater study on Whidbey Island
 - High occupational exposure to pyrethroid pesticides (Applicators)

High-Risk Arsenic Exposure Survey Results

- July – September, 2011
- Screened 313 households for arsenic in water using a field test kit
- Collected 173 urine samples and 82 drinking water samples
- All samples have been analyzed and results reported back to participants
- Environmental Public Health Tracking Network supported the drinking water testing at the PHL

WEBS Advisory Committee

- Have met 3 times in 2009
- Provides recommendations to WA DOH on biomonitoring activities
- Members include:
 - Catherine Karr, MD, PhD, MS, FAAP; University of Washington (UW)
 - Mike Yost, PhD, MPH; UW/Alternates: Richard Fenske, PhD, MPH, and Chris Simpson, PhD
 - Tom Burbacher, PhD; UW/Alternate: Elaine M. Faustman, Ph.D
 - Rob Duff, MS; Washington State Department of Ecology
 - Ngozi Oleru, Ph.D.; Public Health Seattle/King County
 - Harvey Crowder, DVM, MS; Walla Walla County Health Dept.
 - Erika Schreder, MS; Washington Toxics Coalition
 - Glen Patrick, MPH; WADOH-Environmental Public Health Tracking
 - Lon Kissinger, MS; US EPA Region 10
 - Allan Felsot, Ph.D.; Washington State University
 - Todd M. Schoonover, Ph.D., CIH, CSP; Washington State Department of Labor & Industries

Future Projects

Based on Advisory Committee Recommendations

- Measure urinary pyrethroid metabolites in a population of residential pest control professionals who routinely work with pyrethroid insecticides.
- Measure mercury in hair in high seafood consumers with a focus on Asian populations known to have frequent consumption of seafood.
- Analyze Year 1 and 2 general population urine samples for Bisphenol A and the panel of phthalates.
- Prepare for laboratory analysis of NNAL, as resources permit.

Year 3

Surveillance for Pyrethroid Metabolites Among Pesticide Applicators

- Conduct pyrethroid biomonitoring among licensed residential pest control professionals
- Collaboration with Urban Integrated Pest Management Program/Washington State University
- Collect urine samples and questionnaire data
- Identify practices related to high exposures
- Compare to state-level background data (Year 1 and 2) and use results for prevention activities
- Currently in planning stage
 - Focus groups in November to finalize questionnaire and develop sample size
 - Can we get around the LIABILITY Question?

Contact Information

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