



Washington Environmental Biomonitoring Survey (WEBS) – Overview of Activities

Advisory Committee Meeting

October 10, 2013

Public Health Laboratories

Introduction/Background

- Grant Recap
- Overview of Studies
- New Lab Capacity
- WA Tracking Network Portal
- Year 5 Activities
- New Grant Funding Opportunity

Grant Recap

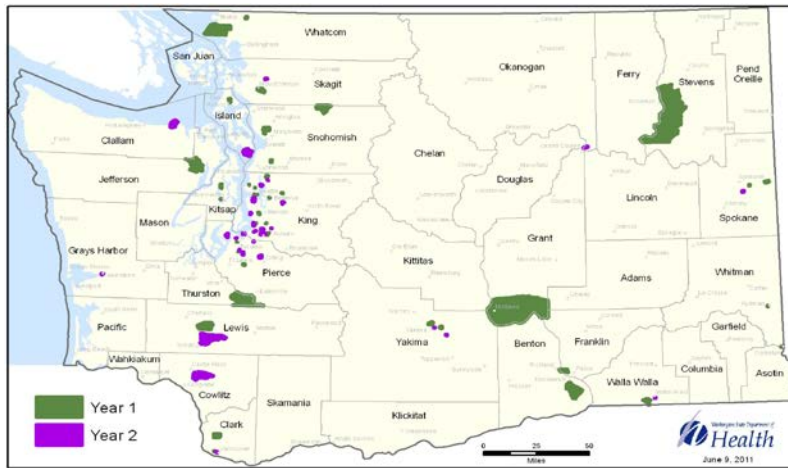
- Increase PHL capacity for biomonitoring
 - CDC methods
 - CDC analytes
- Assess general population exposures
- Assess exposures in high risk groups
- Use information for prevention efforts
- Grant awarded Sept. 1, 2009 for 5 years
 - Year 5: Sept. 1, 2013 – August 31, 2014

Biomonitoring Studies

- WEBS General Population
- WEBS High Arsenic Area
- Licensed Pesticide Applicators
 - Pyrethroid Exposure Survey & Test (PEST)
- UW Dairy Workers Study
- Residents of Subsidized Housing
 - Low-income Survey & Testing (LIST)

WEBS General Population-Methods

70 census block groups



Two-stage
Sampling Design

27 housing units
from each block group



Invited all household
residents ages 6 or older



WEBS General Population

- Participants ≥ 6 years
- May 2010 -June 2011
- Data collection
 - Urine sample (1st morning void)
 - Household & individual questionnaires
 - Household drinking water sample
- Analytes
 - ✓ Total & speciated arsenic
 - ✓ Metals (Ba, Be, Cd, Cs, Co, Pb, Mo, Pt, Sb, Tl, W, U)
 - ✓ Pesticide metabolites (1 OP (TCPy) & 4 pyrethroids)
 - ✓ Subsample of 240 for bifenthrin metabolites (Germany)
 - Subsample of 425 for BPA & phthalates (women & teens)
- Water samples: As, Cd, Pb, Mn, Tl, U
- 1422 participants from 666 households

High Risk Population Area of High Arsenic in Groundwater

- Identified areas with high Arsenic in groundwater
- Local health interest and high population density
- ZIP codes with private or small community wells

Solicited volunteers

- Private or small community wells (Group B)
- Tap water field screened for As $\geq 10 \mu\text{g/L}$

High Risk Population Area of High Arsenic in Groundwater

- Summer - Fall 2011
- Data collection
 - Urine sample (1st morning void)
 - Household & individual questionnaires
 - Household drinking water sample
- Analytes
 - Total and speciated As & 12 metals in urine
 - Six metals in drinking water sample
- Recruited 172 people (ages ≥ 6 years); 82 households



Pyrethroid Exposure Survey & Testing (PEST)

- Pesticide applicators w/ PCO general or PCO structural licenses
- May – October 2012
- Data Collection:
 - 3 urine samples after workday using pyrethroids
 - Participant questionnaire
 - Workday questionnaire
- Analytes:
 - Pyrethroid pesticide metabolites (PHL: 4 analytes)
 - Bifenthrin metabolites (German lab)
- Results for Continuing Education
- Report Dec. 2013

Low Income Survey & Testing (LIST)

- Residents of subsidized housing in King County
- May 2013 – April 2014
- Data Collection
 - 2 urine samples
 - Household & participant questionnaires
 - Pesticide use & building materials from housing authority
- Analytes
 - Pesticides: OP & Pyrethroid metabolites
 - BPA & phthalates
- Results for Education/Prevention Activities

Urine Analytes

Analyte	General Population*	High As Area	Pyrethroid Exposure Survey & Testing (PEST)	Low Income Survey & Testing (LIST)*
1. Total arsenic + 12 metals	X	X		
2. Speciated arsenic	X	X		
3. Creatinine	X	X	X	X
4. Pesticides				
pyrethroid metabolites (3-PBA, DCCA, 4F-3PBA, DBCA)	X		X	X
OP metabolite (TCPy)	X			X
bifenthrin metabolites	X		X	
5. BPA and Phthalates	X			X

* Indicates 5 year storage of samples
 Green indicates non-CDC funding for lab analysis

New Lab Capacity

METHODS

1. Total arsenic and 12 metals
 - As, Ba, Be, Cd, Cs, Co, Pb, Mo, Pt, Sb, Tl, W, U
2. Speciated arsenic
 - AB, AC, DMA, MMA, As III, As V
3. Creatinine
4. Pesticide metabolites
 - Pyrethroids
 - 3-PBA, 4-F-3-PBA, trans DCCA [*cis DCCA still being looked into*], DBCA
 - Organophosphate (TCPy)
5. Bisphenol A and Phthalates
 - MEP, MiBP, MEHHP, *MCNP still being looked into*, MBP, MEOHP, MCOP, MBzP, MECPP, MEHP

INSTRUMENTS

1. ICP/DRC/MS and ICP/MS
2. HPLC/ICP/DRC/MS
 - HPLC part added for speciation = new lab capacity
3. LC/MS/MS
4. LC/MS/MS
5. LC/MS/MS (new Agilent 6430 with quaternary pump and thermostat controlled autosampler = new lab capacity)

New BPA & phthalates method

WA State PHL BPA & Phthalate Metabolite Combo Method

- INITIAL METHOD DEVELOPMENT
- CURRENT VALIDATED METHOD
- FUTURE DEVELOPMENT WORK FOR METHOD IMPROVEMENT

Comments for each Stage of Method Development

- GC/MS vs. LC/MS/MS; Thermo Betasil Phenyl vs. Synergi Polar RP Columns; Binary vs. Quaternary Pump; MRM vs. Dynamic MRM Acquisition
- LC/MS/MS with Quaternary pump gradient, Dynamic MRM, 10 μ L injection, and 4°C autosampler temperature through the Synergi Polar RP column. BPA plus 10 phthalates.
- SPE (Solid Phase Extraction) Clean up; increased injection volume; Column gradient or temperature changes.

Differences Between WA PHL and UW Combo Methods

WA State PHL Combo Method

- Agilent 6430 system
- Autosampler chilled to 4°C
- 10µL Injection size
- Includes MCNP & MCOP
- 1 Matrix blank & 3QC levels in urine at low, medium, and high points of calibration curve run before & after the batch of 25 samples.

UW Combo Method

- Agilent 6410 system
- Autosampler at ambient temperature
- 50µL injection size
- Includes MCPP & MMP
- 2 Matrix blanks & 4 matrix spikes at 100ppb run with each batch of 40 samples along with a mid-level calibration standard (aqueous) injected at 12 sample intervals during the run.

WA Tracking Network Data

- General population data available on WA Tracking Network Portal
- Arsenic, lead, cadmium, TCPy and 3-PBA
- Future posting of BPA and phthalates



Washington Tracking Network

[WTNhome](#)

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Welcome to the Washington Tracking Network (WTN). We are working to improve public health by delivering science-based information on health and the environment where we live, work, and play. We are currently improving our website to better serve the public and our partners, please check back often for new topics, data, and content.

Environmental Exposure



- [Air Quality](#)
- [Biomonitoring](#)
- [Drinking Water](#)
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Health Outcomes



- [Asthma](#)
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Community



- [Population Characteristics](#)



Washington State Department of Health

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WTNhome

Environmental and Health Information Resources What's New

WTN Home >> Biomonitoring Secure Access Help Definitions FAQs Index

WTN Biomonitoring Query Page

Measure

- Arsenic in urine
- Arsenic in urine**
- Cadmium in urine
- Lead in urine
- Antimony in urine
- Barium in urine
- Beryllium in urine
- Cesium in urine
- Cobalt in urine
- Molybdenum in urine
- Platinum in urine
- Thallium in urine
- Tungsten in urine
- Uranium in urine
- Pyrethroid metabolite (3-PBA) in urine
- Chlorpyrifos metabolite (TCPy) in urine

Welcome to the WTN Portal Query Page. The "Measure" drop down lets you select specific data within this topic area. When you select a measure from the drop down list, the query options under it will update. Query options differ among measures as needed to best display data. You can query the data to be presented as creatinine-corrected, a method that accounts for differences in the dilution of people's urine samples.

After selecting the query options, click "Submit Query". Resulting data will display in a chart and table.

Department of Health Resources

- Washington Environmental Biomonitoring Survey
- Biomonitoring map
- Additional Resources**
- CDC environmental chemical summaries
- CDC ToxFAQs

Dataset Notes

Information About the Data

The Washington Environmental Biomonitoring Survey (WEBS) was created in 2009 to increase biomonitoring capacity at the Public Health Laboratories and to find out what levels of environmental chemicals are in people's bodies.

During May 2010 – June 2011, WEBS staff visited a representative sample of households around Washington State. We collected:

- Urine samples from 1422 participants ages 6 and older,
- Tap water samples from 498 households,
- Questionnaire information that helps to explain potential exposure sources.

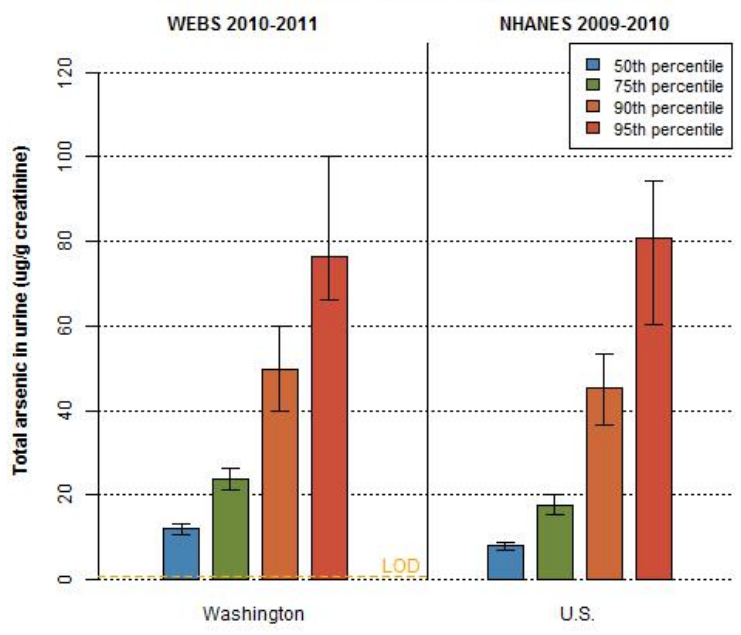
This dataset contains summary statistics for the urine results (tested for 15 chemicals or metabolites), tap water results (tested for 6 environmental chemicals) and questionnaire responses.

The urine sample results are available as raw and "creatinine-corrected" concentrations. "Creatinine-correction" is often used for comparing groups, because it accounts for natural fluctuations in the body's dilution of urine. We analyzed the urine samples for:



[Washington I](#)

Total arsenic in urine, Washington and U.S. levels



	n	50th pctl.	75th pctl.	90th pctl.	95th pctl.
WEBS	1419	11.9 (10.8-13.3)	23.8 (21.2-26.3)	49.6 (40-59.8)	76.3 (66.2-100)
NHANES	2860	7.9 (6.98-8.97)	17.6 (15.4-20.2)	45.2 (36.6-53.3)	80.8 (60.5-94.4)

Total Arsenic in Urine (Creatinine-Corrected), Comparing WA and U.S. Levels

Derivation

Year 5 Activities

- General Population
 - Analyze BPA/phthalates (425 samples)
 - Data analysis
- PEST Study
 - Complete data analysis
 - Report results to participants and WSPMA
 - Integrate results into WSU Continuing Education
- UW Dairy work study
 - Analyze urine samples for pyrethroid metabolites
- LIST Study
 - Complete recruitment
 - Analyze urine samples for pesticides, BPA and phthalates
 - Data Analysis
- Revise webpage
- New data on WTN
- Journal articles
- Plan/prepare grant application

New Grant Funding

- FOA expected in early 2014
- Emphasis on regional biomonitoring
- Funding level unknown
- Letters of support needed
- Staffing changes