

ASTHO *Connects*

A virtual learning series for public health leaders.

State Uses of the PFAS Exposure Assessment Technical Tools

8/6/2019

ASTHO *Connects*

A virtual learning series for public health leaders.

Poll Question #1

Today's Speakers



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New York State Department of Health



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State Epidemiologist

Pennsylvania Department of Health

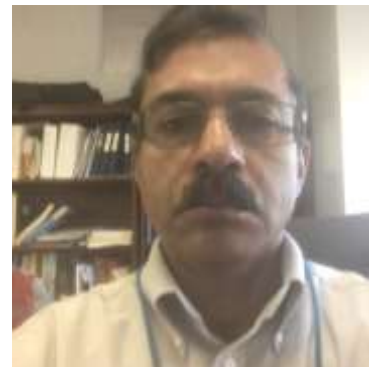


Karen Wilson

Research Scientist, Community Exposure Research Section

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Department
of Health

Westhampton Beach / Quogue, NY PFAS Exposure Assessment

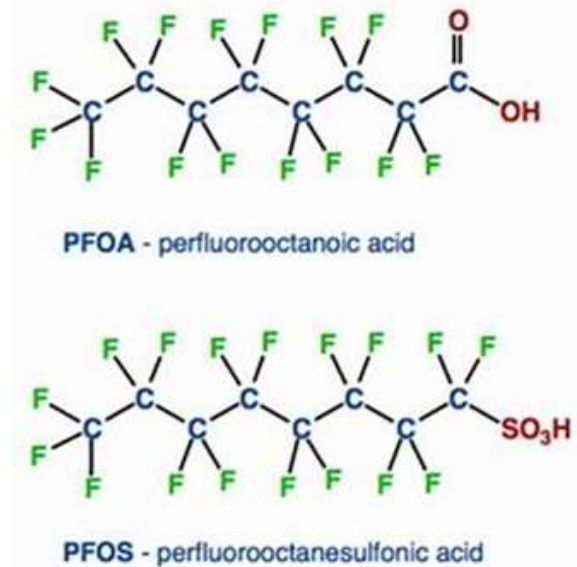
Using CDC/ATSDR's PFAS Exposure Assessment Technical Tools

New York State Department of Health
Center for Environmental Health

Background

Background: What are PFAS

- Perfluoroalkyl and Polyfluoroalkyl Substances
 - Include more commonly known PFAS, such as PFOA, PFOS, PFHxS along with 1000s of others
- Human-made
 - In use since the 1940s
 - Voluntarily phased out in 2000s
- Persistent in the environment
 - Found in animals around the world
- Some have a long half-life
 - PFOA – 2 to 4 years
 - PFOS – 5 to 6 years



Background: PFAS - Uses

- Firefighting foam
- Non-stick cookware
- Stain, water, grease resistant coatings
 - Clothing
 - Carpeting
 - Furniture
- Food packaging
- Paints, varnishes, sealants
- Ski wax

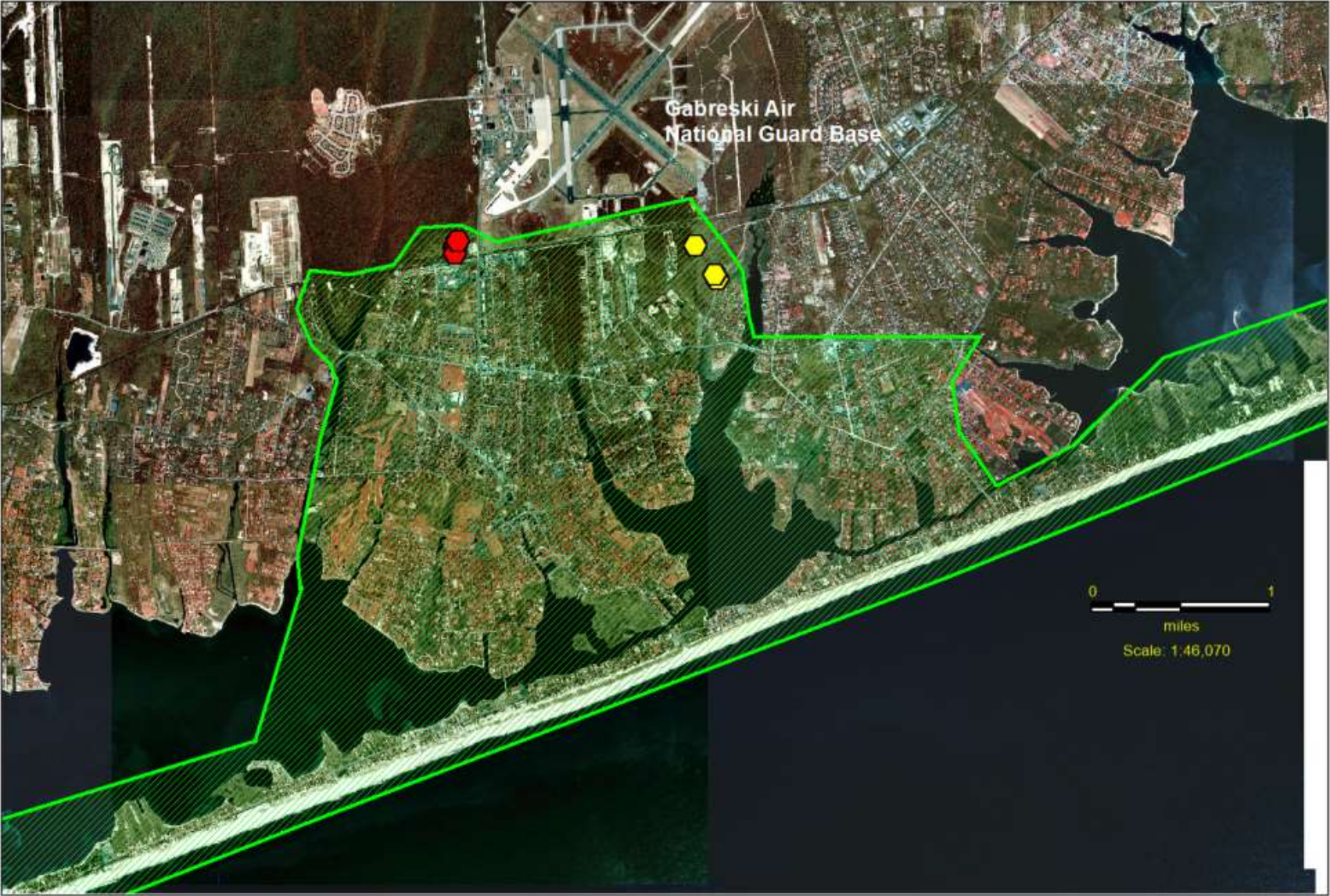


Background: PFAS and People's Health

- **Elevated cholesterol**
- **Increased risk of thyroid disease**
- **Decreased immune system response**
- **Decreased birth weight**
- **Decreased fertility**
- **Increased hypertension during pregnancy**

Background: Gabreski Air National Guard Base

- Gabreski Air National Guard Base (a former DOD site) lies immediately to the north of the Westhampton Beach & Quogue
 - Firefighting foam containing PFOS was used on the base for firefighting and fire training exercises
- In November 2015 two public drinking water wellfields in the area were found to have high levels of PFOS.
 - Meetinghouse Rd wells – 2,400 ppt (well #19)
 - Gus Guerra wells – 550 ppt (well #2)
- Wells were taken out of service
- It was not known how long levels had been this high
 - Nor how extensively the water was distributed



Contaminated public drinking water wells

- Gus Guerrero
- Meetinghouse Road

Area thought to receive contaminated drinking water

- ▨ Study Area

Background: Westhampton Beach/Quogue Community

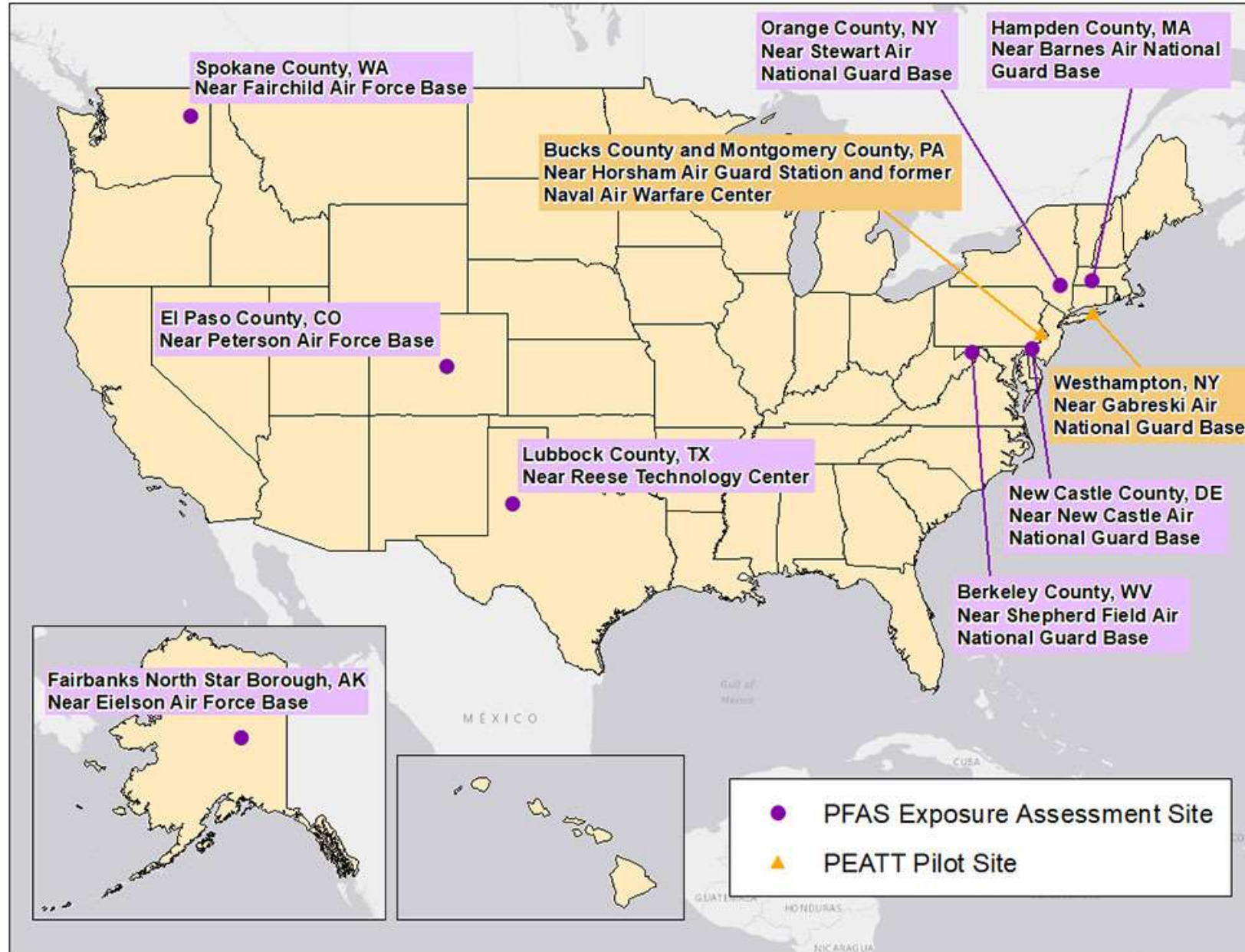
- SCWA estimated 4,250 service connections within this study area
 - However, 70% of homes in the area are seasonally occupied homes
- 2010 Census estimates
 - 3,500 year round residents in 1,400 households
- Previously, SCWA identified ~65 private well owners in the area
 - In 2017 NYSDOH offered them water and blood testing
 - Water results for PFOS ranged from ND (~70%) to 1,600 ppt
 - Serum results for PFOS ranged from <3 ug/L to >80 ug/L

PFAS Exposure Assessment Technical Tools (PEATT)

- A set of tools developed by ATSDR/CDC to help state and local health departments conduct PFAS exposure assessments
 - Includes
 - Study design considerations
 - Survey questions
 - Examples of invitation and results letters
 - Communication materials

Goals:

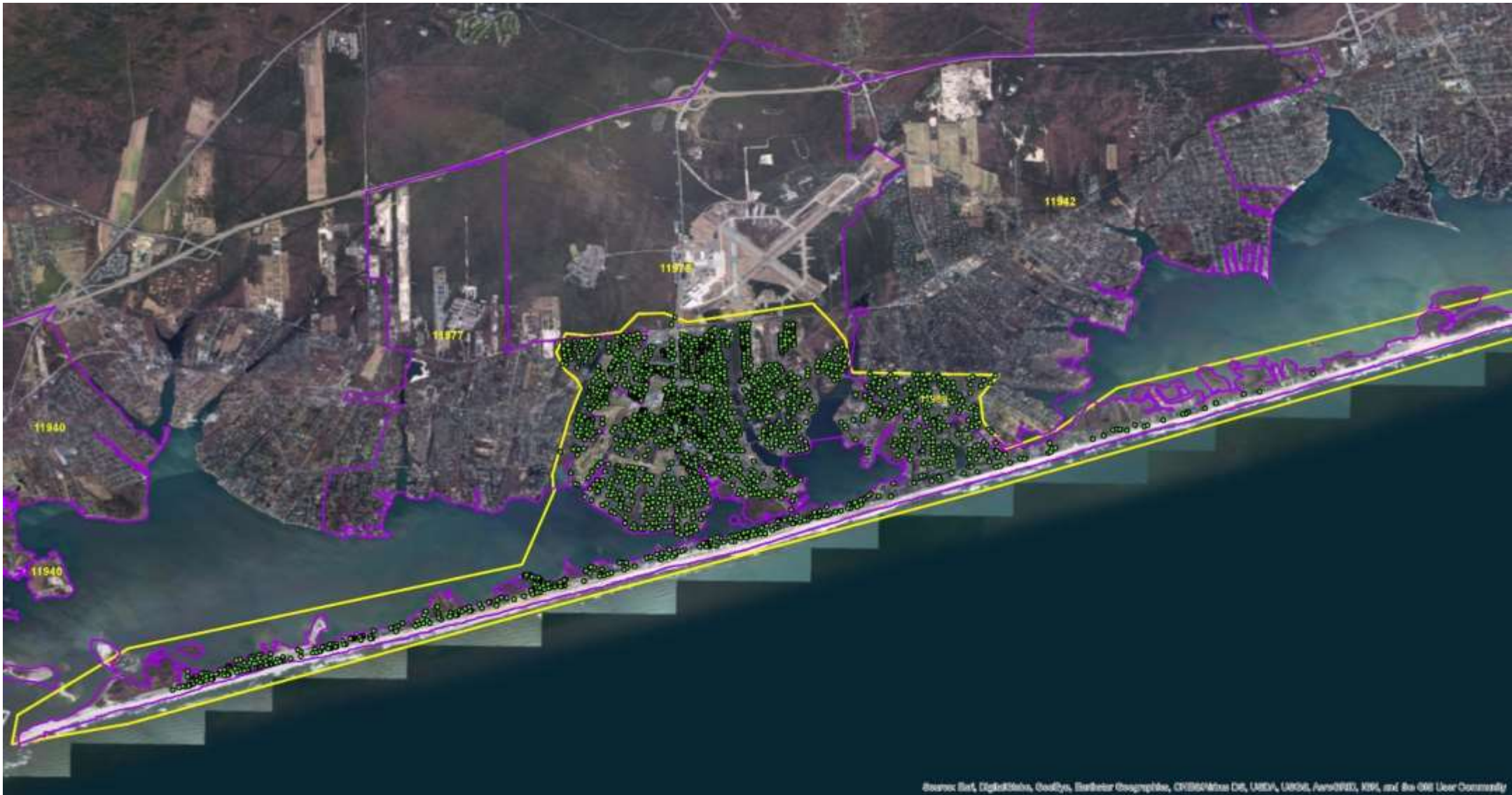
- Use CDC/ATSDR's PFAS Exposure Assessment Technical Tools (PEATT) to evaluate exposure to PFAS in the Westhampton Beach/Quogue community
- Evaluate components of the PEATT and provide feedback to ASTHO and ATSDR/CDC



Methods

Sample selection:

- Using the PEATT (and Census information) we determined that ~150 participants in 60 households would be needed to complete the assessment
- Households in the study area were identified a using commercially available database - from *ReferenceUSA*
 - Other options considered
 - Suffolk County Water Authority billing address records
 - Real Property (Tax) records
- Commercial data source had some limitations
 - Area with no postal delivery
 - Missing records



Invitation package



Department
of Health

ANDREW M. CUOMO
Governor

HOWARD A. ZUCKER, M.D., J.D.
Commissioner

SALLY DRESLIN, M.S., R.N.
Executive Deputy Commissioner

DATE

Last Family
Street
City, State Zip

Dear Last Family,

You are invited to be a part of a study that will measure the levels of perfluorooctane sulfonic acid (PFOS) and other per- and poly-fluoroalkyl substances (PFAS) in your blood. The New York State Department of Health is trying to determine the level of PFAS in the blood of people who may have consumed contaminated drinking water while living in the Westhampton Beach and Quogue areas. The source of the contamination is thought to be firefighting foam used at the Gabreski Air National Guard base for fire-fighting, fire training, and fire suppression systems. The contaminants made their way into the groundwater in the area and subsequently into several wells that supply drinking water to the area. The study will focus on year-round residents and will consist of two parts:

- First, NYSDOH staff will ask you to answer a few questions; the questionnaire should take less than 20 minutes to complete.
- Next, you will be given a blood test order to have your blood drawn at the Christiane & Richard Hiegel Healthcare Center in Westhampton Beach.
- Each participant in your household will receive a \$50 gift card as compensation for their time.
- Results of the blood test will be mailed to you in approximately 4 to 6 weeks

If you would like to participate, please call 518-402-7950.

Participation in this program is voluntary and up to each member of the household. Enclosed is more information about the study and information sheets on blood testing from the NYSDOH and PFAS from the federal Agency for Toxic Substances and Disease Registry. You can find additional information about these chemicals on the Department's webpage at www.health.ny.gov/DrinkingWaterResponse.

If you have any questions or concerns about the study, please call the Department at 518-402-7950.

Sincerely,

Steven Forand, M.S.
Bureau of Environmental and Occupational Epidemiology
New York State Department of Health



Department
of Health

ANDREW M. CUOMO
Governor

HOWARD A. ZUCKER, M.D., J.D.
Commissioner

SALLY DRESLIN, M.S., R.N.
Executive Deputy Commissioner

Information for participants about the study

This study is called an exposure assessment. The main goal for this exposure assessment is to measure PFOS and other PFAS blood levels in residents of the Westhampton Beach and Quogue areas, who were exposed to contaminated drinking water. The New York State Department of Health (NYSDOH) will conduct this exposure assessment from April through June 2018.

Procedures, risks, and benefits of our study to help you decide if you will participate.

Procedures for the Exposure Assessment

First, we will ask you to answer a few questions; the questionnaire should take less than 20 minutes to complete. We will also give you a blood test order to have your blood drawn at the Christiane & Richard Hiegel Healthcare Center in Westhampton Beach. A phlebotomist at the Healthcare Center will draw a small amount of your blood for testing. Only staff at the Healthcare Center and NYSDOH project staff will be able to identify whose blood the sample is from (and only NYSDOH staff will know the results). The Healthcare Center will then send your blood sample to the Wadsworth Center Laboratories at the NYSDOH to measure the levels of PFAS. There will be no charge to you for the blood draw or the laboratory analysis. Each participant in your household will receive a \$50 gift card as compensation for their time.

At the completion of the exposure assessment, NYSDOH will mail your blood test results to you at the address you provided on the questionnaire. If you would like to talk with NYSDOH staff about your results, one working on the exposure assessment will be available to you free of charge. Any blood that is not needed for the measurements will be stored at the Wadsworth Center Laboratories. We will save the extra blood during this time in case the laboratory needs to repeat the test to check your results. Your blood samples will not be tested for any other chemicals or agents without your consent. Your PFAS level results (not including any information that would identify you personally) will also be used by the NYSDOH and the Centers for Disease Control and Prevention for long-term understanding of PFAS exposure in the general population.

What are PFAS?

Per- and Polyfluoroalkyl Substances (PFAS) are a large group of man-made chemicals that were used in a wide range of industries.

Use of PFAS has greatly decreased in the past 10 years, but you can still be exposed to PFAS that are in the environment (water, soil, air) and in consumer products (food, cleaning products, personal care products, paints, and more).

PFAS are widely found in the environment and can persist in the human body for years. Scientists are not sure about the health effects of human exposure to PFAS.

Why does the health department want to test my blood for PFAS?

We detected elevated levels of PFAS in the drinking water supply in your community. We want to determine the PFAS blood level of people exposed to the contaminated water.



Department
of Health

Invitation package

Perfluoroalkyl and Polyfluoroalkyl Substances (PFAS) Frequently Asked Questions

8/22/17

What are PFAS?

Perfluoroalkyl and polyfluoroalkyl substances (PFAS) are a large group of man-made chemicals that have been used in industry and consumer products worldwide since the 1950s.

- PFAS do not occur naturally, but are widespread in the environment.
- PFAS are found in people, wildlife and fish all over the world.
- Some PFAS can stay in people's bodies a long time.
- Some PFAS do not break down easily in the environment.



How can I be exposed to PFAS?

PFAS contamination may be in drinking water, food, indoor dust, some consumer products, and workplaces. Most non-worker exposures occur through drinking contaminated water or eating food that contains PFAS.

Although some types of PFAS are no longer used, some products may still contain PFAS:

- Food packaging materials
- Nonstick cookware
- Stain resistant carpet treatments
- Water resistant clothing
- Cleaning products
- Paints, varnishes and sealants
- Firefighting foam
- Some cosmetics



How can I reduce my exposure to PFAS?

PFAS are present at low levels in some food products and in the environment (air, water, soil etc.) so you probably cannot prevent PFAS exposure altogether. However, if you live near known sources of PFAS contamination, you can take steps to reduce your risk of exposure.

- If your drinking water contains PFAS above the EPA Lifetime Health Advisory, consider using an alternative or treated water source for any activity in which you might swallow water:
 - drinking
 - food preparation
 - cooking
 - brushing teeth, and
 - preparing infant formula
- Check for fish advisories for water bodies where you fish.
 - Follow fish advisories that tell people to stop or limit eating fish from waters contaminated with PFAS or other compounds.
 - Research has shown the benefits of eating fish, so continue to eat fish from safe sources as part of your healthy diet.
- Read consumer product labels and avoid using those with PFAS.



Agency for Toxic Substances and Disease Registry
Division of Community Health Investigations



Questions and Answers about PFOS Blood Testing

NEW YORK STATE
Department of Health

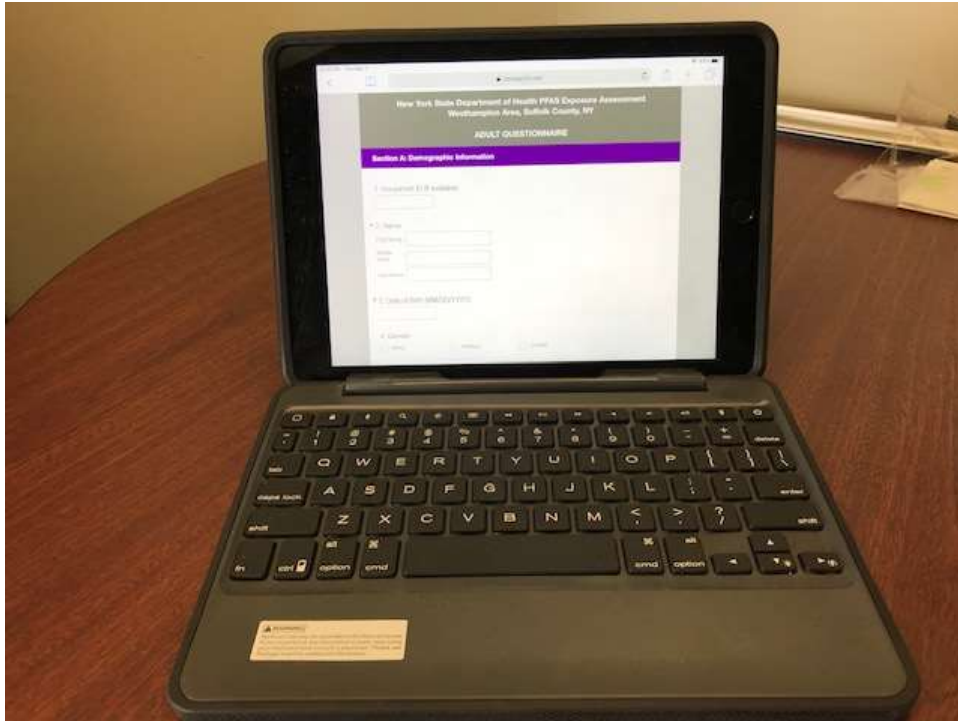
August 2017

NEW YORK STATE
Department of Health

Survey and informed consents

- **Participants were screened for eligibility**
 - Live in the study area year round
 - Have lived in study area two years
 - Served by public water
- **Field staff then visited homes to administer survey and collect consent/assent forms**
 - Used HIPAA compliant version of Survey Monkey to collect survey data electronically

Survey Collection



New York State Department of Health PFAS Exposure Assessment
Westhampton Area, Suffolk County, NY

ADULT QUESTIONNAIRE

Section B: Exposure Assessment

1. How long have you lived at your current address in the Westhampton area?

Years:

Months:

2. Please list all the homes in the Westhampton area served by the public water supply that you have lived in and the years (e.g. 1996 to 2003). **Please start with the most recent one.**

Current Address - Prior:

Address 1:

From:

To:

Address 2:

From:

To:

Address 3:

From:

To:

Additional Information:

The next questions are about the time **BEFORE** you knew about the PFAS in the drinking water and **BEFORE** you took steps to reduce your PFAS exposure:

3. During the time that you lived in a home in the Westhampton area served by the public water supply, on average how many 8 oz. cups of water or beverages prepared with tap water did you drink per day?

Note: 1 Gallon (128 oz.) = 16 cups; 1 quart (32 oz.) = 4 cups; 1 pint (16 oz.) = 2 cups

4. During the time that you lived in a home in the Westhampton area served by the public water supply, did you use water filters or treatment device(s) for your tap water?

Always Occasionally Never

5. Which water filter or treatment device(s) have you used to filter or treat the tap water you drink? (Select all that apply)

None, no filter or treatment device used

Reverse osmosis (RO) system

Water ionized water only

Other:

Whole house carbon filter

Under the sink carbon filter

Distillation

Faucet filter

Pitcher filter

No Filter

Don't Know

Refused to answer

No Appliance

Please specify the "Other"

6. During the time that you lived in a home in the Westhampton area served by the public water supply, did you drink bottled water at home?

Always Occasionally Never

7. How often do you eat "homegrown" vegetables? (Select one)

Never

Once/day or more

Less than once/week

Refused

Once/twice or more, but less than once/day

Don't know

8. How often do you eat fish locally caught from waterbodies in the Westhampton area? (Select one)

Never

Once/day or more

Less than once/week

Refused

Once/twice or more, but less than once/day

Don't know

Serum collection

- At the time of the interview participants were given a test order for blood testing at a local health care clinic



April 9, 2016

«Household_ID»

Westhampton/Quogue PFAS Exposure Assessment

The Department is currently performing blood testing as part of its investigation into the contamination of drinking water with Perfluorooctane sulfonic acid (PFOS) and other Per- and polyfluoroalkyl substances (PFAS). The following person has requested to participate in the blood testing program. I hereby order the clinical laboratory test identified below, subject to the conditions and instructions stated herein.

Individual to be tested:

«First_Name» «Last_Name»
DOB «Date_of_Birth»

Test Ordered:

Perfluorooctanoic acid (PFDA, PFOS, full panel, New York)
(PFDA, PFOS, PFBuS, PFHxS, PFHpA, PFNA, PFDeA, PFUA, PFDoA, PFOSA, and
Me-PFOSA-AcOH)

Special Instructions:

Blood should be drawn at your facility and serum referred to Wadsworth Center for testing. Serum is being tested as part of a collaboration between NYSDOH, CDC/ATSDR, and ASTHO to evaluate exposures to PFAS in the community and to develop a model that can be applied to communities nationwide.

End Date:

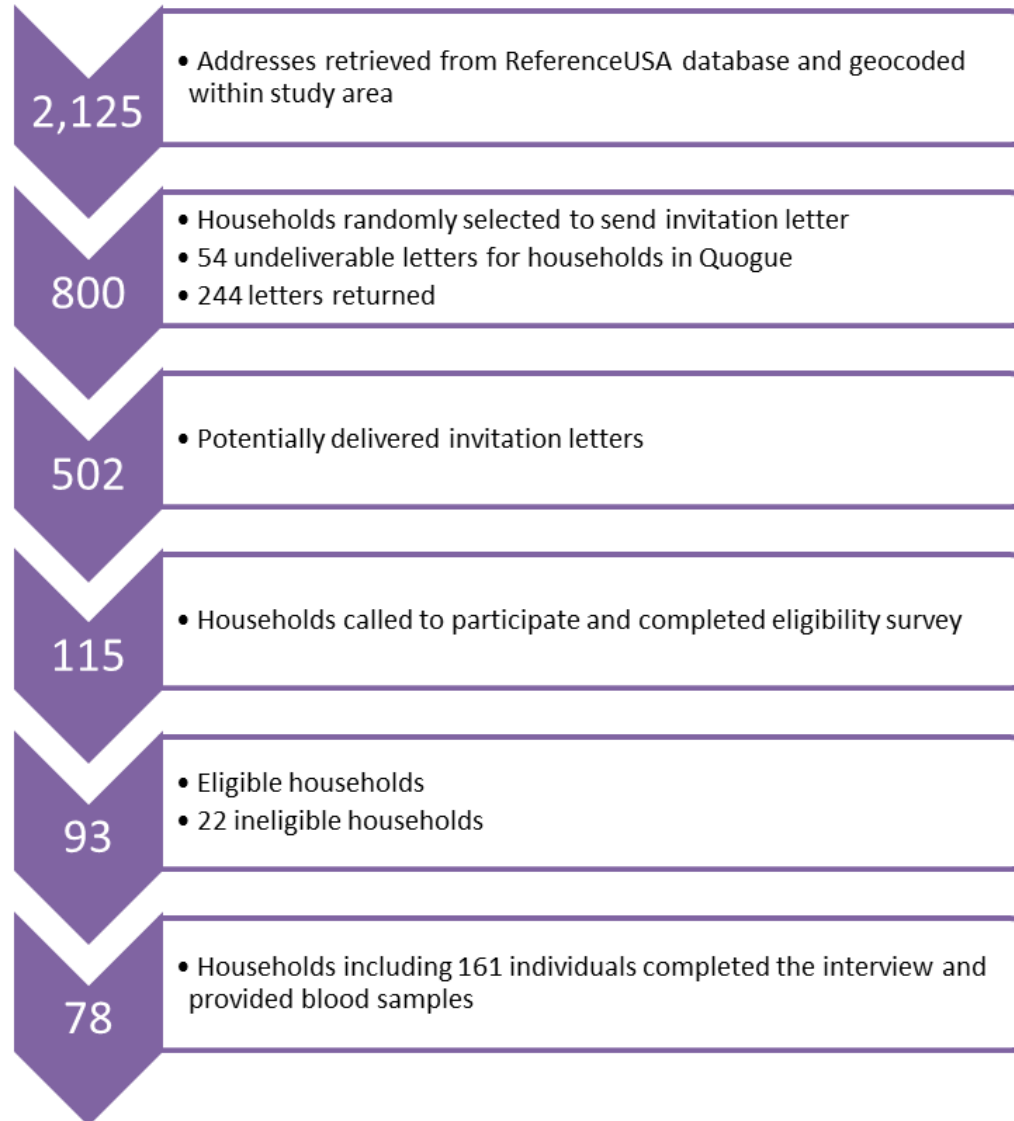
This order expires on May 15, 2016. Blood must be drawn prior to this date.

Barbara Wallace, M.D.
License Number 206847-1

Copies: State Plaza, Corning Tower, Albany, NY 12237 | health.ny.gov



Participant recruitment



Analysis and reporting

- **Samples were analyzed for 11 PFAS by NYSDOH's Wadsworth Center Labs**
- **Participants first received their individual results**
 - **Compared to NHANES**
- **Group and multivariate results sent out at later date**

Analysis and reporting



October 5, 2018

Participant ID Number: «Acc_ID»

«F_Name» «M_Name» «L_Name»
«Addr1» «Addr2»
«City», «State» «Zip»

Dear «F_Name» «L_Name»:

As part of the New York State Department of Health's (NYSDOH) Per- and Polyfluoroalkyl Substances (PFAS) exposure assessment in the Westhampton Beach and Quogue area, we are writing with information about your blood test. Blood samples were analyzed by the Wadsworth Center, NYSDOH's public health lab.

Enclosed please find an official lab report with your test results. A table showing your results and how they compare with the general U.S. population is also included. Once the study is complete we will send additional information describing results in your community as a whole.

In addition, this mailing contains an information sheet that lists the PFAS that were analyzed as part of your blood test. The information sheet also provides additional information about how to interpret your results and where to find additional information.

Your results only provide information about the level of PFAS in your blood. Because scientists and public health experts are still learning about PFAS and human health, your blood testing result does not indicate if a current illness is due to PFAS, or if you will experience illness in the future due to PFAS.

If you have questions about your blood test result, you can speak with your health care provider or with the New York State Department of Health Monday through Friday from 9 a.m. to 5 p.m. at 518-402-7950.

You can find more details and links to related studies at www.health.ny.gov/living/WaterResponse.

We appreciate the time and effort you have given to this study. Please do not hesitate to reach out to NYSDOH with any questions or concerns.

Sincerely,

Steven Forand, M.S.
Community Exposure Research Section
Center for Environmental Health

Barbara Wallace, M.D., M.S.P.H.
Division Director
Center for Community Health

Name: _____ Date sample taken: _____

RESULTS TABLE:
Your PFAS blood levels compared to what has been measured in the general U.S. Population age 12 and up

This column lists all the different chemicals (PFAS) measured in your blood.

This column shows the concentration found in your blood.

These columns show results from 2013-2014 for the general U.S. population - for comparison to your results.

These columns show results from 1999-2000 for the general U.S. population - for comparison to your results.

Type of PFAS	YOUR RESULTS in mcg/L (from the NYSDOH Wadsworth Center Lab)	U.S. population in mcg/L 2013-2014		U.S. population in mcg/L 1999-2000	
		Geometric Mean	95 th percentile	Geometric Mean	95 th percentile
PFBuS	Below LOD	*	**	*	**
PFDeA	Below LOD	0.18	0.70	*	0.60
PFDoA	Below LOD	*	0.20	*	**
PFHpA	Below LOD	*	0.20	*	0.70
PFHxS	2.95	1.35	5.60	2.13	8.70
PFNA	0.712	0.67	2.00	0.55	1.80
PFOA	1.89	1.94	5.57	5.21	11.9
PFOS	6.01	4.99	18.5	30.4	75.7
PFOSA	Below LOD	*	**	0.35	1.40
MEPFOSAAcOH	Below LOD	*	0.60	0.84	2.79
PFUA	Below LOD	*	0.50	*	0.40

mcg/L = micrograms per liter: A microgram per liter equals one part per billion, about one drop of liquid in an Olympic-size swimming pool.

Geometric mean: Geometric means are a way of calculating the middle level. They are used in science to prevent the highest and lowest values from distorting the average when the rest of the data are close together. In most published studies of blood concentrations, the geometric mean is used.

95th percentile: 95 out of every 100 people in the U.S. had results below this level.

LOD - limit of detection. Below LOD means no level was detected or it was detected at a level so low it could not be quantified.

* Geometric mean was not calculated because not enough people had results that were detectable.

** 95th percentile was below the limit of detection (LOD).

Source: The general U.S. population data are from the National Report on Human Exposure to Environmental Chemicals, Updated Tables, March 2018. Available at: <https://www.cdc.gov/exposurereport/>. Note: The most recent results are from 2013-2014, except PFOSA, with data from 2011-2012. General population results are also provided for 1999-2000 to show how levels have changed over time. (The PFBS levels are from 2003-2004, as PFBS was not tested for in 1999-2000.)



Information Sheet

October 2018

Per- and Polyfluoroalkyl Substances (PFAS) Exposure Assessment for the Westhampton Beach and Quogue area

What chemicals were measured in my blood?

A list is provided below of the PFAS measured in people's blood for this study. Full chemical names and acronyms are provided.

PFAS	Acronym
Perfluorobutane sulfonic acid	PFBuS
Perfluorodecanoic acid	PFDeA
Perfluorododecanoic acid	PFDoA
Perfluoroheptanoic acid	PFHpA
Perfluorohexane sulfonic acid	PFHxS
Perfluorononanoic acid	PFNA
Perfluorooctanoic acid	PFOA
Perfluorooctane sulfonic acid	PFOS
Perfluorooctane sulfonamide	PFOSA
2-(N-Methyl-perfluorooctane sulfonamido) acetic acid	MEPFOSAAcOH
Perfluoroundecanoic acid	PFUA

What was the source of information for the U.S. population comparison PFAS levels?

The Centers for Disease Control and Prevention (CDC) collects survey information and takes blood samples from about 2,000 people from across the country as part of a survey called NHANES (the National Health and Nutrition Examination Survey). CDC tests the blood samples for chemicals like PFAS as well as many other chemicals. The NHANES blood results are from a representative sample of members of the U.S. population ages 12 and older so they provide information about the levels of PFAS in the general U.S. population.

What do my results mean for my health?

These results tell you how much PFAS is currently present in your blood from all sources combined, such as water, food, and other environmental sources. You can compare your results with levels for people from across the United States.

Scientists are still learning about the health effects of human exposure to PFAS. Some studies in humans have shown that certain PFAS may affect the developing fetus and child, including possible changes in growth, learning, and behavior. In addition, PFAS may decrease fertility and interfere with the body's natural hormones, increase cholesterol, affect the immune system, and possibly increase cancer risk.

1

Physician Outreach

An Overview of Perfluoroalkyl and Polyfluoroalkyl Substances and Interim Guidance for Clinicians Responding to Patient Exposure Concerns

Interim Guidance
Revised 01/2018

Introduction

The purpose of this fact sheet is to provide interim guidance to aid physicians and other clinicians with patient consultations on perfluoroalkyl and polyfluoroalkyl substances (PFAS). It highlights what PFAS are, which chemicals fall into this category of substances, identifies health effects associated with exposure to various PFAS, and suggests answers to specific patient questions about potential PFAS exposure.

Background

What are PFAS?

PFAS, sometimes known as PFCs, are synthetic chemicals that do not occur naturally in the environment. There are many different types of PFAS such as perfluorocarboxylic acids (e.g., PFOA, sometimes called CB, and PFNA) and perfluorosulfonates (e.g., PFOS and PFHxS). PFAS may be used to keep food from sticking to cookware, to make sofas and carpets resistant to stains, to make clothes and mattresses more waterproof, and to make some food packaging resistant to grease absorption, as well as use in some firefighting materials. Because PFAS help reduce friction, they are also used in a variety of other industries, including aerospace, automotive, building and construction, and electronics.

Why are PFAS a possible health concern?

According to the U.S. Environmental Protection Agency (EPA), PFAS are considered emerging contaminants. An "emerging contaminant" is a chemical or material that is characterized by a perceived, potential, or real threat to human health or the environment or by a lack of published health standards.

PFAS are extremely persistent in the environment and resistant to typical environmental degradation processes. The pathway for dispersion of these chemicals appears to be long-range atmospheric and oceanic currents transport. Several PFAS and their potential precursors are ubiquitous in a variety of environments. Some long-chain PFAS bioaccumulate in animals and can enter the human food chain.

PFOS and PFOA are two of the most studied PFAS. Exposure to PFOA and PFOS is widespread and global. PFOS and PFOA also persist in the human body and are eliminated slowly. Both PFOS and PFOA can be found in blood, and at much lower levels in urine, breast milk and in umbilical cord blood.

PFOS and PFOA may pose potential adverse effects for human health given their potential toxicity, mobility, and bioaccumulation potential. The likelihood of adverse effects depends on several factors such as amount and concentration of PFAS ingested as well as the time span of exposure.

Routes of Exposure and Health Effects

What are the main sources of exposure to PFAS?

For the general population, ingestion of PFAS is considered the major human exposure pathway. The major types of human exposure sources for PFAS include:

- Drinking contaminated water.
- Ingesting food contaminated with PFAS, such as certain types of fish and shellfish.
- Until recently, eating food packaged in materials containing PFAS (e.g., popcorn bags, fast food containers, and pizza boxes). Using PFAS compounds has been largely phased out of food packaging materials.
- Hand-to-mouth transfer from surfaces treated with PFAS-containing stain protectants, such as carpets, which is thought to be most significant for infants and toddlers.

National Center for Environmental Health
Agency for Toxic Substances and Disease Registry

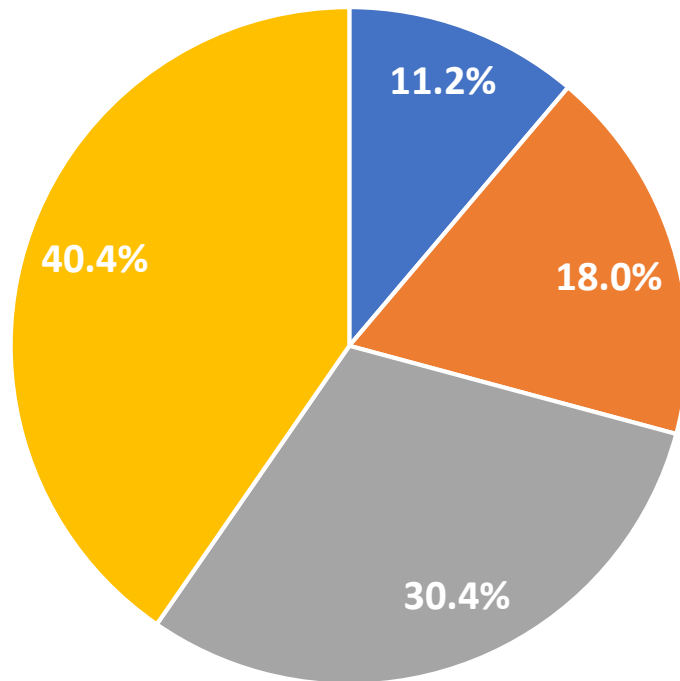


- Sent ATSDR's PFAS Clinician Guidance to all local physicians and practices
- Worked with Dr. Kenneth, Spaeth at *Northwell Health's Occupational and Environmental Medicine Center* to provide additional consultation for physicians

Results

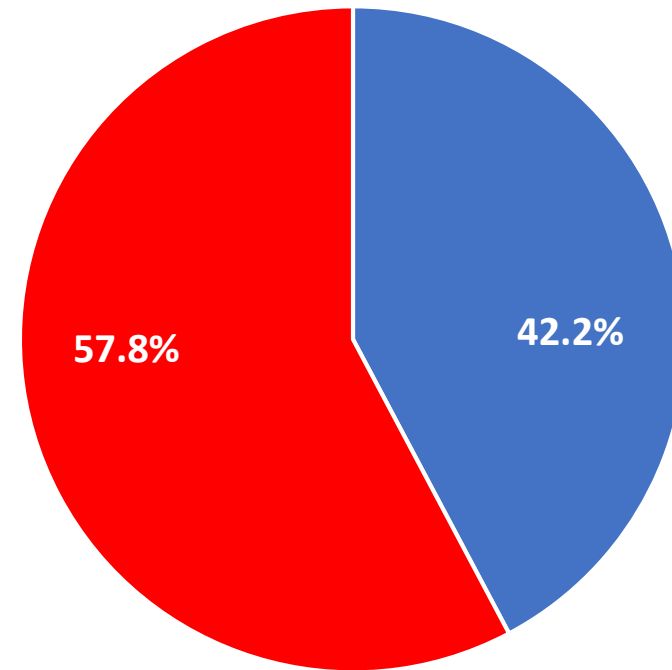
Demographics

Age Groups



■ 19 and under ■ 20-39 ■ 40-59 ■ 60 and older

Gender



■ Males ■ Females

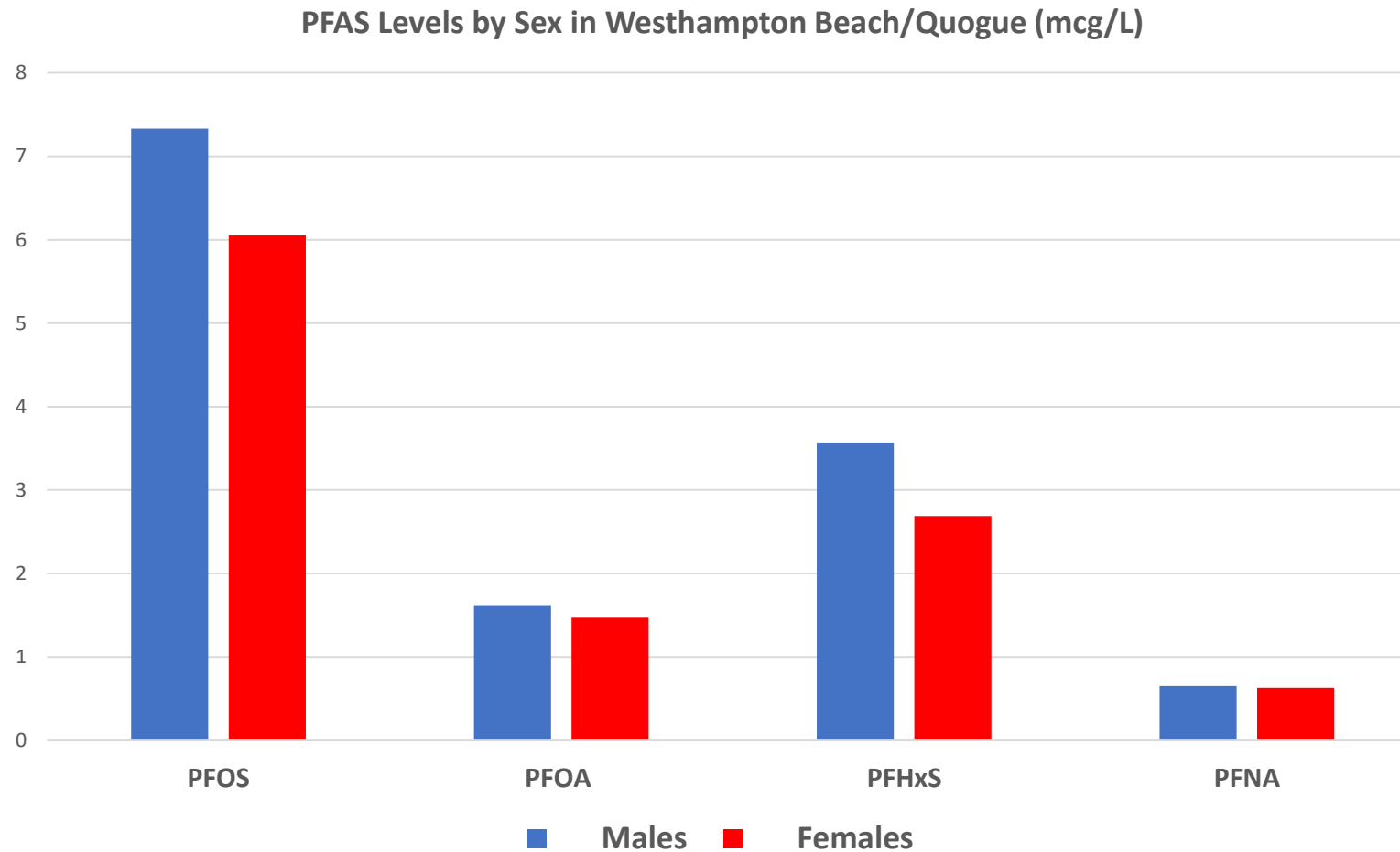
Results

PFAS blood levels in 161 Westhampton Beach/Quogue area residents and the general U.S. Population age 12 and up.					
PFAS	Westhampton Beach/Quogue			U.S. population (mcg/L) 2015-2016	
	% of samples with PFAS detected	Geometric Mean (mcg/L)	95 th percentile (mcg/L)	Geometric Mean (mcg/L)	95 th percentile (mcg/L)
PFBuS	-	*	**	*	**
PFDeA	9%	*	0.58	0.154	0.70
PFDoA	-	*	**	*	**
PFHxA	-	*	**	*	0.20
PFHxS	100%	3.03	12.26	1.18	4.90
PFNA	70%	0.64	1.42	0.577	1.90
PFOA	99%	1.54	3.48	1.56	4.17
PFOS	100%	6.56	18.37	4.72	18.30
PFOSA	-	*	**	*	**
Me-PFOA-AcOH	8%	*	0.63	*	0.60
PFUA	9%	*	0.59	*	0.40

* Geometric mean was not calculated because not enough people had results that were detectable.

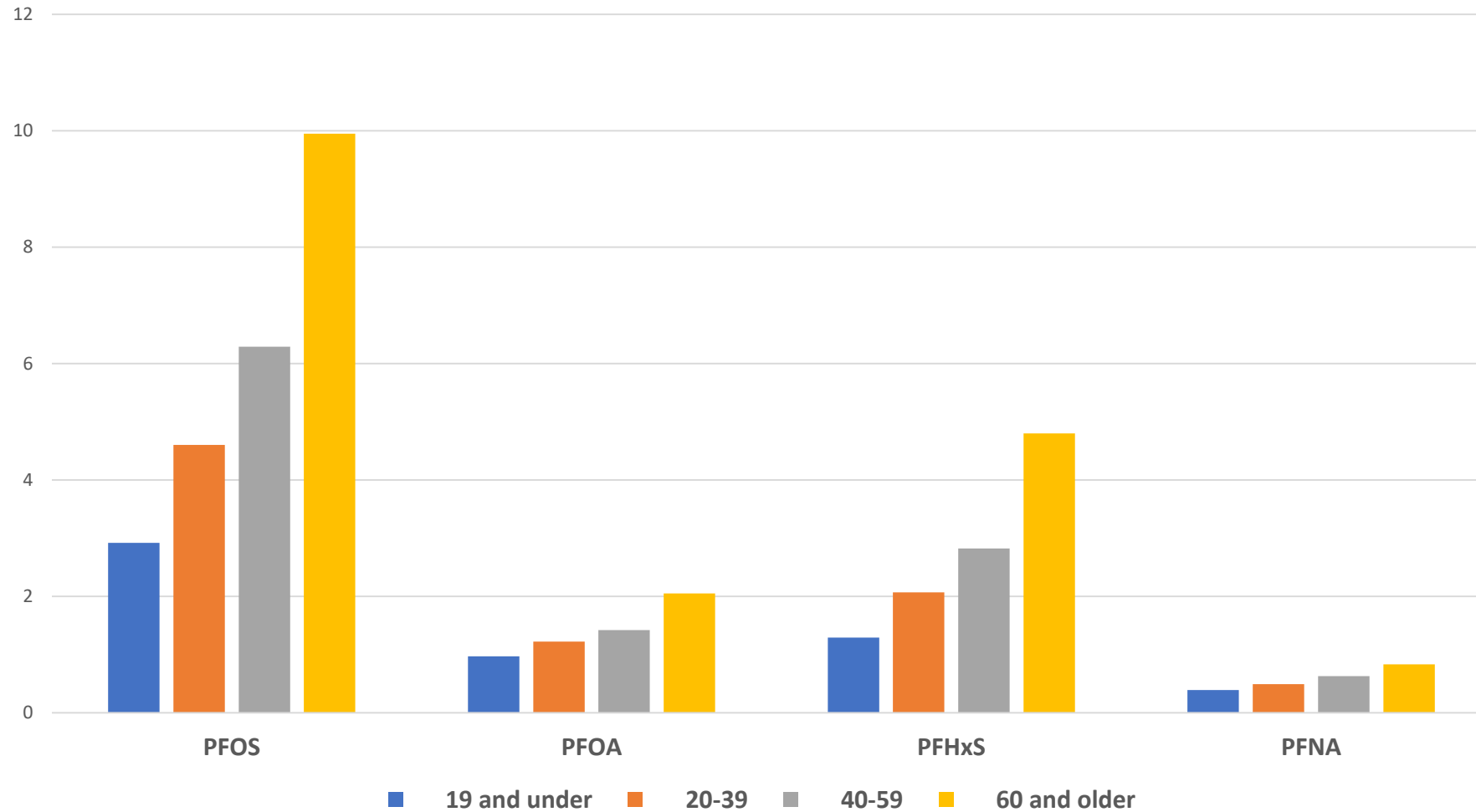
** 95th percentile was below the limit of detection (LOD).

Results



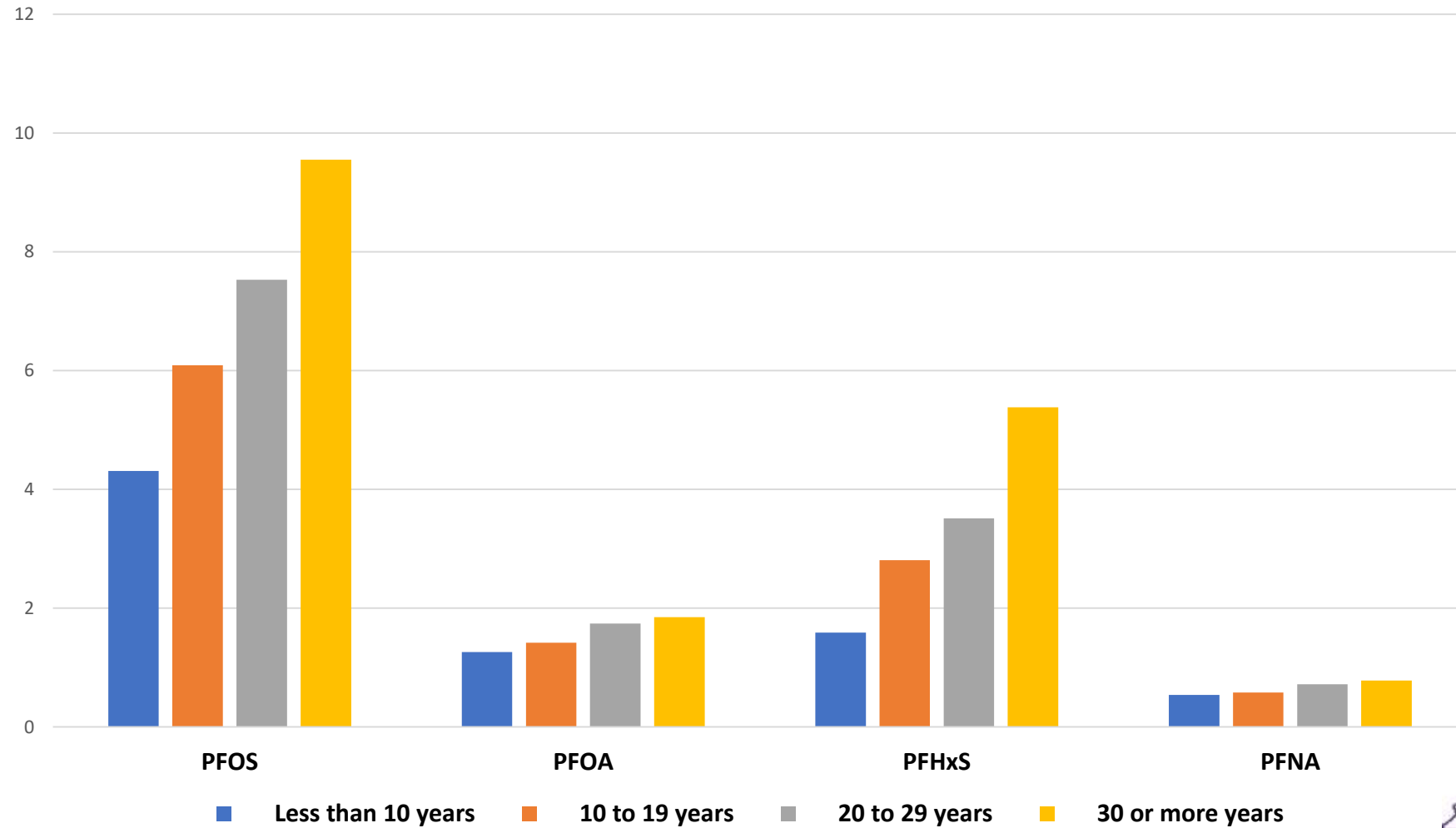
Results

PFAS Levels by Age Group (mcg/L)



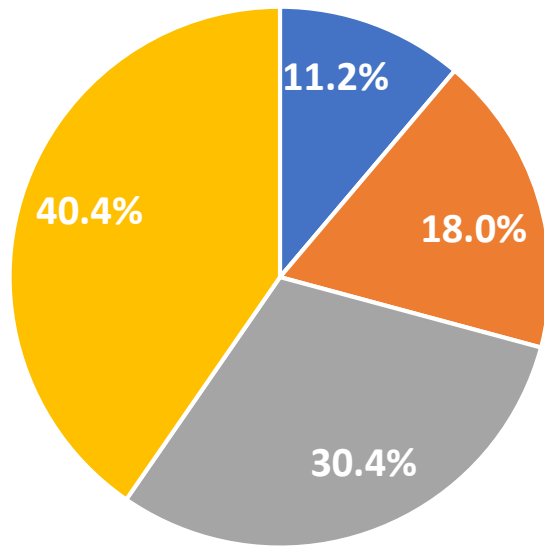
Results

PFAS Levels by Length of Residence (mcg/L)



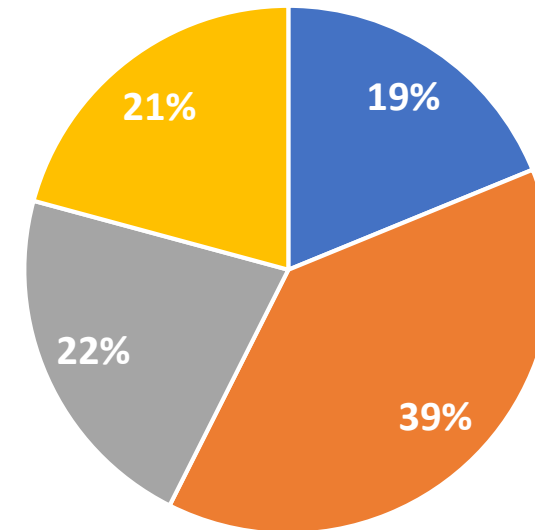
Demographics – Age and Length of Residence

Age Groups



■ 19 and under ■ 20-39 ■ 40-59 ■ 60 and older

Length of Residence



■ < 10 years ■ 10-19 years ■ 20-29 years ■ 30+ years

Results: PFOS and PFHxS levels by age

PFOS and PFHxS blood levels in Westhampton Beach/Quogue area residents and the general U.S. population by age group.					
Age group	Number of participants	PFOS 50 th percentile level (mcg/L) (95% Conf. interval)		PFHxS 50 th percentile level (mcg/L) (95% Conf. interval)	
		Westhampton Beach/Quogue	General U.S. population 2015-2016	Westhampton Beach/Quogue	General U.S. population 2015-2016
12-19 years	18	2.82† (2.28-3.35)	2.9 (2.7-3.3)	1.27† (0.92-1.61)	0.9 (0.7-1.2)
20-39 years	29	4.37 (3.61-5.13)	3.6 (3.3-4.1)	2.00* (1.49-2.50)	1.1 (0.9-1.2)
40-59 years	49	6.61 (5.23-7.98)	5.3 (4.6-6.3)	2.89* (2.07-3.70)	1.2 (0.9-1.4)
60 years and older	65	10.60 (8.86-12.34)	7.9 (7.0-9.3)	4.26* (3.07-5.45)	1.7 (1.5-2.0)

† Westhampton Beach/Quogue lowest age group was 7-19

* Significantly elevated above NHANES 50th Percentile

Results of Multivariate Model

- Age was the strongest predictor of PFOS and PFHxS levels
- Sex was also a significant predictor but to a lesser extent
- Length of Residence results were suggestive of an association but not all significant
- Fish consumption was found to be significantly associated with PFOS and PFHxS levels

Regression Coefficients

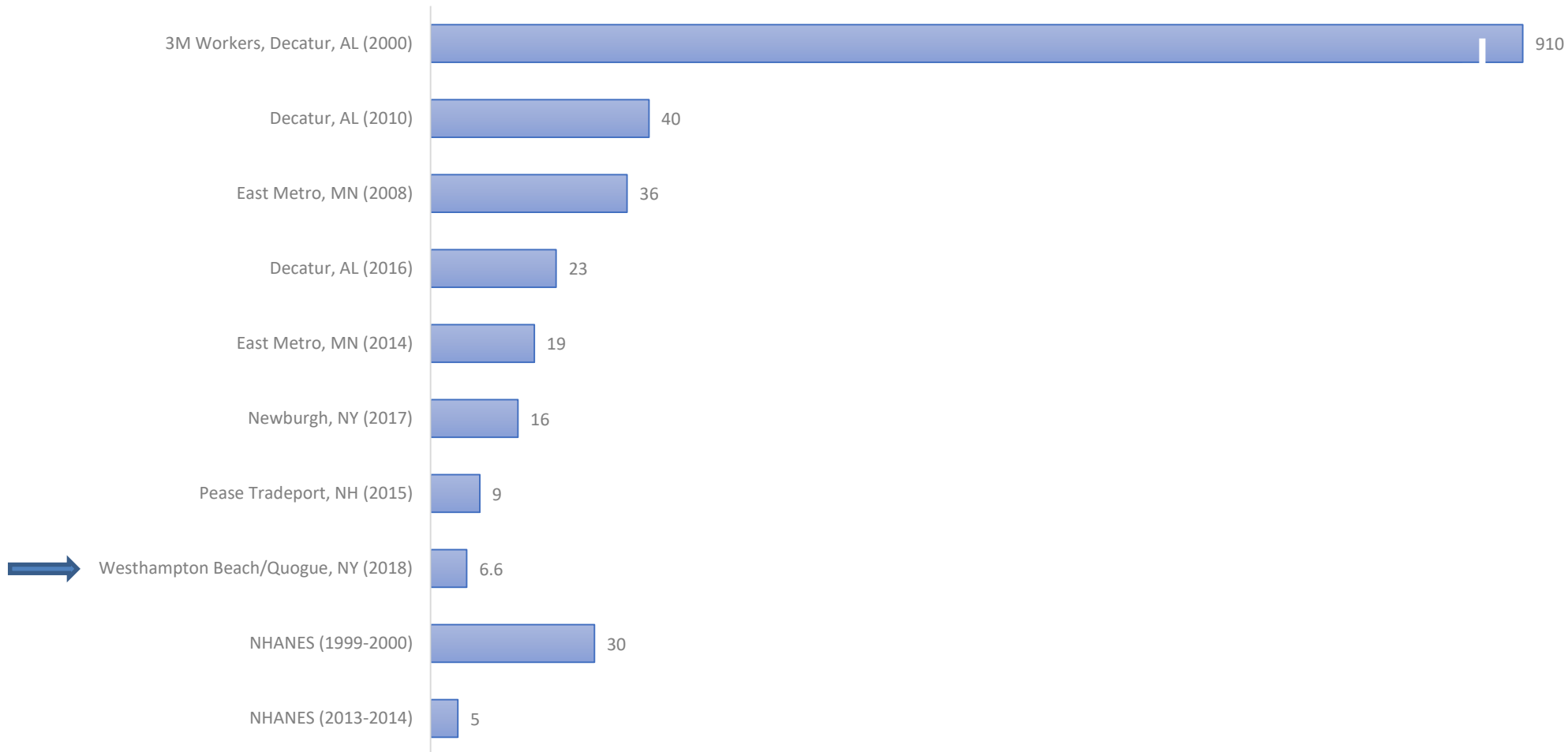
PFOS		
Parameter	Probt	exp_estimate
Intercept	<.0001	9.34292
AgeGroup 7-19 years	<.0001	0.33429
AgeGroup 20-39 years	<.0001	0.47111
AgeGroup 40-59 years	0.0010	0.65011
AgeGroup >=60 years	.	1.00000
gender Male	0.0422	1.18801
gender Female	.	1.00000
RLength <10 years	0.0082	0.67763
RLength 10 to 19 years	0.8704	0.98083
RLength 20 to 29 years	0.7842	0.96182
RLength 30+ years	.	1.00000
Ate locally caught fish	0.0465	1.18274
Never ate locally caught fish	.	1.00000

PFHxS		
Parameter	Probt	exp_estimate
Intercept	<.0001	4.97829
AgeGroup 7-19 years	<.0001	0.35751
AgeGroup 20-39 years	<.0001	0.46674
AgeGroup 40-59 years	0.0083	0.65717
AgeGroup >=60 years	.	1.00000
gender Male	0.0150	1.29864
gender Female	.	1.00000
RLength <10 years	<.0001	0.44013
RLength 10 to 19 years	0.1526	0.79628
RLength 20 to 29 years	0.1973	0.79173
RLength 30+ years	.	1.00000
Ate locally caught fish	0.0455	1.23684
Never ate locally caught fish	.	1.00000

Conclusions

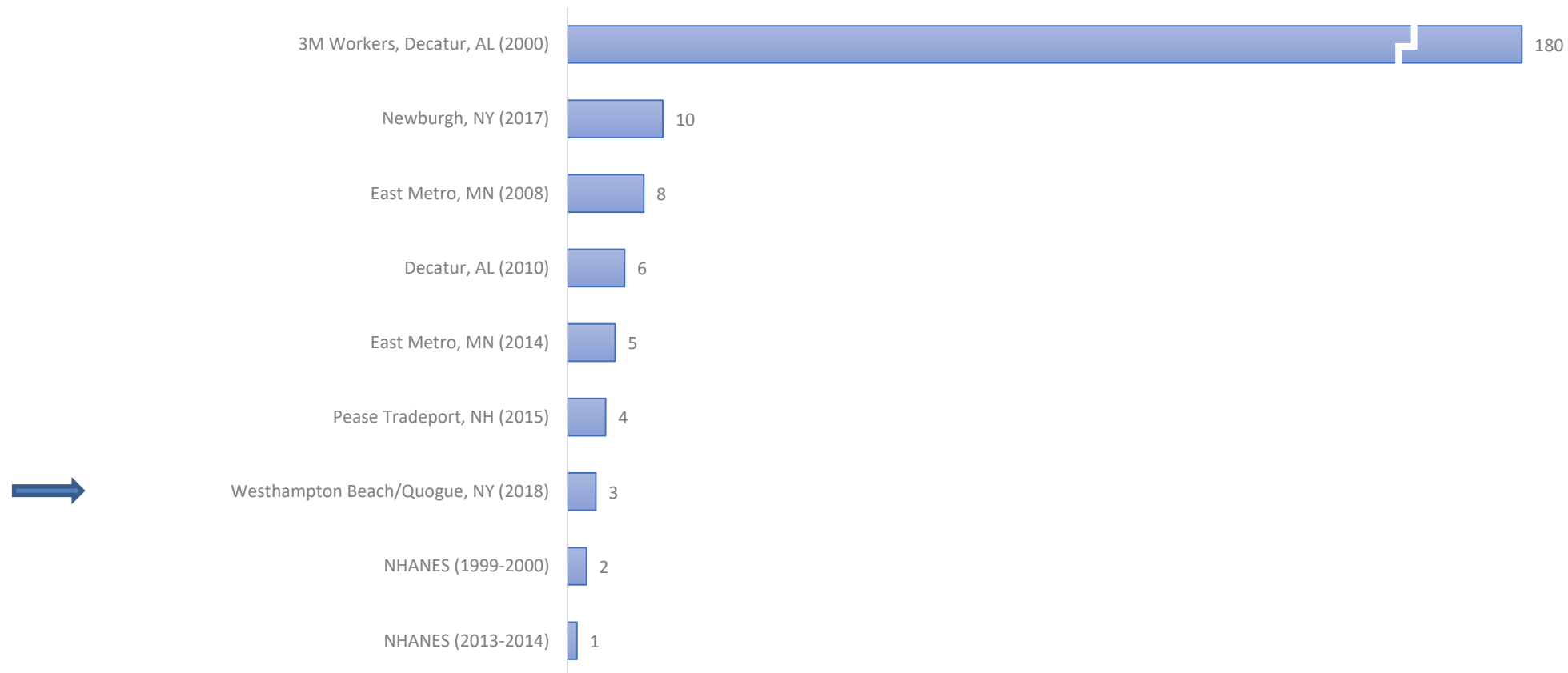
PFOS Serum Concentrations in Other Populations

Geometric Mean Serum Concentration of PFOS (mcg/L)



PFHxS Serum Concentrations in other Populations

Geometric Mean Serum Concentration of PFHxS (mcg/L)



Conclusions

- **Although we did see statistically significant elevations of PFOS and PFHxS in the community the excesses were small**
 - Age may have played a role
 - Fish consumption may have played a role
- **We don't really know how these levels compare to other New Yorkers and more specifically other Long Island residents**
 - Would need a NYS statewide biomonitoring program to determine this
- **In general, the results are not indicative of long-term, high-level exposure to PFAS in the Westhampton Beach/Quogue community**
- **A full report for the project is forthcoming and will be shared with participants and the community.**

Partners

- **ASTHO**
- **CDC/ATSDR**
- **NYSDOH's Wadsworth Laboratory**
- **Stony Brook University**
- **Stony Brook/Southampton Hospital**
 - **Hiegel Healthcare Center in Westhampton Beach**

Thanks – staff

Steve Forand
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Judy Liu

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Sarah Davis
Leila Esmailzada
Kelsey Reardon
Sam Yagudayev

<https://www.health.ny.gov/environmental/investigations/drinkingwaterresponse/>

Contact NYSDOH - beoe@health.ny.gov 518-402-7950

Community Level Biomonitoring for Per and Polyfluoroalkyl Substances (PFAS) in Pennsylvania

Sharon Watkins, PhD., Anil Nair, Ph.D., MPH.
Bureau of Epidemiology
Pennsylvania Department of Health

PEATT Pilot Project Webinar
August 6, 2019



Perfluoroalkyl and Polyfluoroalkyl Substances (PFAS)

- ▼ Man-made chemicals
- ▼ Used in protective surfaces and things that have water-repellant coatings
- ▼ PFAS-containing firefighting foam



EPA Health Advisory Levels

2009 - Provisional Health Advisory Levels (PHAL)

- 0.4 ug/L for PFOA and 0.2 microgram per liter (ug/L) for PFOS (400 and 200 parts per trillion, respectively)

May 2016 - Lifetime Health Advisory Level (LHAL)

- 70 parts per trillion or 0.07 ug/L for PFOS and PFOA combined.

PFOA - Perfluorooctanoic acid

PFOS - Perfluorooctanesulfonic acid

Background

- Former Naval Air Warfare Center (NAWC)-
Warminster Twp. Bucks County (840 acre site)
 - ▣ In operation from 1940s-1997
 - ▣ Firefighter training activities using foams containing PFAS



Background

NAWC

- 2013: PFAS detected in ground water
- 2014: all contaminated public wells taken out of service
- 2015: PFAS found in 93 out of 100 private wells within a 1-3 mile radius
- Private well owners were given bottled water

Background

- Former Naval Air Station Joint Reserve base and Horsham Air Guard Station (1,200 acre site)
 - In operation from 1920s-2011

Contamination in two public water systems

- 2014 - Five public wells were taken out of service
- 2016- EPA released LHAL, additional wells were taken out of service, private well owners were given bottled water



PFAS Exposure in Community

- Levels 21 times higher (1,440 ppt) than EPA's health advisory level (70 ppt) found in a municipal well in one PWS area
- Assumed to have been exposed for a long time - nearly 50 years
- Wide range of exposure:
 - Some municipal wells had no levels of PFAS
 - Some municipal wells much higher than national guideline

PEATT Pilot Project

- CDC/ATSDR has developed a toolkit to conduct biomonitoring for PFAS
- Pennsylvania was chosen for the pilot program to evaluate the toolkit
- Feedback from this project-
 - ▣ Will be used to improve the toolkit
 - ▣ Will support a larger, national study

Participant Selection

- Aimed to select 500 participants
- We mailed eligibility information form and invitation letter to 600 randomly selected households
- Eligibility form
 - ▣ How many in each household?
 - ▣ How many lived there prior to July 1, 2016?
 - ▣ How many willing to participate?

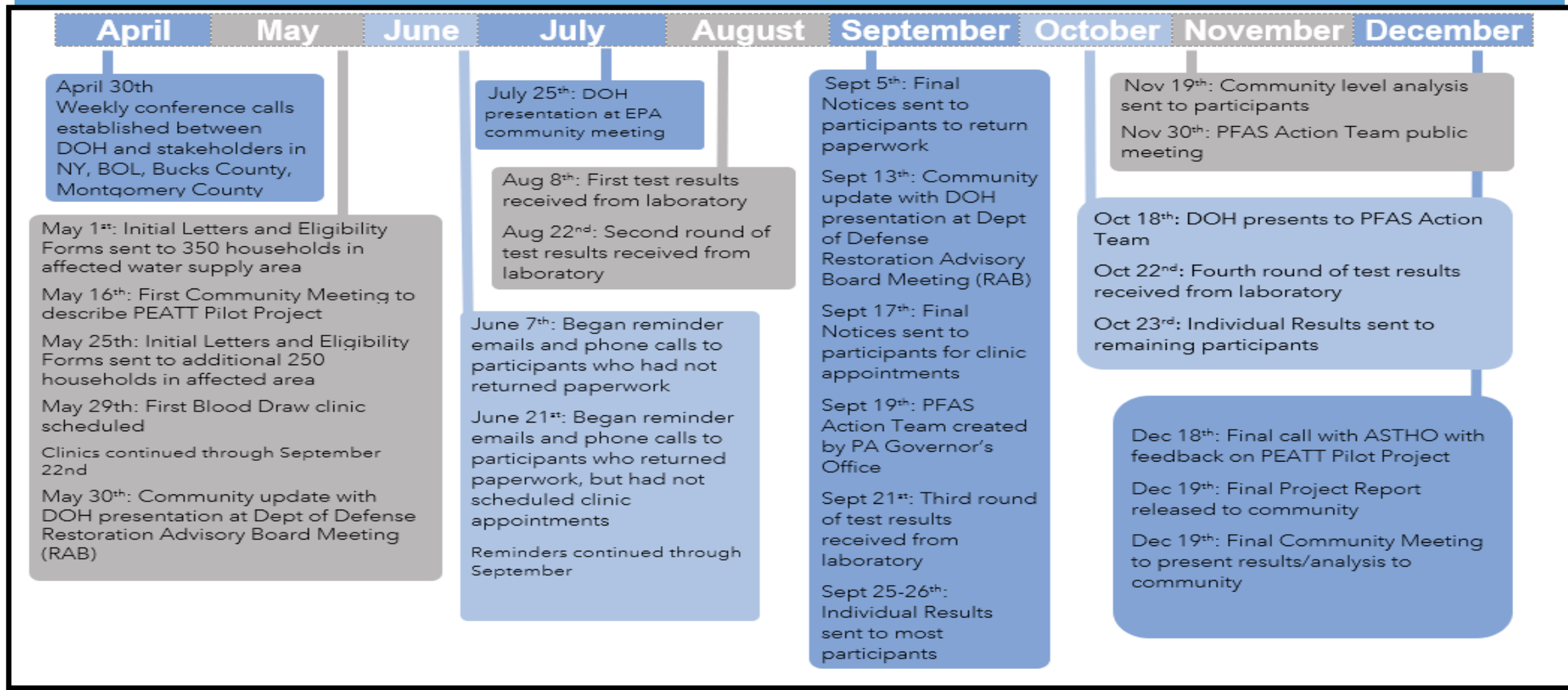
Participant Selection- Response Rates

- Total households contacted: 600
- Total households responded: 276
- Household level response rate: 46%
- Number of eligible participants identified: 584 (including 113 kids aged 3-17 years)
- Number of eligible participants who completed the questionnaire and the informed consent form: 305
- Number of eligible participants who completed paperwork AND provided blood samples: 235 – from 118 households
- Individual participation rate: 40% (235 out of 584)
- Household level participation rate: 19.6% (118 out of 600 contacted)

PEATT Pilot Project

- Weekly clinics in Bucks and Montgomery Counties to draw the blood samples
- From May through September 2018
- 235 samples obtained and sent to Wadsworth Laboratory in the New York State Health Department
- Wadsworth returned all results to DOH, and all 235 participants were notified of their individual results along with information on national and community averages

PEATT Pilot Project Timeline

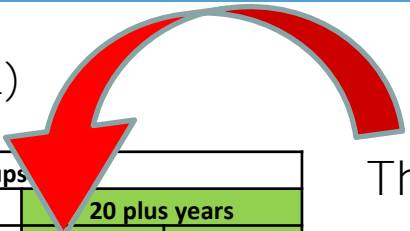


▶ Reading Individual Results (first letter)

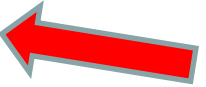
For an ADULT age 20 or older (unit: microgram/L)

PFAS chemicals measured in your blood	Concentration found in your blood	US Population - Age groups					
		3-11 years		12-19 years		20 plus years	
		Geometric mean	95th percentile	Geometric mean	95th percentile	Geometric mean	95th percentile
Perfluorooctanoic acid (PFOA)	3.52	1.92	4.19	1.66	3.47	1.98	5.60
Perfluorooctanesulfonic acid (PFOS)	9.60	3.88	11.00	3.54	9.30	5.22	19.50
Perfluorohexane sulfonic acid (PFHxS)	8.37	0.84	3.12	1.27	6.30	1.36	5.50
Perfluorononanoic acid (PFNA)	0.80	0.79	3.26	0.60	2.00	0.69	2.00
Perfluorobutanesulfonic acid (PFBuS)	ND	*	<0.10**	*	<0.10**	*	<0.10**
Perfluorodecanoic acid (PFDeA)	ND	*	0.37	0.14	0.40	0.19	0.80
Perfluorododecanoic acid (PFDoA)	ND	*	<0.10**	*	0.20	*	0.20
Perfluoroheptanoic acid (PFHpA)	ND	*	0.21	*	0.20	*	0.10
Perfluorooctane sulfonamide (PFOSA)	ND	*	<0.10**	*	<0.10**	*	<0.10**
2-(N-Methyl-perfluorooctane sulfonamido) acetic acid (MeFOSAA)	ND	*	1.02	*	0.60	*	0.60
Perfluoroundecanoic acid (PFUA)	0.95	*	0.28	*	0.20	*	0.50

Your number was in *italicized bold* if it exceeded the 95th percentile



This is the NHANES average



95 percent of pop. is below this number

ND or * means "non detect" - levels are so tiny they cannot be detected

Above results from NHANES 2013-2014, except PFOSA which is from 2011-2012.



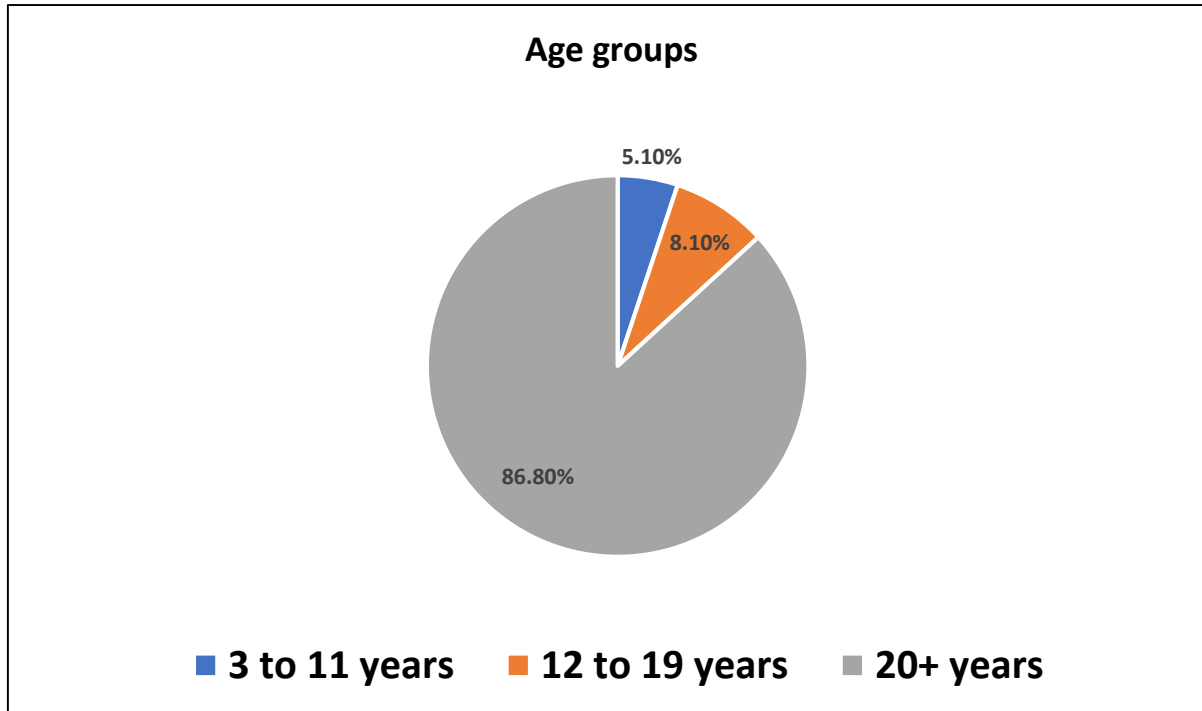
PEATT Project Demographics - Comparison

	Study Participants (%)	Community (%)	U.S. (%)
Age			
Under 12 years	5.1	14.9	15.8
12 to 19 years	8.1	10.9	11.2
20+ years	86.8	74.2	73.0
Sex			
Male	44.3	48.8	49.2
Female	55.7	51.2	50.8
Race/Ethnicity			
Hispanic or Latino	0	5.1	16.3
White	94.5	85.6	63.7
Black	0	3.0	12.2
Asian	0.4	4.8	4.7
Other	5.1	1.5	3.0
Education Level (18+ years old)			
Lower than College	20.6	34.7	40.5
Some College or more	74.2	65.3	59.5
Other	5.3	0.0	0.0

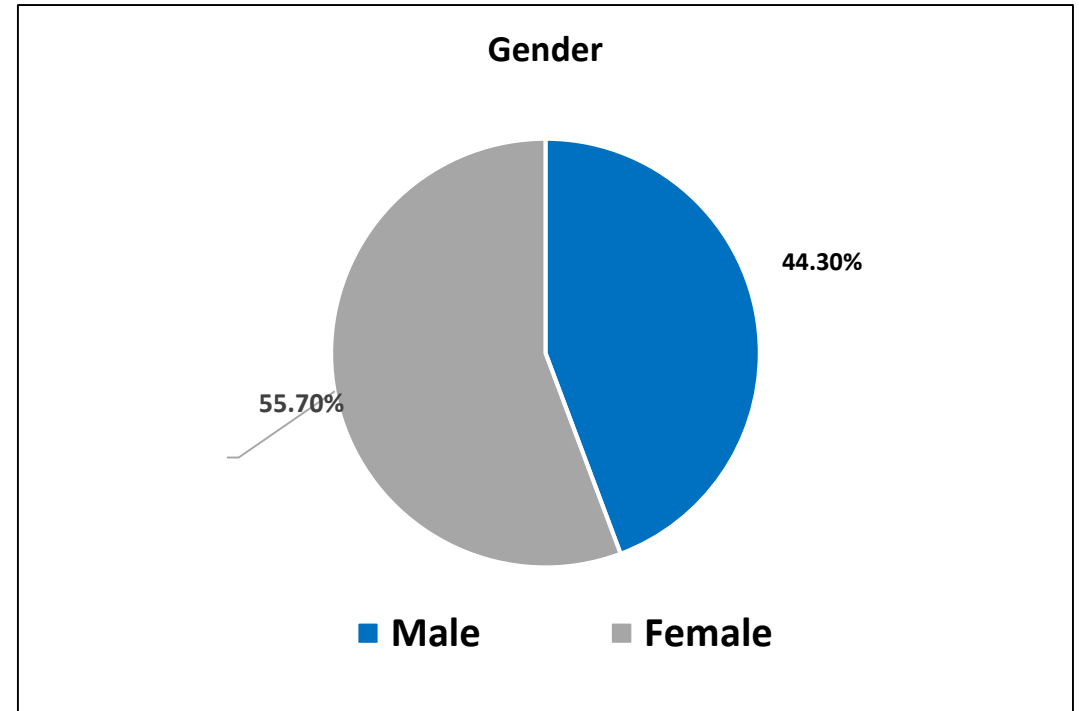
Study group determined by water service area, community determined by Warrington, Warminster, Horsham Twps., and Ivyland Borough

Study Demographics

Mostly adults 20+ years old



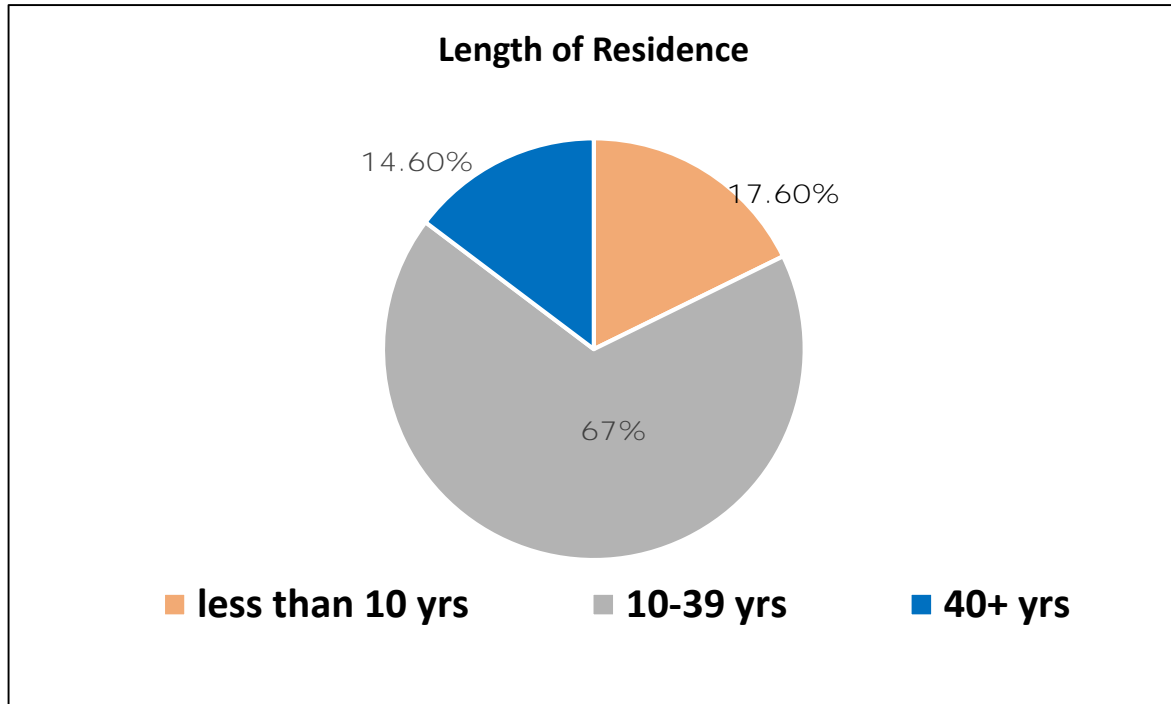
More females than males



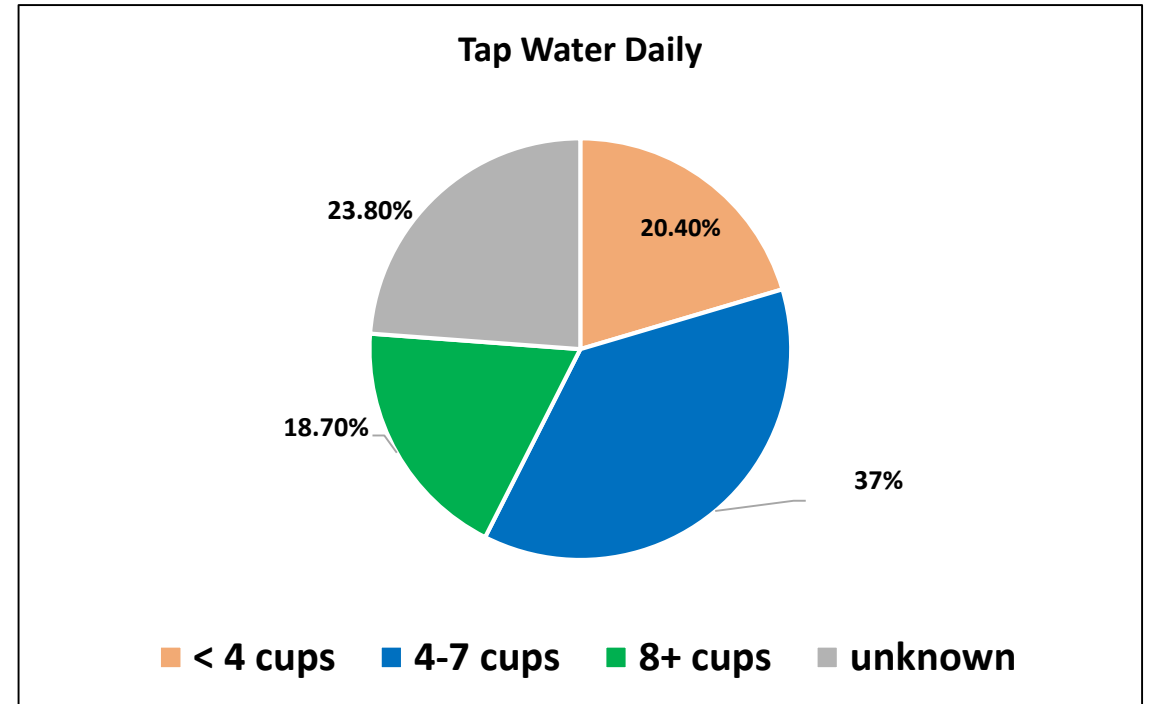
- Average age – 49 years
- 66 percent had college education or higher
- 12 percent were ever employed on a military base

Study Demographics

Most are long-term residents (>10 years)



Estimated Tap Water Consumed Daily



- 82 percent used public water

11 PFAS tested for

Perfluorobutanesulfonic acid (PFBS)

Perfluoroheptanoic acid (PFHpA)

Perfluorohexanesulfonic acid (PFHxS)

Perfluorononanoic acid (PFNA)

Perfluorooctanoic acid (PFOA)

Perfluorooctanesulfonic acid (PFOS)

Perfluorodecanoic acid (PFDeA)

Perfluoroundecanoic acid (PFUA)

Perfluorododecanoic acid (PFDoA)

Perfluorooctane sulfonamide (PFOSA)

2-(N-Methyl-perfluorooctane sulfonamido) acetic acid (MeFOSAA)

PFAS Detected

- Tested for 11 PFAS compounds
 - ▣ Four compounds were commonly detected
 - ▣ PFOS in 235 participants (100%)
 - ▣ PFHxS in 233 participants (99.1%)
 - ▣ PFOA in 232 participants (98.7%)
 - ▣ PFNA in 185 participants (78.7%)
 - ▣ All four detected in 79 percent of participants

PFAS Detected

- Of the remaining seven compounds-
 - ▣ PFDeA was found in 14 participants
 - ▣ MeFOSAA was found in nine participants
 - ▣ PFUA in eight participants
 - ▣ PFHpA in one participant

Serum PFAS Levels (ug/L)

Four most commonly found PFAS

PFAS Compound	Community Results (n=235)				NHANES Results (2013-2014)	
	Average	95% Confidence Interval	Median	Range	Average	95% Confidence Interval
PFOA	3.13	2.81-3.50	3.06	0.55-24.8	1.94	1.76-2.14
PFOS	10.24	8.86-11.83	9.86	1.02-105.00	4.99	4.50-5.52
PFHxS	6.64	5.51-7.99	6.61	0.54-116.00	1.35	1.20-1.52
PFNA	0.74	0.67-0.80	0.76	0.50-2.56	0.68	0.61-0.74

Range excludes <LOD

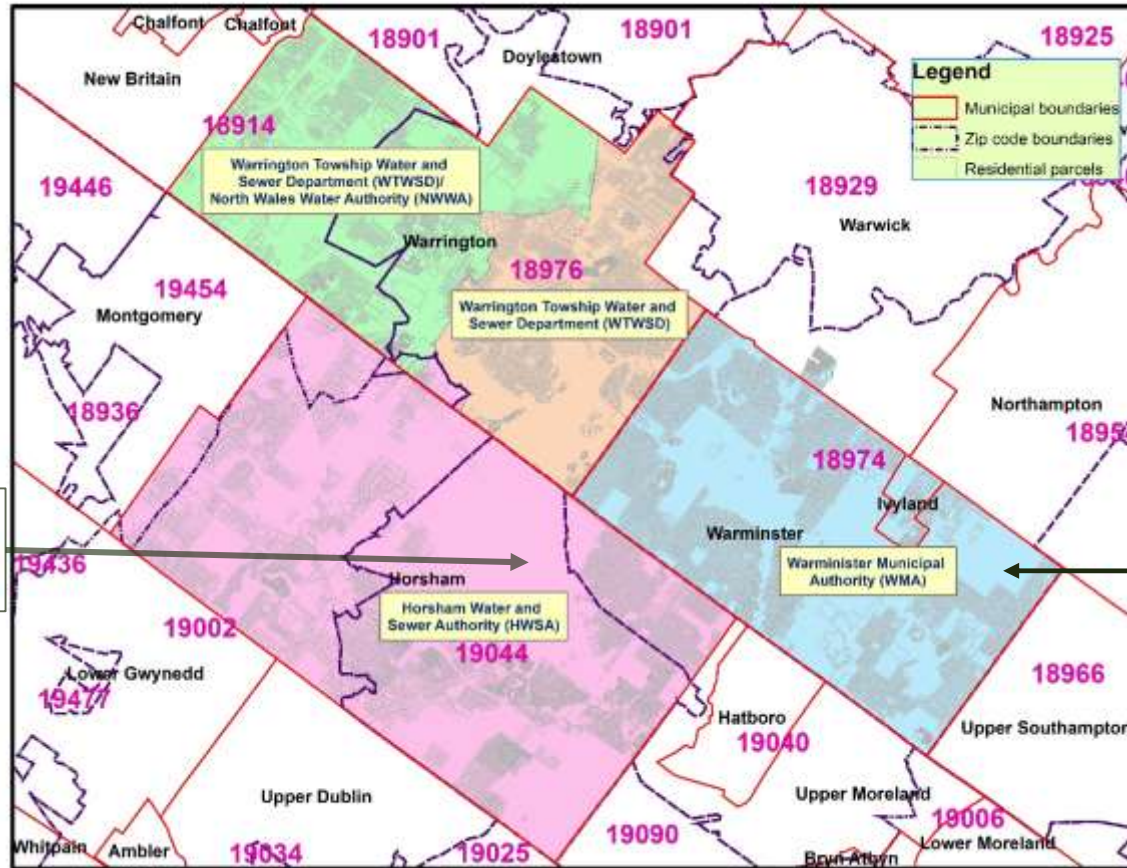
Serum PFAS Levels – Univariate Analyses

- ▣ Age
- ▣ Male gender
- ▣ Residence time
- ▣ BMI
- ▣ Private well use
- ▣ Quantity of tap water consumed
- ▣ **Water service area's proximity to military base**

▶ PFAS Exposure in Southeastern PA

- Affected area = population of 84,184 (2010 census)

Horsham Air Guard Station



Naval Air Warfare Center

Serum PFAS Levels (ug/L) by Public Water System (PWS) Area- Current Address

PFAS Compound	HWSA (n=69)		WMA (n=98)		WTWSD (n=41)		WTWSD/NWWA (n=27)	
	Average	95% C.I.	Average	95% C.I.	Average	95% C.I.	Average	95% C.I.
PFOA	3.69	2.99-4.56	3.17	2.71-3.71	3.35	2.62-4.29	1.78	1.44-2.20
PFOS	12.38	9.47-16.19	10.06	8.06-12.57	11.47	8.69-15.15	5.65	4.17-7.67
PFHxS	8.81	6.28-12.37	6.98	5.32-9.16	6.56	4.61-9.33	2.72	1.72-4.30
PFNA	0.79	0.68-0.92	0.72	0.62-0.84	0.78	0.66-0.94	0.59	0.51-0.67

Significant difference in levels of all four PFAS ($P \leq 0.05$ for all) among PWS areas

WTWSD/NWWA had lower serum PFAS levels

Includes all drinking water sources

Serum PFAS Levels (ug/L) - Private Well Users – Current Address

PFAS Compound	HWSA (n=1)		WMA (n=10)		WTWSD (n=3)		WTWSD/NWWA (n=6)	
	Average	95% C.I.	Average	95% C.I.	Average	95% C.I.	Average	95% C.I.
PFOA	7.78	7.78-7.78	3.23	2.30-4.55	4.87	2.43-9.79	2.33	1.27-4.28
PFOS	23.60	23.60-23.60	12.59	8.36-18.97	15.94	7.19-35.33	7.55	5.86-9.74
PFHxS	25.90	25.90-25.90	8.05	4.48-14.47	11.75	8.99-15.35	2.29	0.99-5.28
PFNA	1.44	1.44-1.44	0.76	0.58-0.99	0.96	0.68-1.35	0.69	0.37-1.31

WTWSD/NWWA had lower serum PFAS levels

Serum PFAS Levels (ug/L) -Public Water Users- Current Address

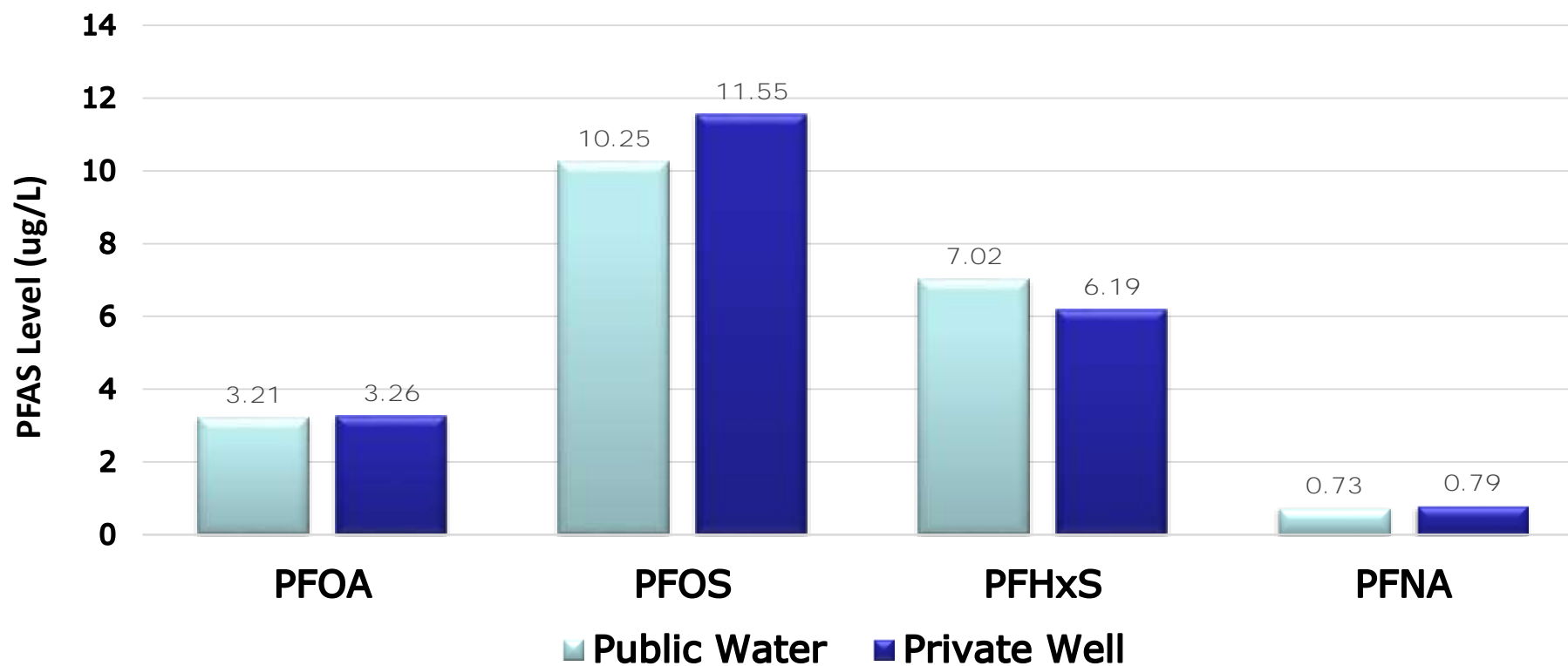
PFAS Compound	HWSA (n=61)		WMA (n=83)		WTWSD (n=31)		WTWSD/NWWA (n=18)	
	Average	95% C.I.	Average	95% C.I.	Average	95% C.I.	Average	95% C.I.
PFOA	3.65	2.89-4.60	3.24	2.73-3.84	3.63	2.76-4.78	1.63	1.25-2.11
PFOS	12.17	9.03-16.39	10.06	7.89-12.83	12.39	9.08-16.91	4.53	3.51-5.85
PFHxS	8.90	6.11-12.96	7.19	5.31-9.73	7.69	5.41-10.92	2.42	1.55-3.79
PFNA	0.76	0.65-0.89	0.72	0.60-0.85	0.81	0.66-0.99	0.56	0.51-0.61

Significant difference ($P \leq 0.05$) in levels of all four PFAS compounds

WTWSD/NWWA had lower serum PFAS levels

Serum PFAS Levels (ug/L) by Water Source- Public vs. Private Well

Overall, private well users had slightly higher levels of PFOA, PFOS, and PFNA than public water users, but not PFHxS



Public well (n=193), Private well (n=20)

Differences in levels not statistically significant ($P > 0.05$ for all)

Serum PFAS Levels and Self-Reported Health Conditions

- Elevated cholesterol was the most frequently reported health condition
- Those reporting elevated cholesterol also had higher PFAS levels (all four compounds)
- Those reporting endocrine disruption had higher levels of PFOA and PFHxS
- Those with cancer had higher levels of PFOA and PFNA

Multivariate Analysis (n=204)

- Demographic characteristics
 - age
 - gender
 - education
- Exposure characteristics
 - water source at current address
 - HSWA, WMA, WTWSD, WTWSD/NWWA, private well, other
 - quantity of water consumed at current address
 - total length of residence in the study area
 - employment information - ever employed on a base, in the area
- Health information
 - health status, BMI

Multivariate Analysis

- Serum PFAS (PFOA, PFOS, PFHxS and PFNA) levels were positively associated with total length of residence in the study area.
- Those who lived in the area for 10 years or more had higher PFAS serum levels compared to those who lived in the area less than 10 yrs.).

Total Length of Residence	PFOA percent higher	PFOS percent higher	PFHxS percent higher	PFNA percent higher
10-19 yrs	22.5%	89.1%	49.8%	17.3%
20-29 yrs	27.7%	66.0%	67.6%	5.8%
30-39 yrs	38.9%	77.9%	65.4%	46.1%
40+ yrs	55.4%	124.3%	171.8%	17.0%

Bold = statistically significant ($p \leq 0.05$)

Multivariate Analysis

- In general, PFAS levels were higher the closer the water source was to the military base.
- Water sources were compared to the source farthest from the military bases (WTWSD/NWWA reference group):

Drinking water source	PFOA percent higher	PFOS percent higher	PFHxS percent higher	PFNA percent higher
HWSA	157.4%	168.5%	257.2%	33.6%
WMA	104.5%	88.5%	137.4%	15.3%
WTWSD	94%	98.7%	113.9%	10.4%
Other (bottled water, unknown)	78.1%	97.84%	77.2%	29.6%
Private Well	105.9%	101.24%	97.9	38.6%

Bold= statistically significant ($p \leq 0.05$)
 WTWSD/NWWA reference group

Multivariate Analysis

- Average PFHxS serum levels 32 percent higher in men
- Average PFHxS serum levels 35 percent higher in employed than never employed in study area (self-reported)
- Average PFOA serum level of participants consuming four-seven cups of tap water daily was 29 percent higher than participants consuming zero-three cups daily
- Average serum levels of PFOA, PFOS and PFNA increased with participant age

Summary

- Four PFAS compounds were consistently detected (PFOA, PFOS, PFHxS and PFNA)
- Seventy-five, 81, 94 and 59 percent of the study participants had levels exceeding the national average for PFOA, PFOS, PFHxS and PFNA respectively
- Serum levels associated with
 - ▣ receiving water from select public water systems
 - ▣ total length of residence in the study area
 - ▣ age of the study participants
 - ▣ employment in the study area
 - ▣ quantity of daily tap water consumption

PA- Specific Changes to PEATT

Sample selection

- Used eligibility information form because of exposure cut-off date
- Modified Consent/Assent form

Questionnaires

- Questionnaires had to be reworded to reflect past exposure
- Questions had to be added considering multiple residences
- Excluded questions on other sources of exposure (soil, fish, food)

Created detailed instructions for collection, handling, storage and shipment of samples

Modified results letter – initial letter and final letter

Recommendations

- Selection Process
 - Option to include volunteer participants and special categories of exposure (i.e. veterans)
 - Create initial eligibility form to determine number of participants in a household. This facilitates sending the correct number of forms to a household, along with return postage-paid envelopes
- Questionnaires
 - Need to accommodate for long duration of exposure
 - Fewer open-ended questions and more structured, multiple choice questions for health conditions

Recommendations

- Participant Drop-out
 - ▣ Paper questionnaire visually overwhelming- consider online survey options with built-in **"skips"** to lessen the perceived burden
 - ▣ Streamline the participation process- possible online scheduling for clinics
 - ▣ Consider visiting nurses/teams to collect information
 - ▣ Possible tokens of appreciation
- Results Process
 - ▣ Letter templates complete for information and numbers, but limited in psychological comfort for those with high levels

Communicating the Risks of PFAS

- Cancer Data Review (1985–2013) with Addendums 1 and 2
 - A review of cancer incidence rates in Horsham, Warminster and Warrington
- Fact sheets
 - PFAS FAQs
- Presented at five PFAS community meetings including the Willow Grove Air Station Restoration Advisory Board meetings
- Participated in Medical Grand Rounds in hospitals
- Always available to answer citizen emails and phone calls
env.health.concern@pa.gov or by phone at 717-787-3350

Communicating the Risks of PFAS

- PEATT Pilot Project gave some residents the chance to find out about their own individual exposures.
- PEATT Pilot Project recruitment letter sent to 600 households
 - ▀ Included information on the limitations of interpreting the results of PFAS biomonitoring
- Results letters included information to share with physicians
- Responded to several media inquiries

PFAS Responses - Pennsylvania

PFAS Action Team

Governor's Executive Order in September 2018

Members:

- Secretaries of
 - Department of Environmental Protection
 - Department of Health
 - Department of Military and Veteran Affairs
 - Department of Community and Economic Development
 - Department of Transportation
 - Department of Agriculture AND
 - State Fire Commissioner

PFAS Action Team - Functions

- Ensure drinking water is safe
- Identify impacted locations and develop response protocols for identified sites
- Engage stakeholders to develop site-specific plans
- Reduce risk to drinking water from potential sources
- Establish a site to inform and educate the public about PFAS
- Explore funding avenues for remediation efforts
- Engage with academic institutions, public health and environmental remediation experts

PFAS Responses - Pennsylvania

- Regular participation in DoD's Restoration Advisory Board Community meetings
- Participation in Environmental Exposure Assessment Efforts in Other DoD Sites
- Participation in PEATT Expansion Project
- Multi-site National Health Study

Our Partners

- Centers for Disease Control and Prevention (CDC)
- Association of State and Territorial Health Officials (ASTHO)
- Agency for Toxic Substances and Disease Registry (ATSDR)
- Bucks County Health Department
- Montgomery County Health Department
- New York State Health Department Laboratory

PEATT Pilot Project Team

- Dr. Sharon Watkins
- Dr. Anil Nair
- Dr. Marshal Ma
- Susan Schrack Wood
- Dr. Farhad Ahmed

Contact Information

Should you have any questions, feel free to contact us at env.health.concern@pa.gov or by phone at 717-787-3350

For more information:

<https://www.health.pa.gov/topics/envirohealth/Pages/PFAS.aspx>



THANK YOU!

Questions?

ASTHO *Connects*

A virtual learning series for public health leaders.

Poll Question #2

ASTHO *Connects*

A virtual learning series for public health leaders.

Audience Q/A



TELL US WHAT YOU THINK >>

Help ASTHO evaluate

**State Uses of the PFAS Exposure Assessment Technical
Tools**

by visiting <http://bit.ly/pfasexposure>
on your device now!



ASTHOConnects

A virtual learning series for public health leaders.