

# Summary for the First 98 Participants (1)

- Compared to U.S. residents without a known high exposure to PFCs tested in 2011-2012, the average amount of PFOA, PFOS, and PFHxS in blood samples from the adult Pease Tradeport community is **higher**
- The amounts of PFOA and PFOS are, however, similar to amounts detected in the U.S. population over the last decade

# Summary for the First 98 Participants (2)

- Compared with other communities exposed to environmental contamination and with chemical plant workers, the average amount of PFOA, PFOS, and PFHxS in blood samples from the adult Pease Tradeport community is **lower**
- Compared to U.S. residents without a known high exposure to PFCs tested in 2011-2012, the average amount of PFCs (other than PFOA, PFOS, and PFHxS) in blood samples from the adult Pease Tradeport community were **similar or lower**

# Perfluorochemical (PFC) Testing Program: Summary of the First 98 Test Results

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Department of Health & Human Services  
June 17, 2015

# Purpose of Tonight's Meeting

- Review the testing program, including the results reporting process
- Review initial results from the first 98 participants (note: a detailed epidemiologic analysis will be done at the end of the testing program)
- Highlight the work DHHS & partners are doing to provide you your test results and information about PFCs
- Offer a chance for questions and feedback

# Current Status of the Testing Program

- 100 people tested (Adults)
- Reporting out participant results today
- Shipped blood samples for the next 100-200 people to the CDC
- We will report individual results as testing is completed
- We are expecting approximately 500 people total will participate in the testing program
- When all results are back, we will give you a complete analysis at another community meeting

# Multiagency Collaborative Response

- U.S. Air Force
- Environmental Protection Agency (EPA)
- NH Dept. of Environmental Services (DES)
- NH Department of Health & Human Services (DHHS)
- Northern New England Poison Center (NNEPC)
- Centers for Disease Control and Prevention (CDC)
- Agency for Toxic Substances and Disease Registry (ATSDR)
- Environmental Medical Group at Boston Children's Hospital
- Portsmouth Regional Hospital
- Community Advisory Board (CAB) & community members
- Senator Shaheen & staff
- Senator Ayotte & staff

# PFCs Tested in Blood

| PFC Name  | Abbreviation  |
|---|---------------|
| perfluorooctane sulfonic acid                         | PFOS          |
| perfluorooctanoic acid                                | PFOA          |
| perfluorohexane sulfonic acid                         | PFHxS         |
| perfluorononanoic acid                                | PFNA          |
| perfluorodecanoic acid                                | PFDeA         |
| perfluoroundecanoic acid                              | PFUA          |
| Perfluorooctane sulfonamide*                          | PFOSA         |
| 2-(N-ethyl-perfluorooctane sulfonamido) acetic acid*  | ET-PFOSA-ACOH |
| 2-(N-methyl-perfluorooctane sulfonamido) acetic acid* | ME-PFOSA-ACOH |

# PFCs Tested in Water

| PFC Name  | Abbreviation |
|---|--------------|
| perfluorooctane sulfonic acid                               | PFOS         |
| perfluorooctanoic acid                                      | PFOA         |
| perfluorohexane sulfonic acid                               | PFHxS        |
| perfluorononanoic acid                                      | PFNA         |
| perfluorodecanoic acid                                      | PFDeA        |
| perfluoroundecanoic acid                                    | PFUA         |
| Perfluorododecanoic acid**                                  | PFDoA        |
| Perfluoropentanoic acid**                                   | ?            |
| Perfluorobutane sulfonate**                                 | PFBuS        |
| Perfluorohexanoic acid**                                    | PFHxA        |
| Perfluoroheptanoic acid**                                   | PFHpA        |
| * PFCs tested in blood by CDC lab, but not tested in water  |              |
| ** PFCs not tested in blood by CDC lab, but tested in water |              |

# PFC levels in Water

| PFC Name  | Abbreviation  | PFC Levels in µg/L |               |            |
|---|---------------|--------------------|---------------|------------|
|   |               | Haven Well         | Harrison Well | Smith Well |
| perfluorooctane sulfonic acid                               | PFOS          | 2.50               | 0.05          | 0.02       |
| perfluorooctanoic acid                                      | PFOA          | 0.35               | 0.009         | 0.004      |
| perfluorohexane sulfonic acid                               | PFHxS         | 0.83               | 0.04          | 0.01       |
| perfluorononanoic acid                                      | PFNA          | 0.02               | ND            | ND         |
| perfluorodecanoic acid                                      | PFDeA         | 0.005              | ND            | 0.004      |
| perfluoroundecanoic acid                                    | PFUA          | ND                 | ND            | 0.02       |
| Perfluorooctane sulfonamide*                                | PFOSA         | --                 | --            | --         |
| 2-(N-ethyl-perfluorooctane sulfonamido) acetic acid*        | ET-PFOSA-ACOH | --                 | --            | --         |
| 2-(N-methyl-perfluorooctane sulfonamido) acetic acid*       | ME-PFOSA-ACOH | --                 | --            | --         |
| Perfluorododecanoic acid**                                  | PFDoA         | ND                 | ND            | 0.01       |
| Perfluoropentanoic acid**                                   | ?             | 0.27               | 0.008         | 0.004      |
| Perfluorobutane sulfonate**                                 | PFBuS         | 0.05               | 0.002         | 0.0009     |
| Perfluorohexanoic acid**                                    | PFHxA         | 0.33               | 0.009         | 0.004      |
| Perfluoroheptanoic acid**                                   | PFHpA         | 0.12               | 0.005         | 0.003      |
| * PFCs tested in blood by CDC lab, but not tested in water  |               |                    |               |            |
| ** PFCs not tested in blood by CDC lab, but tested in water |               |                    |               |            |

ND = Not Detected

# Statistics Overview

- Range: The lowest and highest levels found in the U.S. population sample
- Geometric Mean: A special type of average
  - Most people will not have a blood level of a PFC that exactly matches the average number; it will be above or below.
- 95<sup>th</sup> percentile: Describes the spread of a set of numbers
  - In a group of numbers, 95% will be at or below the 95<sup>th</sup> percentile.
  - The remaining 5% will be above it.
  - If a person has a PFC level close to the 95<sup>th</sup> percentile it means they have a PFC level at the higher end of what is normally found in the U.S. population.

# Statistics Overview

- The mean (average) and 95<sup>th</sup> percentile do not tell us anything about possible health impacts.
- The numbers are simply a way for you to compare your results with others.
- Specific health effects cannot currently be linked to PFC blood levels.

## ADULT LABORATORY REPORT

Participant Name: Benjamin Chan

Participant Identification Number: PT9999

### Your Perfluorochemical (PFC) Blood Test Results Compared with National Averages\*

| PFC Tested   | Your Level<br>(µg/L) | Levels in the U.S. Population (µg/L)* |                |                             |
|--|----------------------|---------------------------------------|----------------|-----------------------------|
|  |                      | Range                                 | Geometric Mean | 95 <sup>th</sup> Percentile |
| PFOA<br>perfluorooctanoic acid   | 4.97                 | 0.07-43                               | 2.08           | 5.68                        |
| PFOS<br>perfluorooctane sulfonic acid                                  | 5.2                  | 0.14-235                              | 6.31           | 21.7                        |
| PFHxS<br>perfluorohexyl sulfonate                                      | 2.15                 | 0.07-47.8                             | 1.28           | 5.44                        |
| PFUA<br>perfluoroundecanoic acid                                       | <LOD                 | 0.07-6.96                             | **             | 0.620                       |
| PFOSA<br>perfluorooctane sulfonamide                                   | <LOD                 | 0.07-0.62                             | **             | <LOD                        |
| PFNA<br>perfluorononanoic acid   | 0.627                | 0.06-80.77                            | 0.881          | 2.54                        |
| PFDeA<br>perfluorodecanoic acid  | 0.631                | 0.07-17.8                             | 0.199          | 0.690                       |
| Me-PFOSA-AcOH2<br>2-(N-methyl-perfluorooctane sulfonamido) acetic acid | 0.372                | 0.06-4.25                             | **             | 0.690                       |
| Et-PFOSA-AcOH<br>2-(N-ethyl-perfluorooctane sulfonamido) acetic acid   | <LOD                 | 0.07-0.72                             | **             | 0.110                       |

(µg/L) = micrograms per liter

LOD = limit of detection (0.01 µg/L)

Samples were analyzed at the National Center for Environmental Health, US Centers for Disease Control and Prevention, Chamblee, GA.

\*Fourth National Report on Human Exposure to Environmental Chemicals, Updated Tables (February, 2015) for specimens collected 2011-2012.

\*\* The national average was not calculated for this PFC, as the proportion of results below limit of detection was too great to provide a valid result.

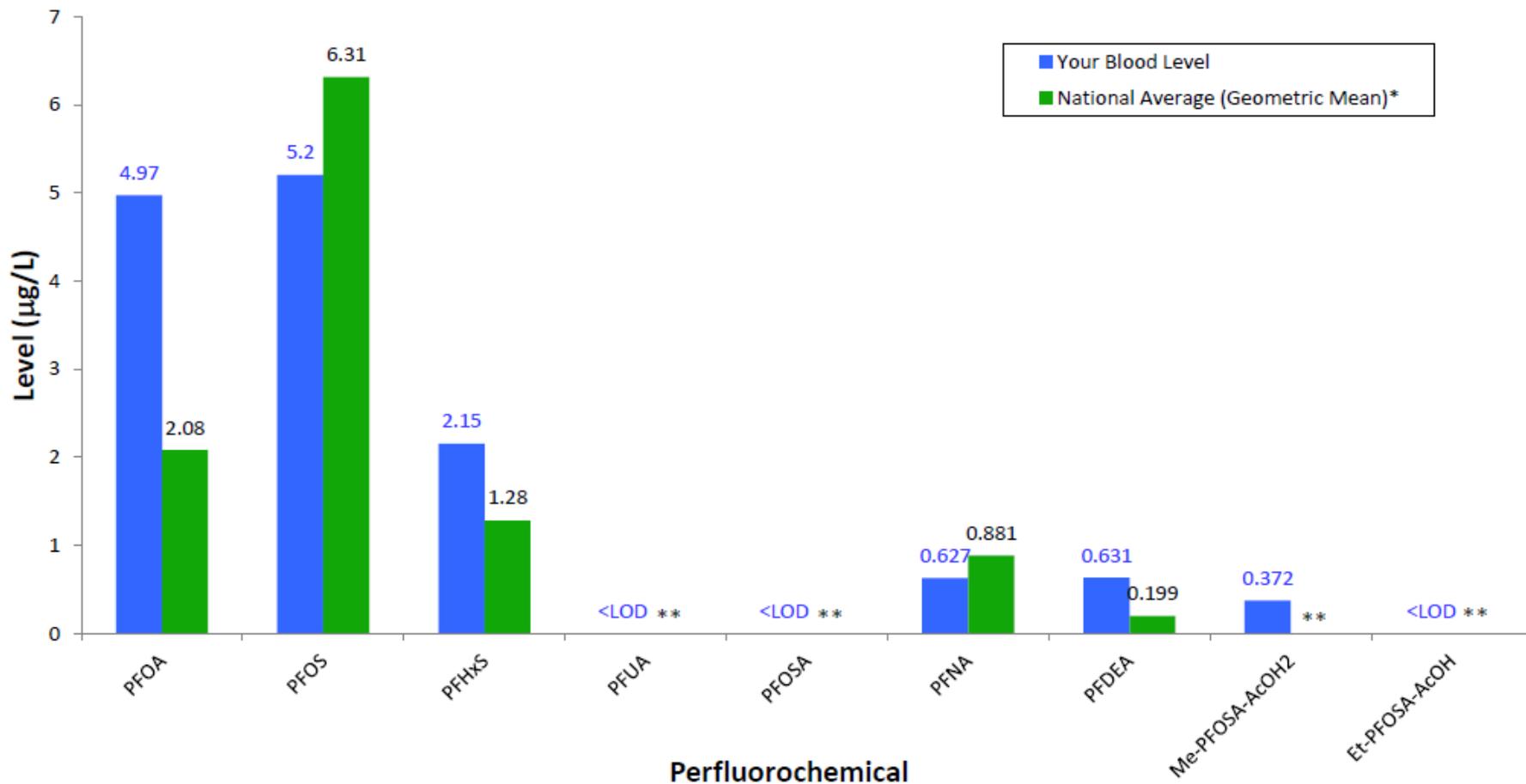
A health level concern has not been established for perfluorochemicals in blood.

# ADULT LABORATORY REPORT

Participant Name: Benjamin Chan

Participant Identification Number: PT9999

## Your perfluorochemical levels compared with the national average



\*Fourth National Report on Human Exposure to Environmental Chemicals, Updated Tables (February, 2015) for specimens collected 2011-2012.

\*\*The national average was not calculated for this PFC, as the proportion of results below limit of detection was too great to provide a valid result.

A health level concern has not been established for perfluorochemicals in blood.

# Summary of first 98 results compared to U.S. Population

| PFC Tested  | Geometric Mean,<br>first 98 samples<br>( $\mu\text{g/L}$ ) | Levels in the U.S. Population ( $\mu\text{g/L}$ )* |                |                             |
|---|--|--|----------------|-----------------------------|
|   |  | Range  | Geometric Mean | 95 <sup>th</sup> Percentile |
| <b>PFOA</b><br>perfluorooctanoic acid   | <b>3.20</b>  | 0.07-43  | 2.08           | 5.68                        |
| <b>PFOS</b><br>perfluorooctane sulfonic acid                                  | <b>8.08</b>  | 0.14-235   | 6.31           | 21.7                        |
| <b>PFHxS</b><br>perfluorohexyl sulfonate                                      | <b>4.79</b>  | 0.07-47.8  | 1.28           | 5.44                        |
| <b>PFUA</b><br>perfluoroundecanoic acid                                       | <b>0.20</b>  | 0.07-6.96  | **             | 0.620                       |
| <b>PFOSA</b><br>perfluorooctane sulfonamide                                   | <b>0.10</b>  | 0.07-0.62  | **             | <LOD                        |
| <b>PFNA</b><br>perfluorononanoic acid   | <b>0.69</b>  | 0.06-80.77   | 0.881          | 2.54                        |
| <b>PFDeA</b><br>perfluorodecanoic acid  | <b>0.21</b>  | 0.07-17.8  | 0.199          | 0.690                       |
| <b>Me-PFOSA-AcOH2</b><br>2-(N-methyl-perfluorooctane sulfonamido) acetic acid | <b>0.15</b>  | 0.06-4.25  | **             | 0.690                       |
| <b>Et-PFOSA-AcOH</b><br>2-(N-ethyl-perfluorooctane sulfonamido) acetic acid   | <b>0.14</b>  | 0.07-0.72  | **             | 0.110                       |

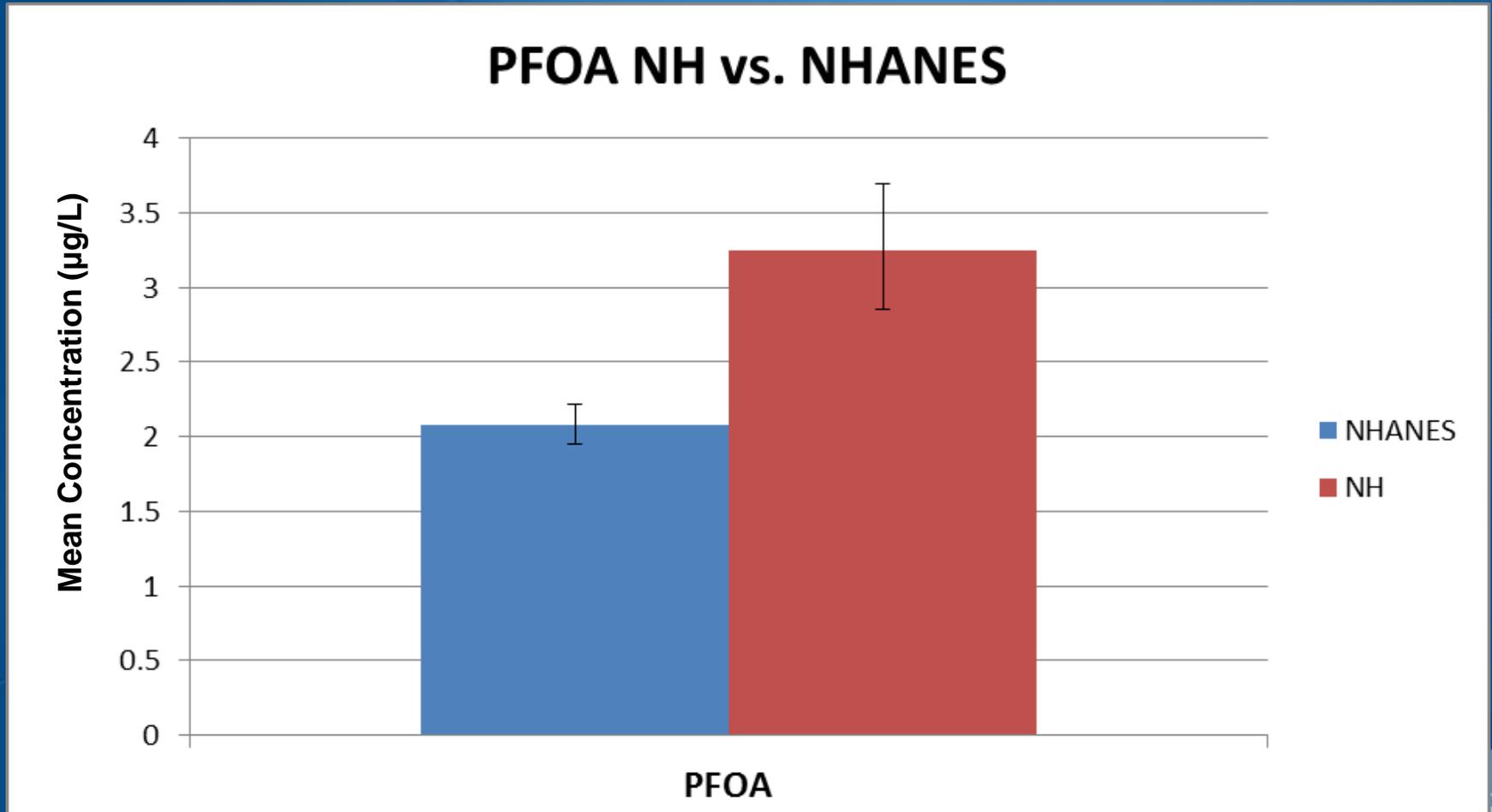
( $\mu\text{g/L}$ ) = micrograms per liter

LOD = limit of detection (0.01  $\mu\text{g/L}$ )

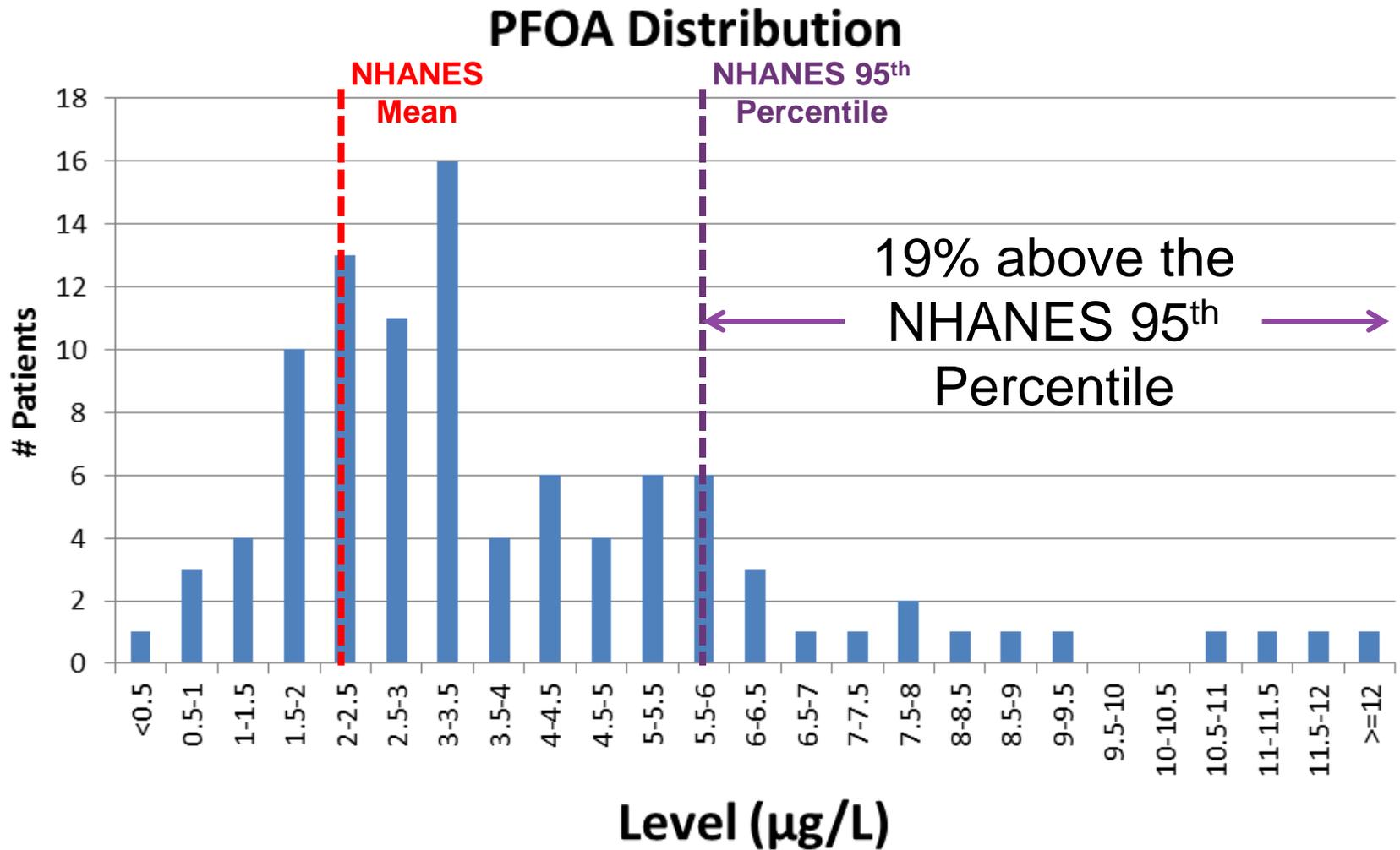
\*Fourth National Report on Human Exposure to Environmental Chemicals, Updated Tables (February, 2015) for specimens collected 2011-2012.

\*\* The national average was not calculated for this PFC, as the proportion of results below limit of detection was too great to provide a valid result.

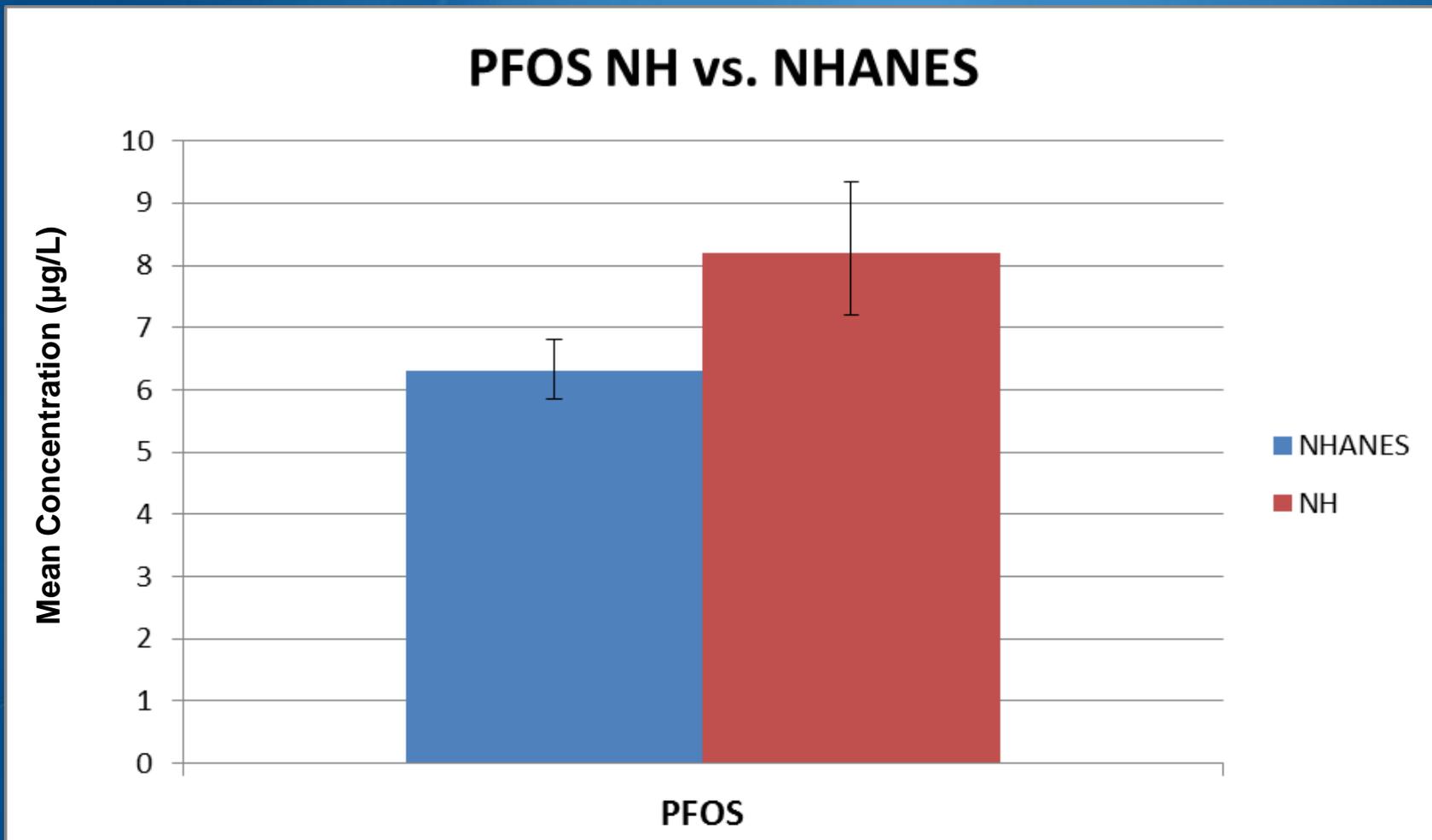
# PFOA average compared to NHANES



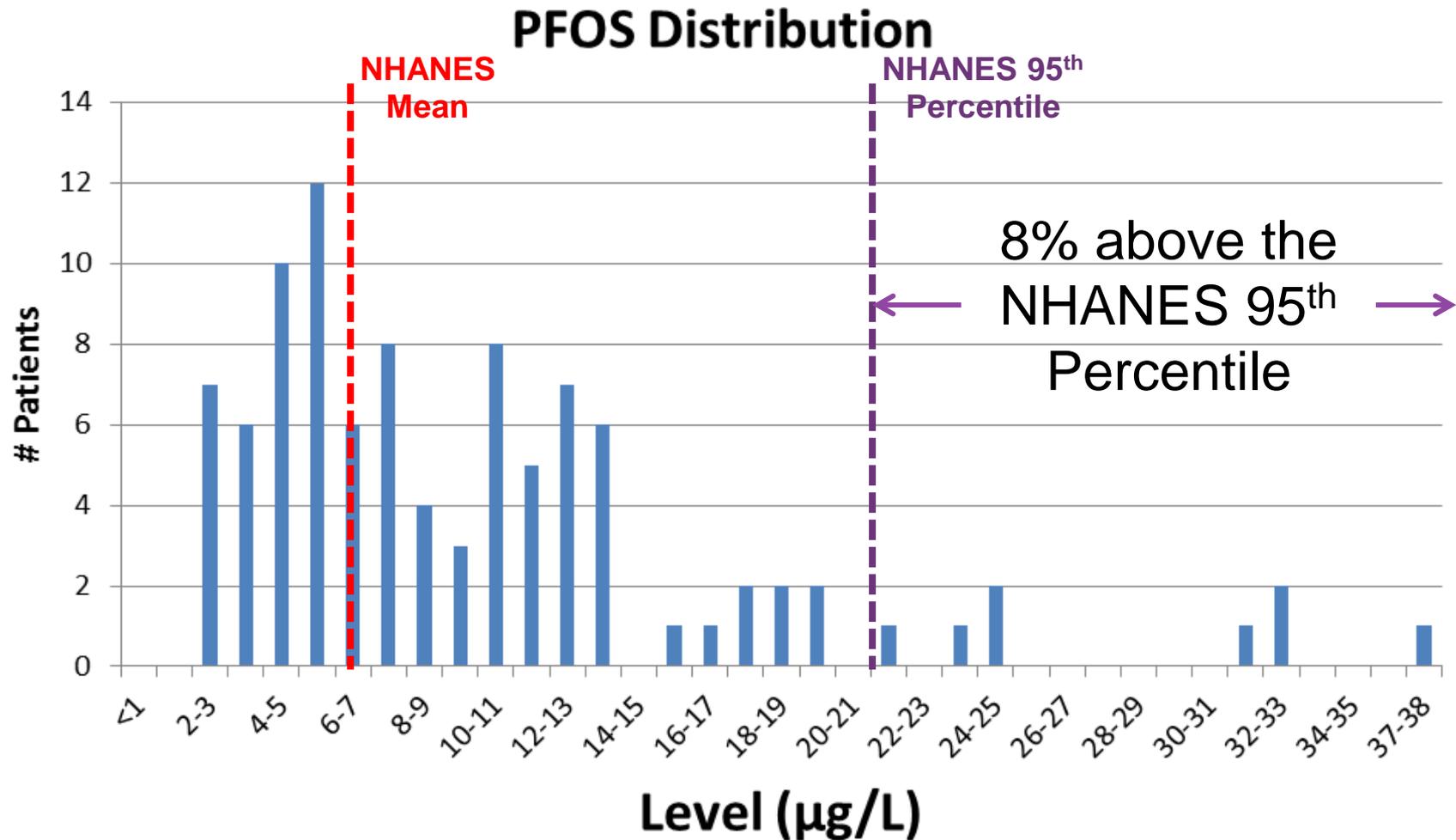
# PFOA Distribution of Results



# PFOS average compared to NHANES

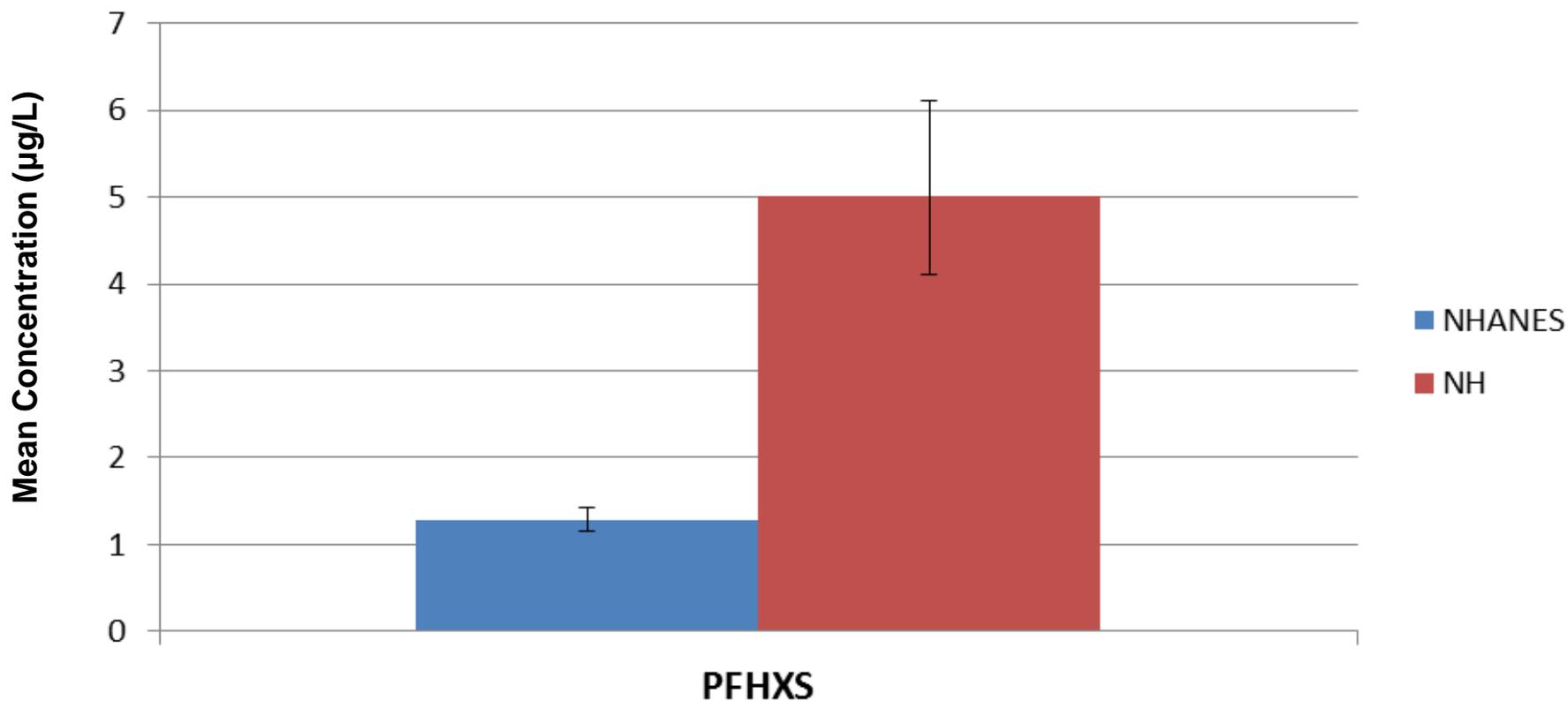


# PFOS Distribution of Results

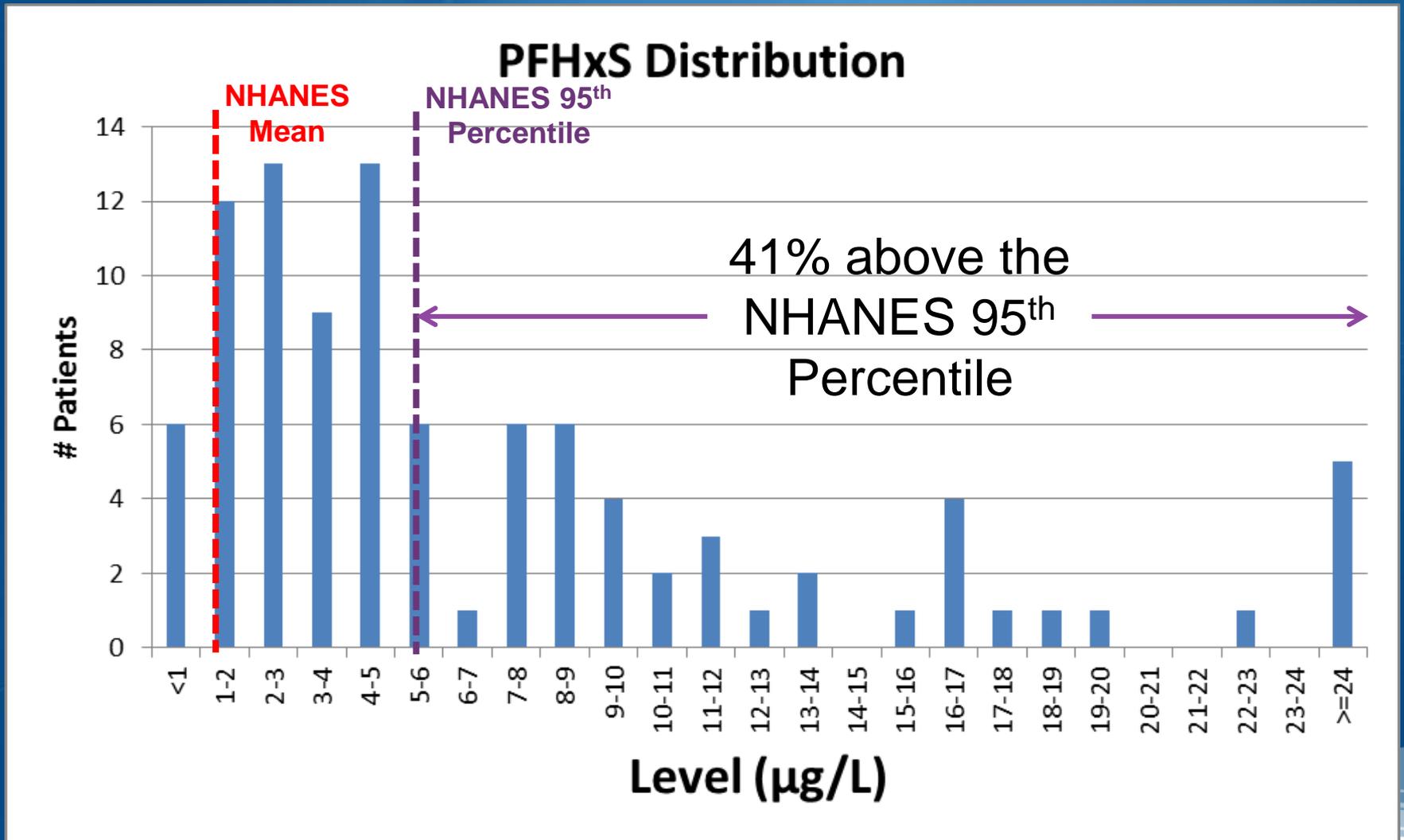


# PFHxS average compared to NHANES

## PFHXS NH vs. NHANES

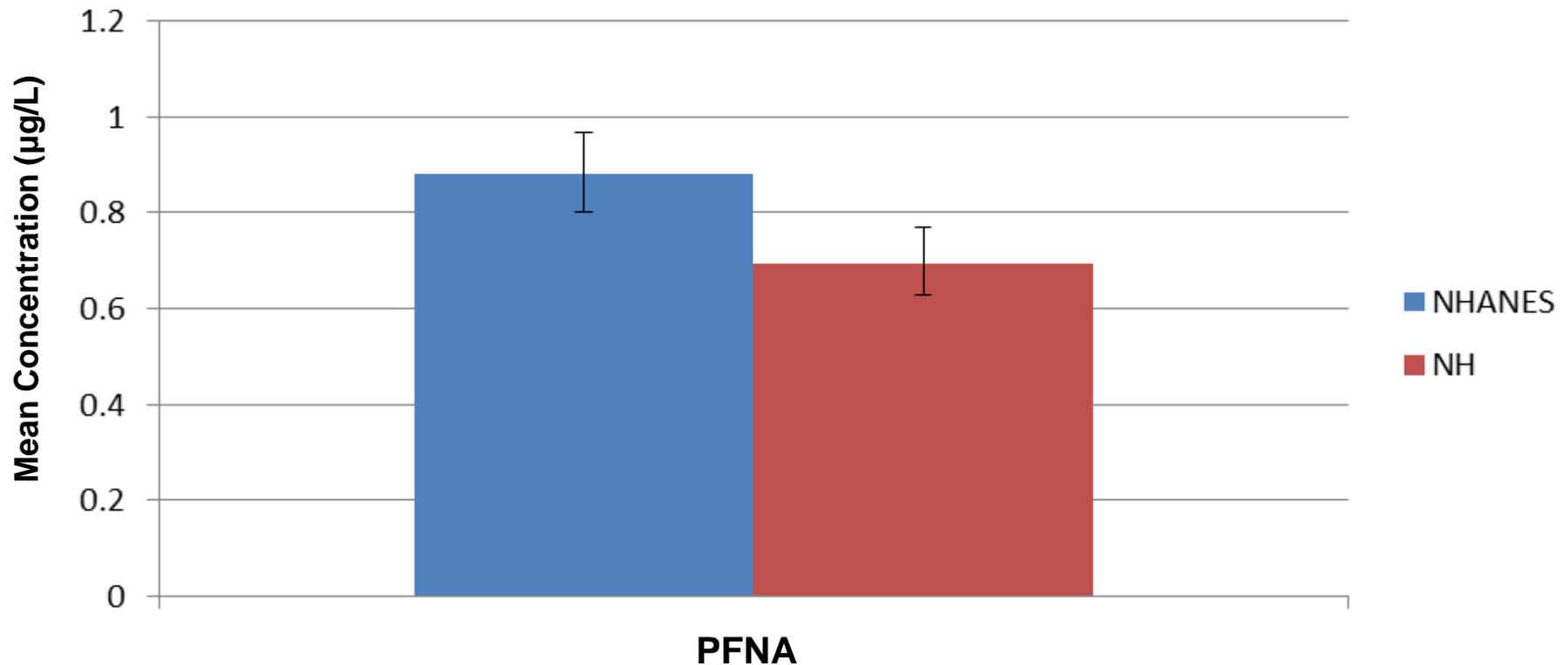


# PFHxS Distribution of Results

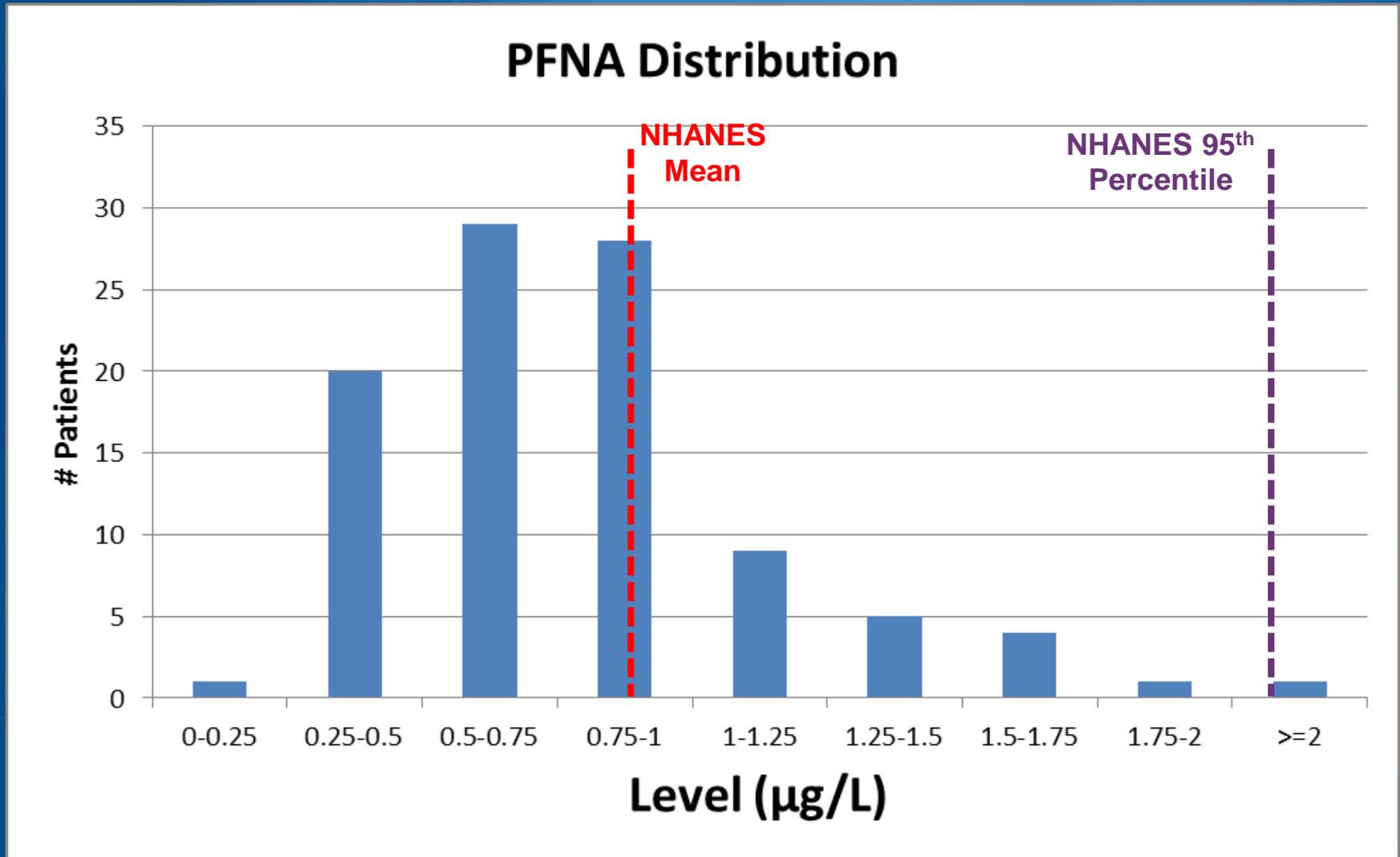


# PFNA compared to NHANES

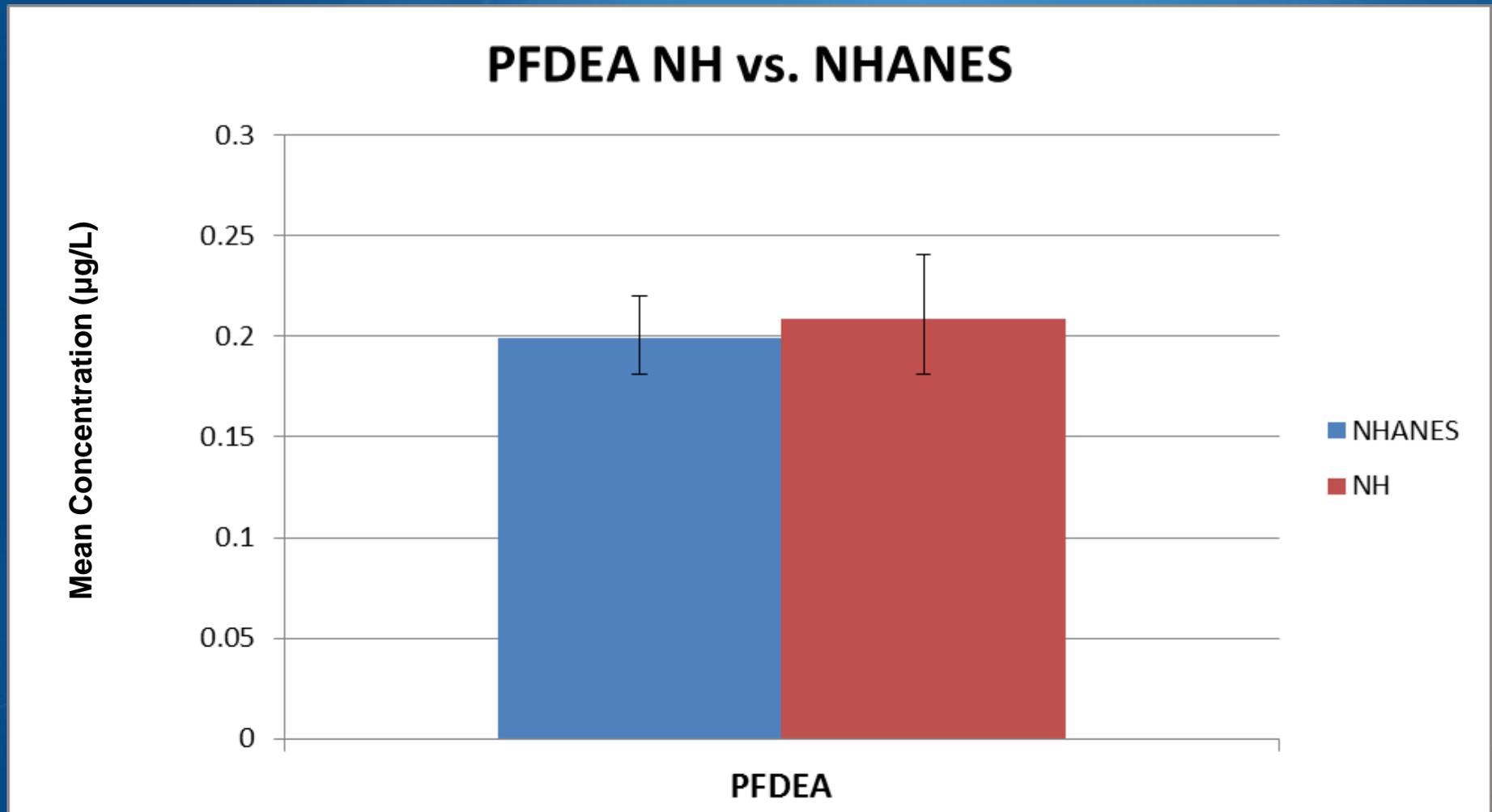
## PFNA NH VS. NHANES



# PFNA Distribution of Results

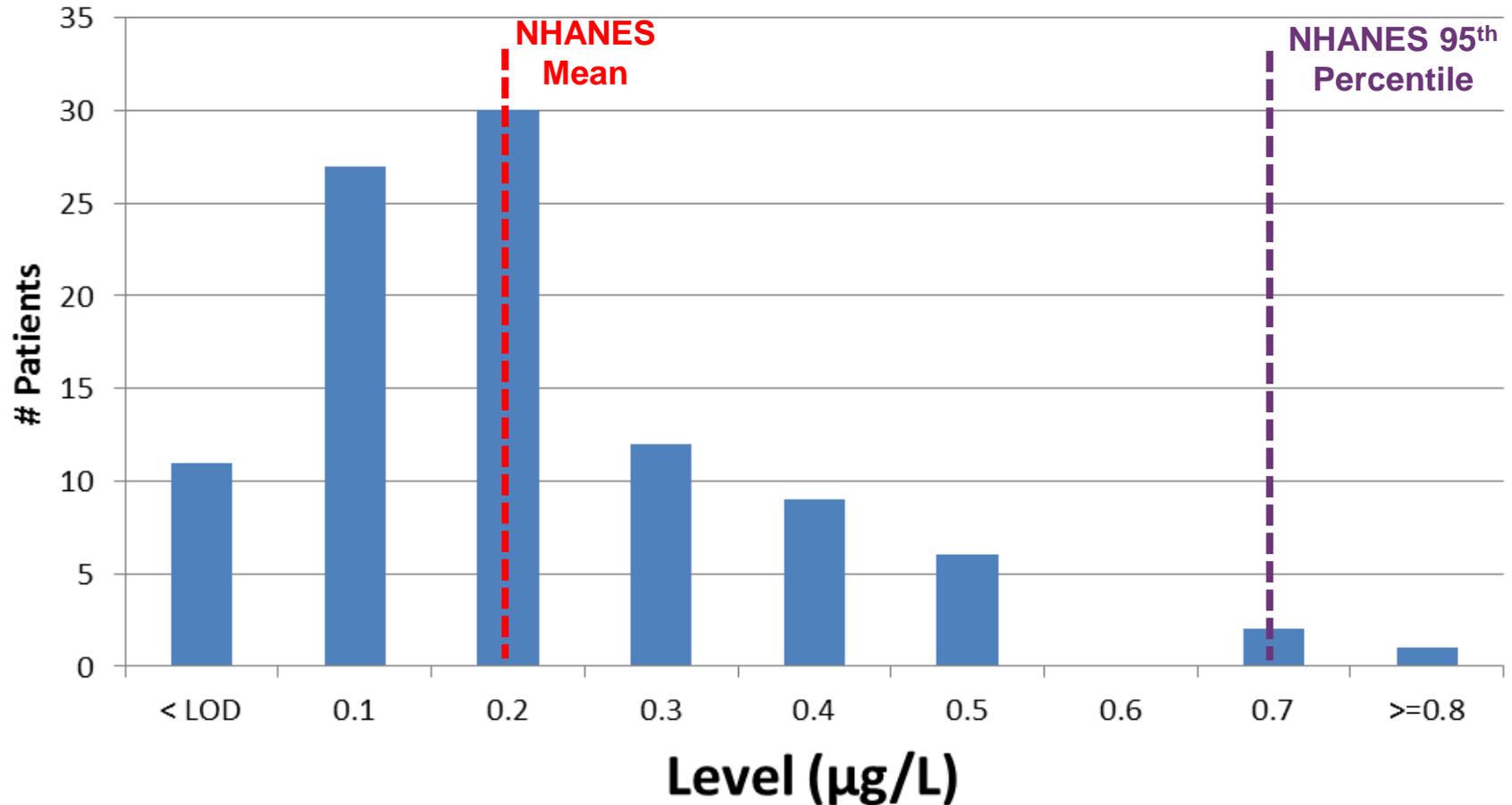


# PFDeA average compared to NHANES

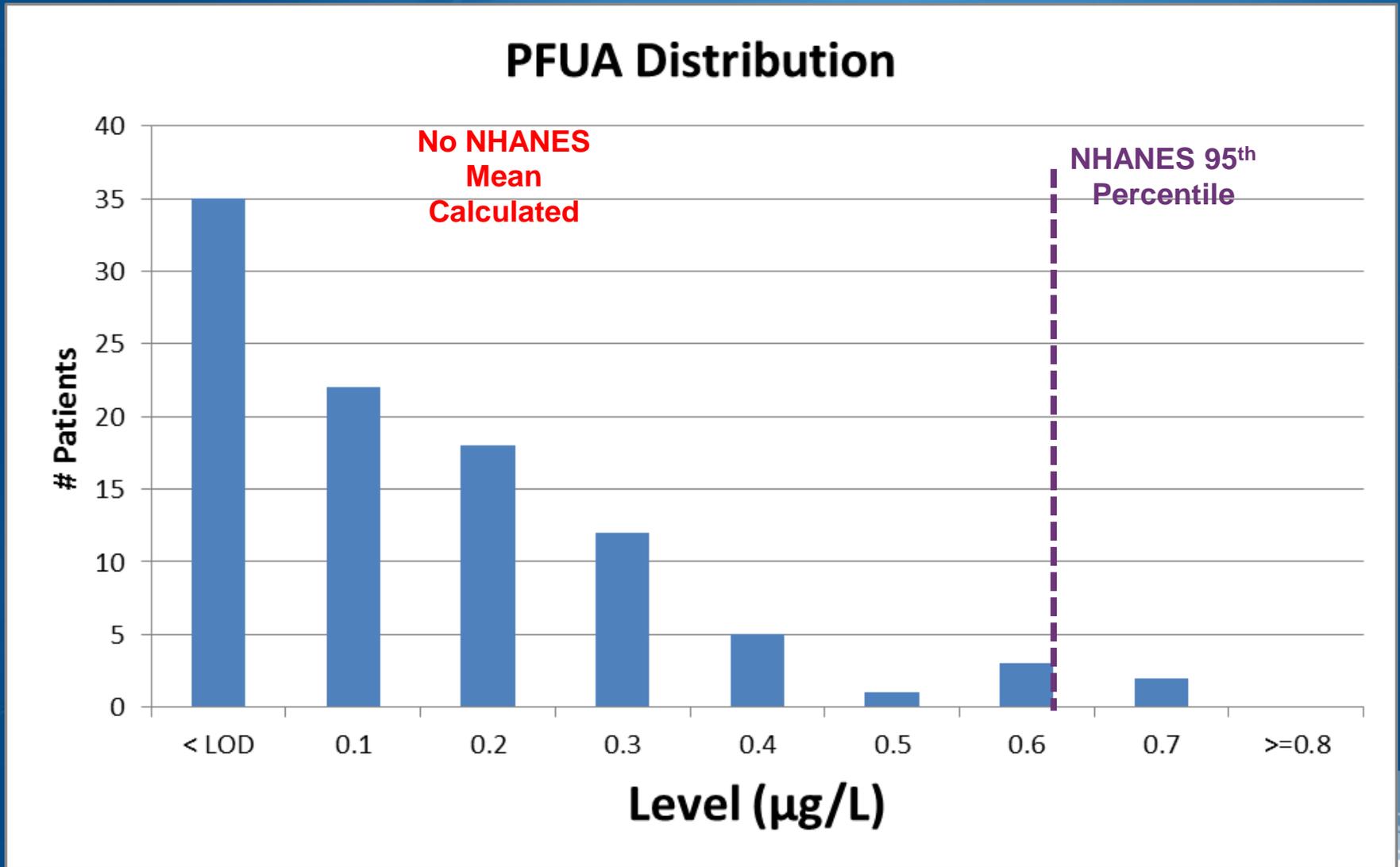


# PFDeA Distribution of Results

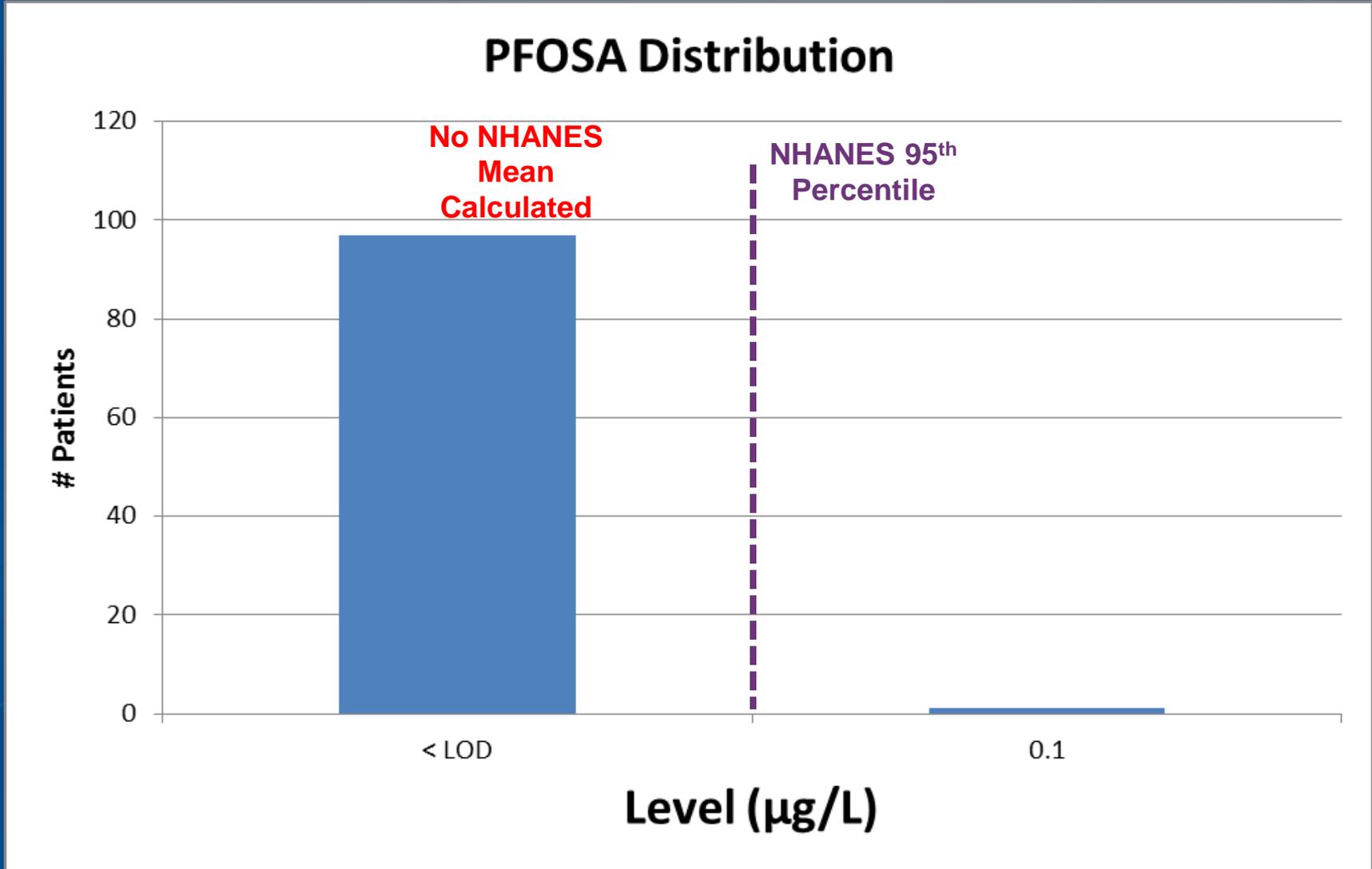
## PFDeA Distribution



# PFUA Distribution of Results

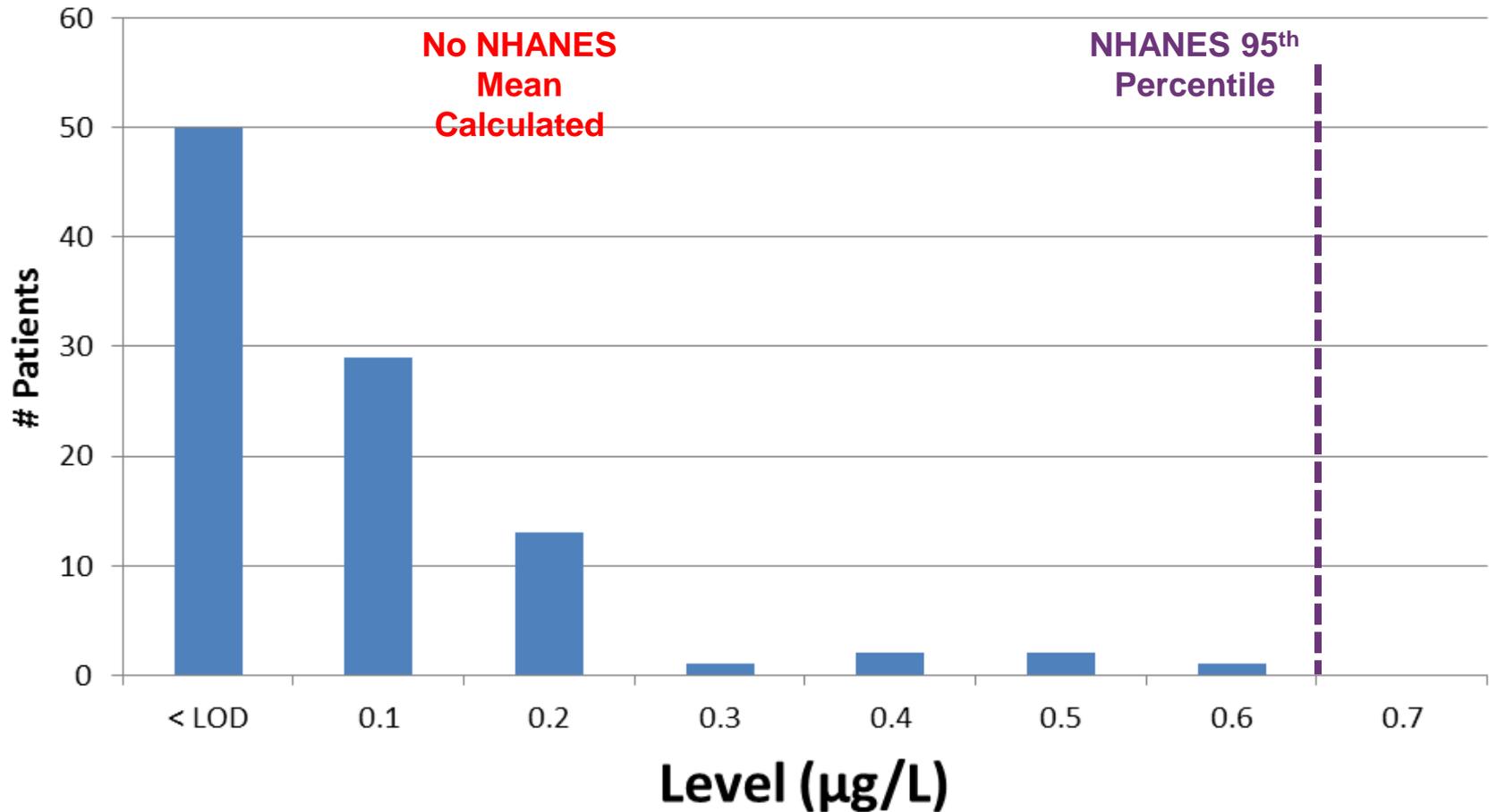


# PFOSA Distribution of Results

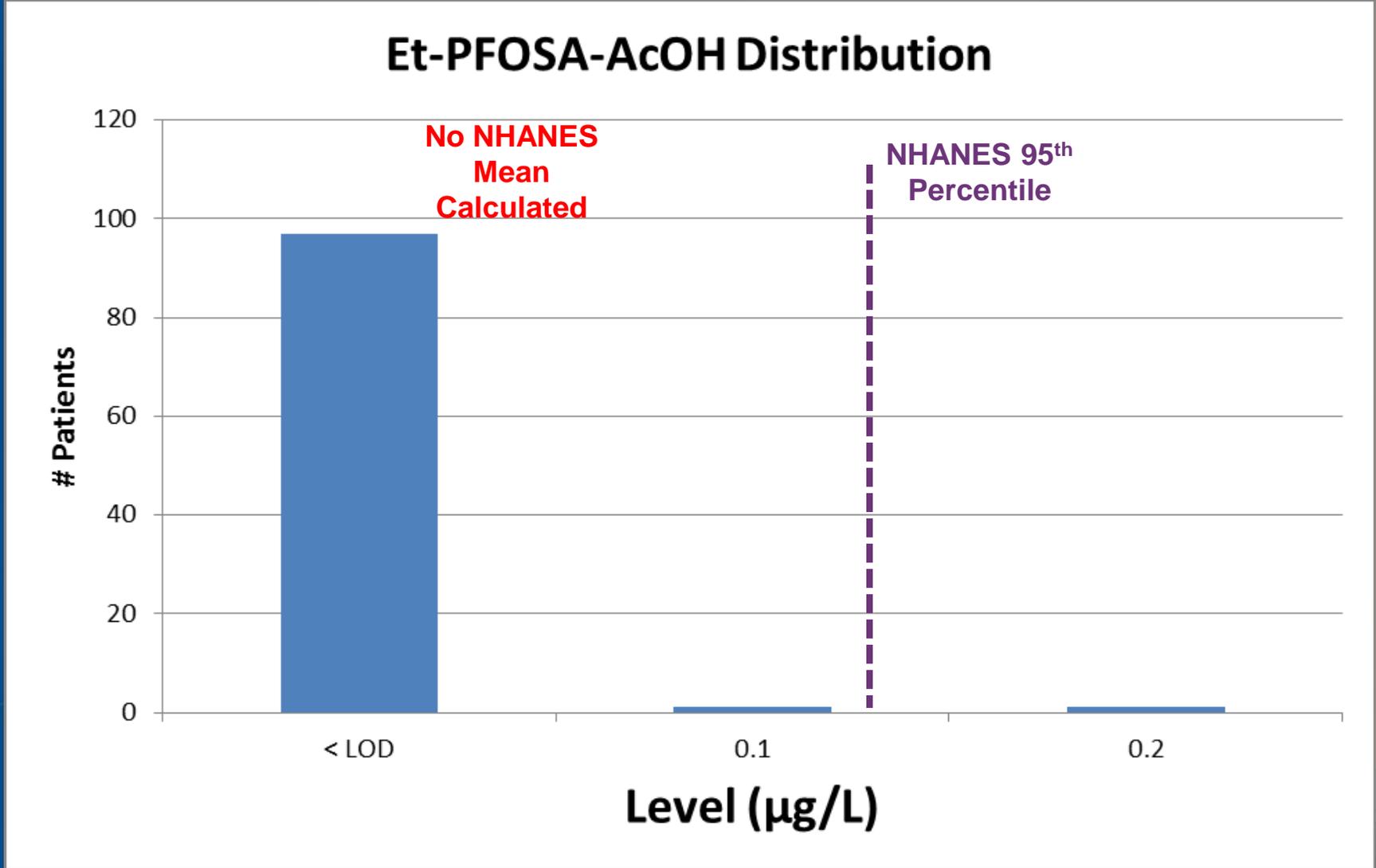


# Me-PFOSA-AcOH Distribution of Results

## Me-PFOSA-AcOH Distribution



# Et-PFOSA-AcOH Distribution of Results

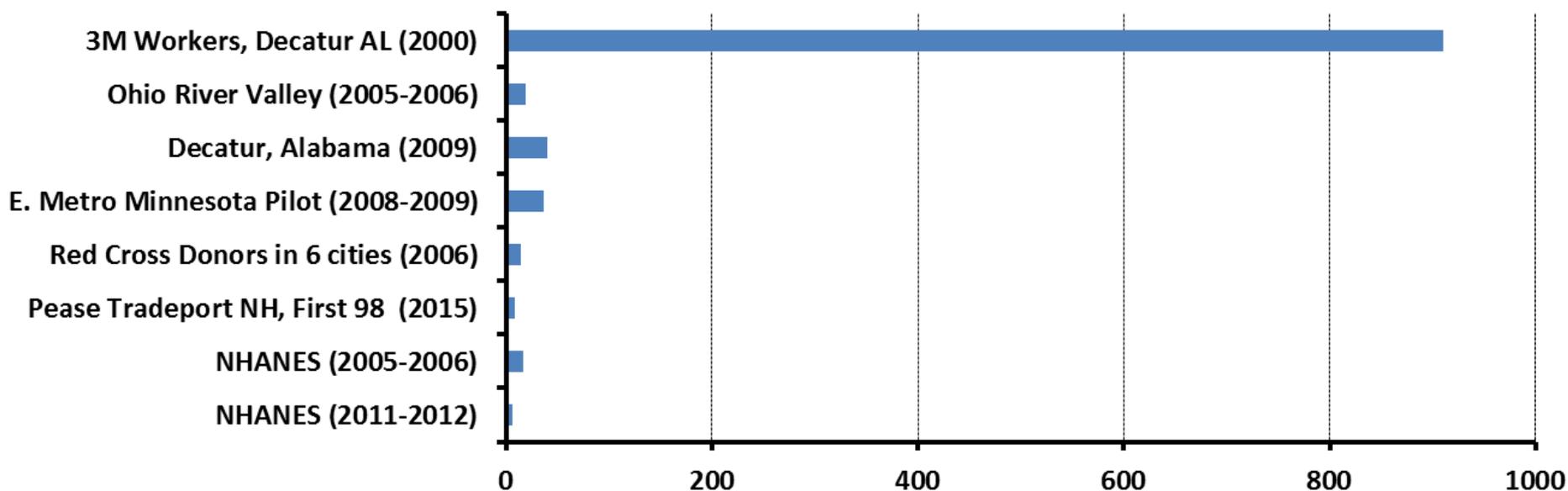


# Summary

- The average levels of PFOA, PFOS, and PFHxS were higher than the national averages.
- The levels of the other PFCs were similar or lower than the national comparisons.
- Overall the levels of PFOA, PFOS, and PFHxS are lower than what has been seen in other environmentally exposed communities and chemical plant workers

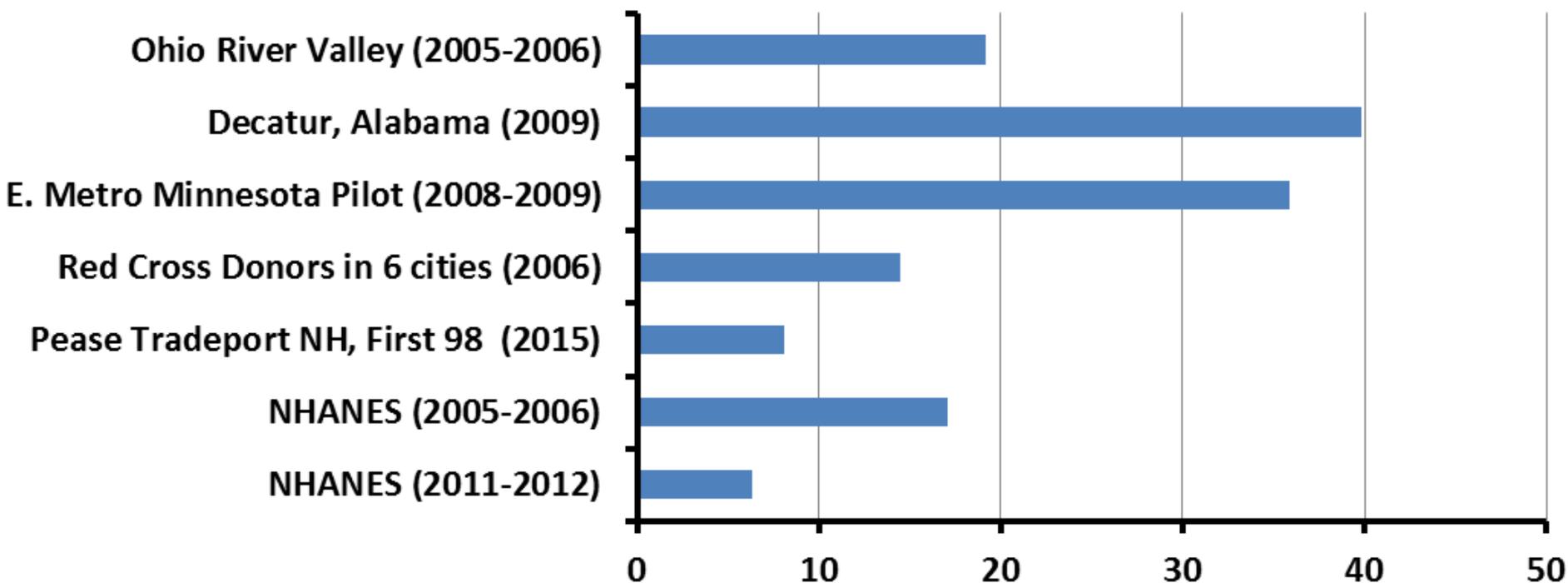
# PFOS Comparison to Other Study Populations

PFOS Geometric Mean Serum Concentration ( $\mu\text{g}/\text{L}$ ) in Various Study Populations  
(Chemical Workers, Environmentally Exposed Communities, & General U.S. Population)



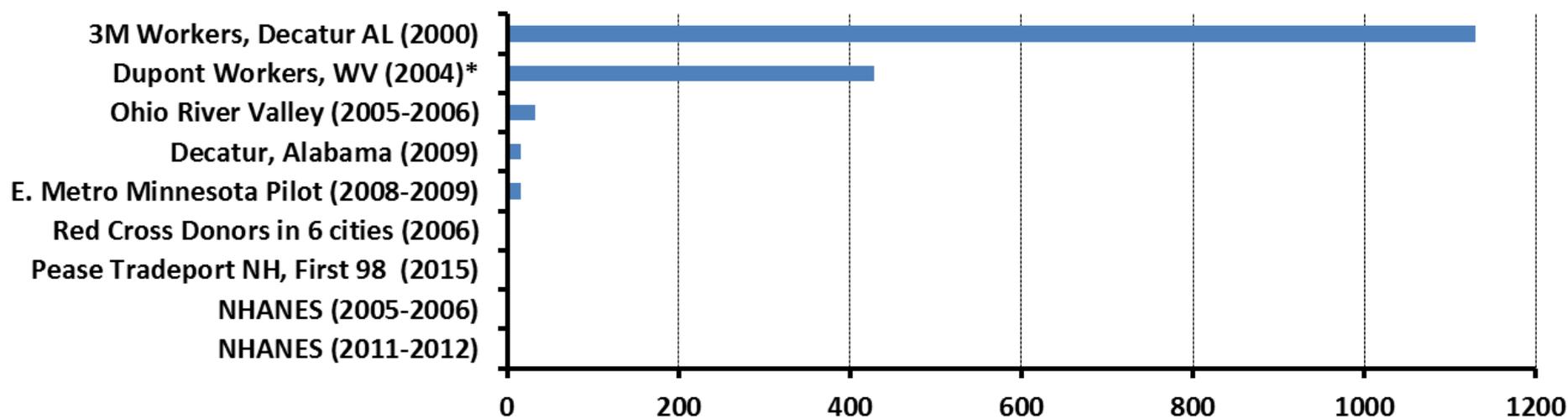
# PFOS Comparison to Other Study Populations

PFOS Geometric Mean Serum Concentration ( $\mu\text{g/L}$ ) in Various Study Populations (Environmentally Exposed Communities, & General U.S. Population)



# PFOA Comparison to Other Study Populations

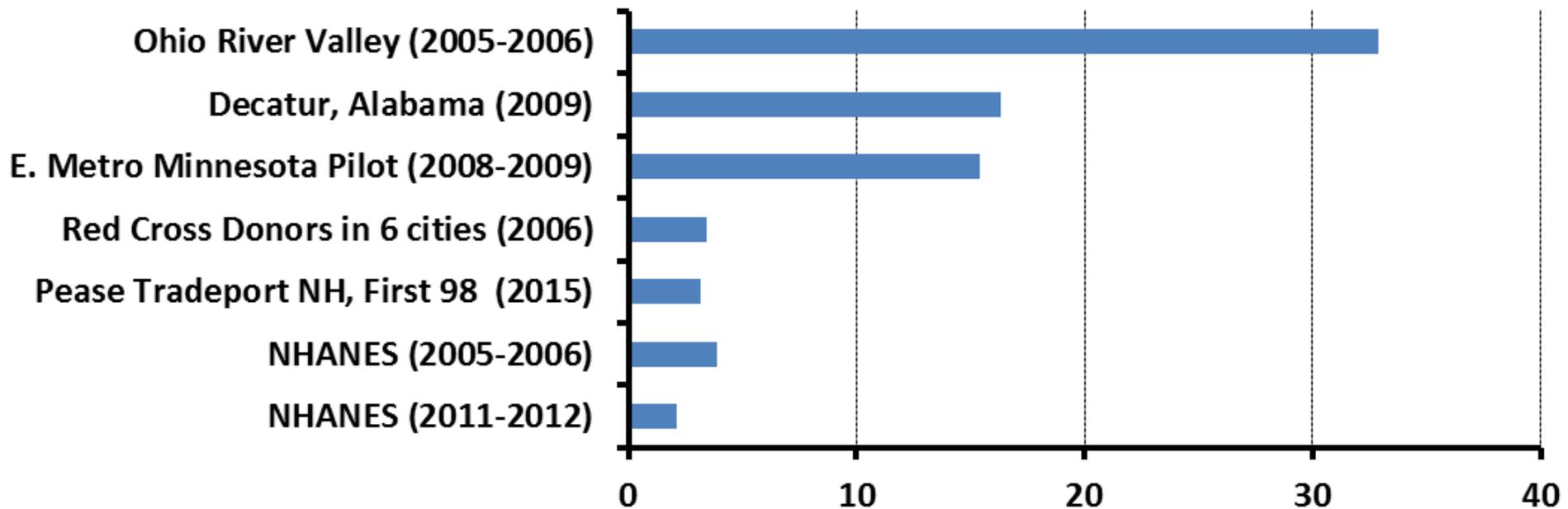
**PFOA Geometric Mean (unless otherwise noted\*) Serum Concentration ( $\mu\text{g}/\text{L}$ ) in Various Study Populations (Chemical Workers, Environmentally Exposed Communities, & General U.S. Population)**



\* Indicates Arithmetic mean reported (instead of geometric mean). Arithmetic mean is usually higher than the geometric mean.

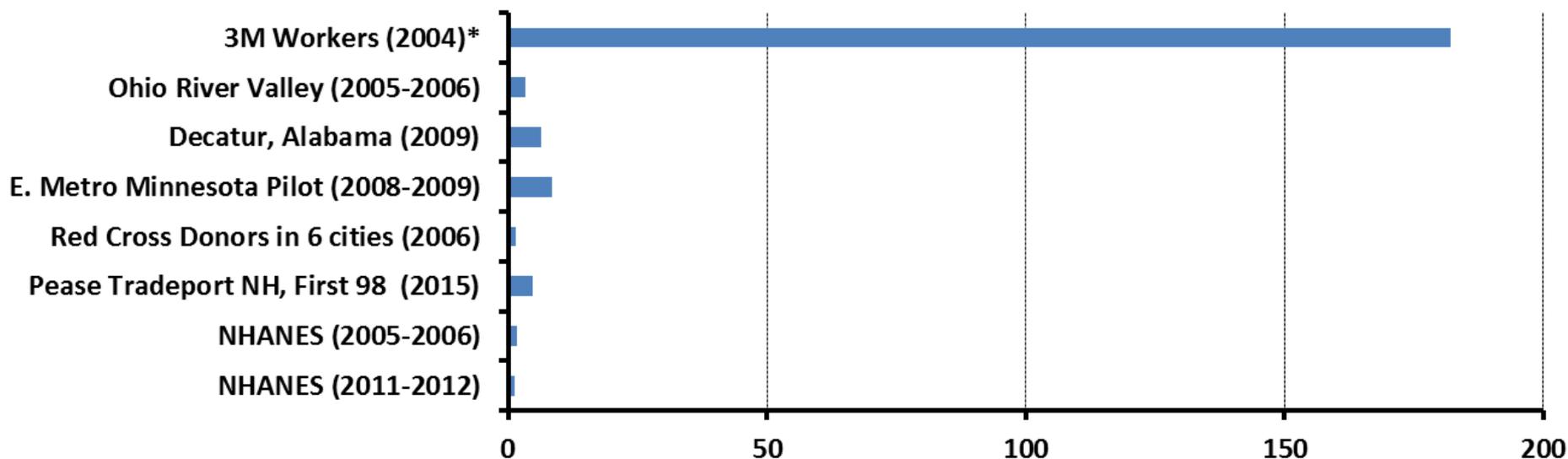
# PFOA Comparison to Other Study Populations

**PFOA Geometric Mean Serum Concentration ( $\mu\text{g/L}$ ) in Various Study Populations (Environmentally Exposed Communities, & General U.S. Population)**



# PFHxS Comparison to Other Study Populations

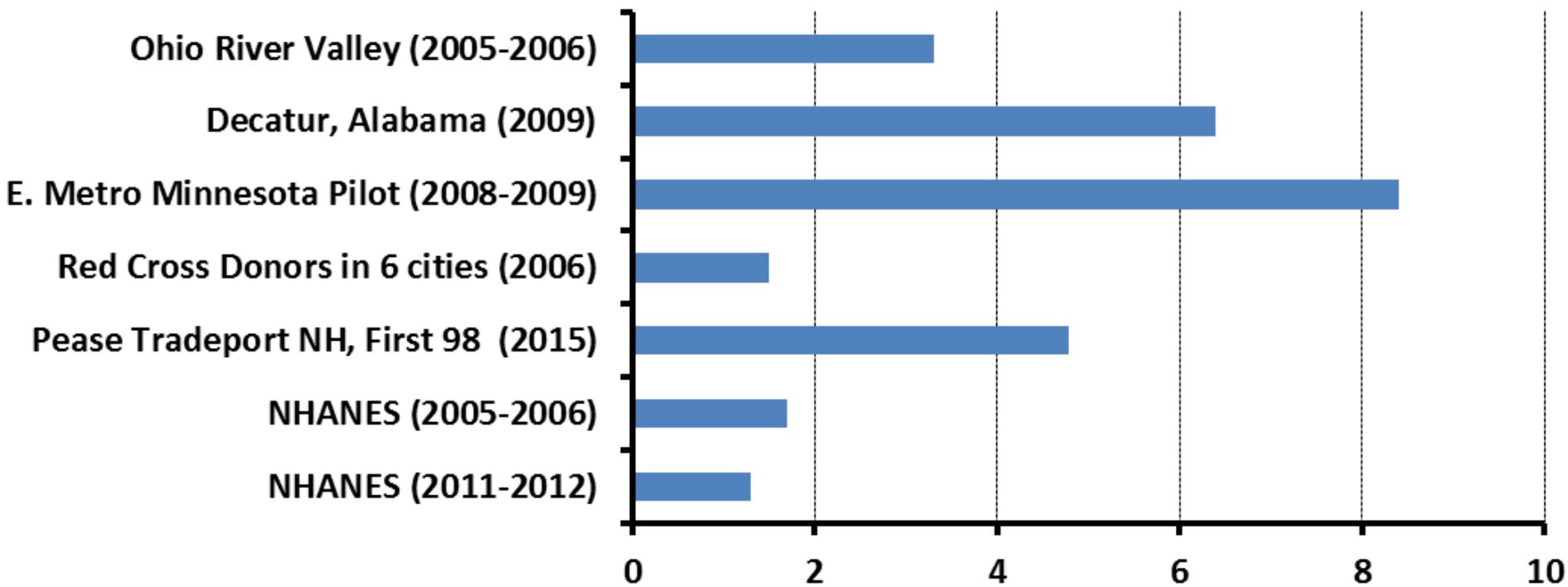
PFHxS Geometric Mean (unless otherwise noted\*) Serum Concentration ( $\mu\text{g/L}$ ) in Various Study Populations (Chemical Workers, Environmentally Exposed Communities, & General U.S. Population)



\* Indicates Arithmetic mean reported (instead of geometric mean). Arithmetic mean is usually higher than the geometric mean.

# PFHxS Comparison to Other Study Populations

PFHxS Geometric Mean Serum Concentration ( $\mu\text{g/L}$ ) in Various Study Populations (Environmentally Exposed Communities, & General U.S. Population)



# References for Study Comparisons

| References for Study Population Graph Comparisons: |  |
|--|--|
| 3M workers(PFOS and PFOA)                          | Olsen GW, et al. Epidemiologic assessment of worker serum perfluorooctanesulfonate (PFOS) and perfluorooctanoate (PFOA) concentrations and medical surveillance examinations. J  |
| 3M workers (PFHxS)                                 | Olsen GW, et al. Half-life of serum elimination of perfluorooctanesulfonate,perfluorohexanesulfonate, and perfluorooctanoate in retired  |
| Dupont workers                                     | Sakr CJ, et al. Cross-sectional study of lipids and liver enzymes related to a serum biomarker of exposure (ammonium perfluorooctanoate or APFO) as part of a general health survey in a cohort of occupationally exposed workers. J Occup Environ Med. Oct 2007;49(10):1086-1096.   |
| Ohio River Valley                                  | Frisbee et al. The C8 Health Project: Design, methods, and participants. Env Health Persp 2009;117(12):1873-82.  |
| Decatur, Alabama                                   | ATSDR. Exposure Investigation Report: PFC serum sampling in the vicinity of Decatur, AL Morgan, Lawrence, and Limestone Counties. Apr 2013. Accessed at: <a href="http://www.atsdr.cdc.gov/HAC/pha/Decatur/Perfluorochemical_Serum%20Sampling.pdf">http://www.atsdr.cdc.gov/HAC/pha/Decatur/Perfluorochemical_Serum%20Sampling.pdf</a> |
| East Metro Minnesota pilot                         | Minnesota Dept of Health. East Metro PFC biomonitoring pilot project. Jul 2009. Accessed at: <a href="http://www.health.state.mn.us/divs/hpcd/tracking/biomonitoring/projects/pfcfinalrpt2009.p">http://www.health.state.mn.us/divs/hpcd/tracking/biomonitoring/projects/pfcfinalrpt2009.p</a>   |
| Red Cross donors                                   | Olsen GW, et al. Decline in PFOS and other PFCs in American Red Cross adult blood donors, 2000-2006. Environ Sci Technol. 2008;42:4989-4995.   |
| NHANES   | CDC. Fourth National report on human exposure to environmental chemicals. Feb 2015. Accessed at: <a href="http://www.cdc.gov/exposurereport/">http://www.cdc.gov/exposurereport/</a>   |

# Perfluorohexane Sulfonic Acid (PFHxS)

- Found in firefighting foams called aqueous film-forming foams (AFFF)
- Detected in the Haven well (April-May 2014) possibly from contamination with AFFF used while Pease operated as an Air Force base
- Also found in stain resistant sprays for carpets and furniture
- PFHxS is one of the main PFCs commonly found in studies analyzing household dust (along with PFOS and PFOA)
- As with PFOS and PFOA, no one can be sure about the health effects of PFHxS on humans.

# Responding to Your Concerns

- Northern New England Poison Center (NNEPC) is establishing an inquiry line for questions about individual results
- DHHS will be hosting a healthcare provider Webinar next week to inform healthcare providers
- Working with the Boston Environmental Health Medical Group and the CDC/ATSDR
- Working closely with Department of Environmental Services
- Coordinate our efforts with the Community Advisory Board (CAB)

# Thank You to our Partners

- Community Advisory Board (CAB)
- Senator Shaheen and Senator Ayotte
- CDC/ATSDR
- Dr. Alan Woolf at Boston Children's Hospital, Environmental Medical Group
- Northern New England Poison Center
- NH Department of Environmental Services
- Portsmouth Regional Hospital

# Thank You!

Questions?