Environmental Occupational Health sciences Institute
Rutgers, The State University of New Jersey
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Rutgers Pilot Study of Perfluorochemical Compounds in Paulsboro Residents

PRELIMINARY STUDY REPORT

September 13, 2017

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BACKGROUND

Who we are

- A research team from Rutgers University
  - We are: environmental and public heath scientists, doctors, community outreach workers and other researchers.
- We are all members of The Center for Environmental Exposures and Disease (CEED)
  - CEED scientists work in and with NJ communities to understand, detect, prevent and solve environmental health problems.

Why we did the study

- In 2009, a chemical called perfluorononanoic acid (PFNA) was discovered in the Paulsboro public water supply.
  - PFNA is one of a group of chemicals called perfluorochemical compounds (PFC).
- These chemicals are concerning because:
  - They spread easily in the environment
  - They stay in our bodies and the environment for many years.
  - High blood levels of some PFC have been associated with some poor health effects.

What are perfluorochemical (PFC) compounds?

- PFC compounds are used in many manufacturing processes because they are resistant to heat, and repel water, and oil. Industries and jobs they are used in include:
  - Automotive, aerospace electronic, firefighting and others
- PFC are also used in many products we buy and have in our homes, including:
  - Carpeting, upholstery, fire-resistant clothing, food wrapping, non-stick cookware and others

PFNA was in Paulsboro water

- The New Jersey Department of Environmental Protection (NJDEP) recommends levels of no more than 0.01 PPB (parts per billion) in drinking water
- PFNA levels in some Paulsboro water samples were 10 times higher than the recommended level
- Since April 2014, Paulsboro's city water has been filtered to take out PFC from the water that goes to Paulsboro homes and businesses

ABOUT OUR STUDY

The lawsuit

- Because of the PFNA contamination in Paulsboro water, there was a class action lawsuit and settlement
    - The people who lived in Paulsboro and were part of the lawsuit were offered one PFC blood test
- We invited anyone who had a PFC test from the lawsuit to join our study.

What questions did the study try to answer?

1. What are the levels of PFNA and other PFC in blood of Paulsboro residents?
2. How do PFC levels compare those of all US residents?
    - Does this differ among people of different ages, gender, or race-ethnicity?
3. Were there any associations between PFC levels and self-reported health conditions?

Who could be in the study?

- Adults and children who were part of the class action lawsuit and had a copy of their PFC serum level test results.

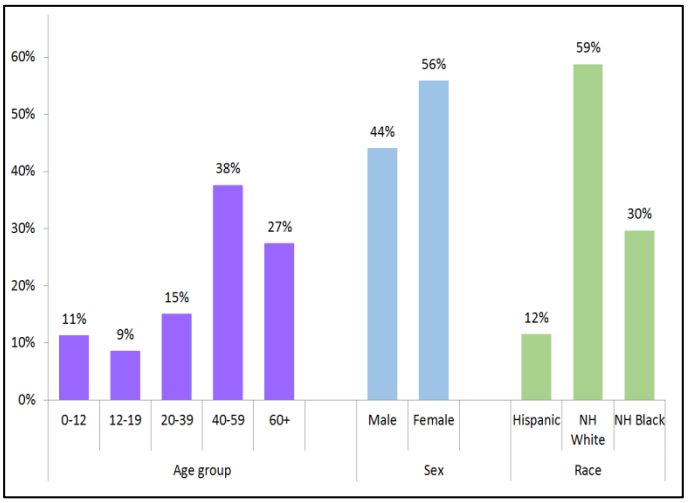
How did the study work?

- Our research team met with eligible participants at the Independent Oil Workers Union Hall during six sessions between November 2016 and January 2017.
- A copy of the PFC blood test results was scanned onto secured servers, along with a one-page cover sheet that collected information on people's age, race/ethnicity, sex and address.
- Participants had the option to use our laptops to fill out an online survey about their drinking water habits, jobs, and health conditions.
- People who could not attend the in-person meetings but wanted to be in the study could be in the study by mail.

How did we compare PFC blood levels in Paulsboro residents to US residents?

- The US Center for Disease Control and Prevention (CDC) conducts a nationwide biomonitoring program, including blood tests for PFC, that is part of the National Health and Nutrition Examination Survey (NHANES)
- NHANES provides information on levels of chemicals in blood of people in the U.S.
- We compared PFC blood levels in study participants to the PFC blood levels across the U.S. from the most recently available NHANES data - 2013 and 2014

WHAT WE FOUND

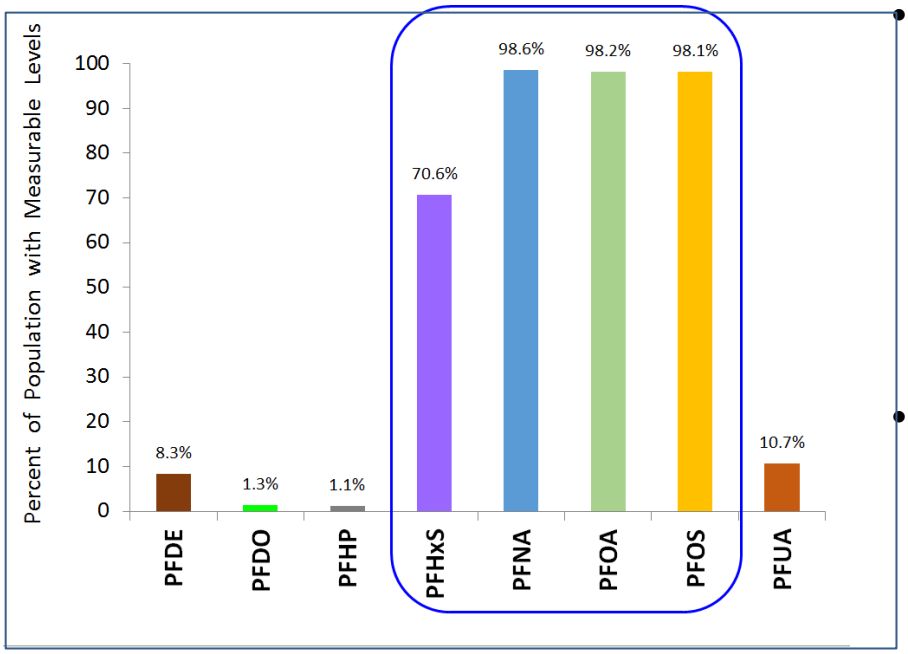


Who enrolled in the study?

- 194 people enrolled in the study
- Slightly more females than males were in the study
  - The percent of men and woman in the study is similar to that in all of Paulsboro
- People of different race and ethnic groups enrolled in the study.
  - The percent of people of different race and ethnic groups in the study is similar to that in all of Paulsboro.
- There were more older people than younger people enrolled in the study.

TECHNICAL NOTE: Because the people who enrolled in the study were on average older than in the Paulsboro's population, we have adjusted the study results shown in the following tables so they are more like what you would see for all people in Paulsboro.

What PFC were found in study participant's blood?



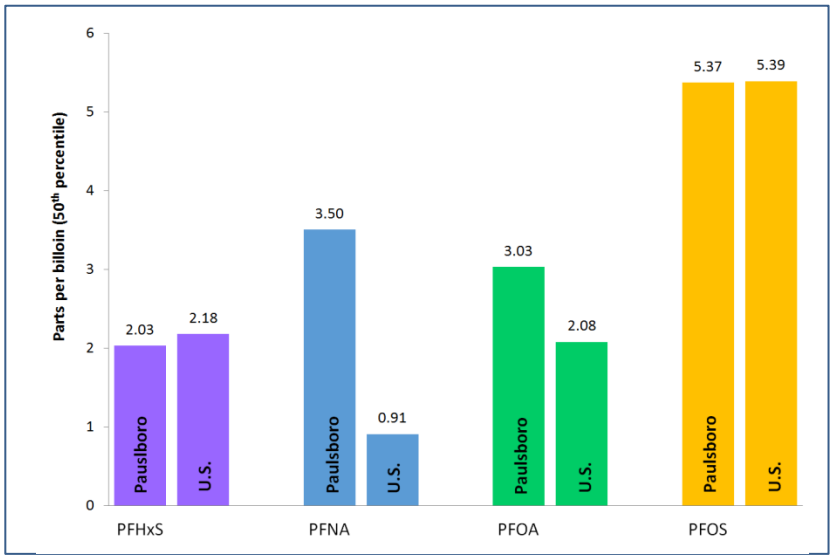
- 4 PFC were found in most study participants' blood
  - PFHxS was found in over 7 out of every 10 people tested
  - PFOA, PFOS and PFNA were found in more than 9 out of every 10 people tested
- These are the same PFC found in most people in the United States

Are the levels of these 4 PFC different from other people in the US?

PFOS and PFHxS blood levels in study participants were the same as those in the general US population.

PFOA and PFNA blood levels were higher in study participants than in the general U.S. population.

- The higher PFNA blood levels were expected because the Paulsboro drinking water had been contaminated with PFNA.
- PFOA was also found in Paulsboro drinking water, but at lower levels than PFNA.



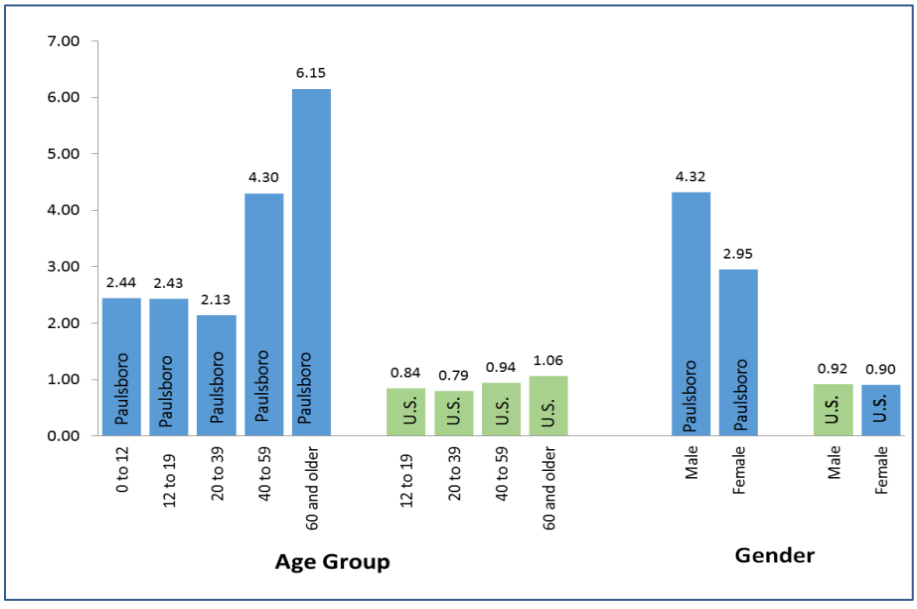
TECHNICAL NOTE: The levels are shown as the 50th percentile, meaning half the people had a result below and half had a result above the values shown.

Are the levels of PFNA different in older and younger people or in men and women?

Yes, Overall PFNA levels are higher in older people than younger people in Paulsboro

- This pattern is also seen in the US population and other studies of PFC in people's blood
- This is partly because of different water drinking patterns in different age groups.

- PFNA blood levels were higher in children than younger adults (age 20 to 39).
  - This is seen in other studies and is thought to reflect the amount of water people drink and the way people of different ages process of PFC.
- PFNA levels were higher in males than in females.
  - In the US population the levels are about the same in males and females.



HEALTH SURVEY RESULTS

HEALTH SURVEY RESULTS

What do the levels of PFC in blood mean for health?

- We do not know if the levels of PFC in people's blood in Paulsboro may cause an increased risk of any health problems.
- Scientists are working to better understand how different levels of PFC might affect people's health.
- The health effects of PFNA has not been studied as much as other some other PFC. Some, but not all, studies in people have found increased levels of some PFC to be associated with:
    - Effects on the developing fetus and child, including by possible changes in growth, learning, and behavior.
    - Decreased fertility and interference with the body's natural hormones.
    - Increased cholesterol levels in blood.
    - Effects on the immune system.
    - Increased risk for kidney and testicular cancer.
- It has been not firmly established which, if any, specific health risks occur in people from exposures to PFC or what particular levels of PFC in blood are related to the above conditions.
    - This is because studies have all not found the same results, and
    - Many of these studies have been preliminary studies that just look at a snapshot of people's health and exposure in time.

What we found

- 116 people in the study also completed the longer survey.
- Some questions on the survey asked whether the person had ever been "diagnosed by a doctor with" specific health conditions.
    - Health conditions have been reported in some other studies to occur more frequently in people with higher levels of some PFC. We asked about the following health conditions on the survey:
        - Circulatory conditions like high blood pressure and high cholesterol;
        - Autoimmune diseases like rheumatoid arthritis and ulcerative colitis; and
        - Some kinds of cancer.

- In our study, we did not find any strong associations between PFNA levels in participants' blood and any of the health conditions listed above.
- Our data suggest that participants who said a doctor had diagnosed them with high cholesterol, on average, had higher levels of PFNA
    - Did PFNA cause higher cholesterol levels or other health effects among Paulsboro residents?
    - **We cannot answer that question at this time. To begin to answer that question we would need:**
        - A much larger study with hundreds or even thousands of participants
        - To collect information about people's health directly. One way to do this would be to take blood tests for the health condition ourselves (like blood cholesterol level) and/or get copies of peoples medical records.
        - To follow people over time to see if or how their health changes,
        - To make sure we can account for other factors associated with these health conditions.
- Cholesterol levels vary widely among different people and they can be effected by many things (from https://www.nhlbi.nih.gov/files/docs/public/heart/cholesterol_atglance.pdf)

Here is some information about high cholesterol and actions you can take. We suggest you talk to you doctor about your cholesterol level and if you need to be tested.

Things you cannot do anything about can affect your cholesterol levels:

- Age—As people get older, their cholesterol levels may get higher
- Gender—Men often have higher cholesterol levels then women
- Heredity—High cholesterol can run in families.

These you can do something about:

- Diet—Saturated fat and cholesterol in food may increase your cholesterol level
- Weight—Being overweight tends to increase your cholesterol level
- Physical activity—Regular physical activity can help lower LDL (bad) cholesterol and raise HDL (good) cholesterol.

- In our study we were able to account for differences in people's age, gender, race and smoking (ever, former, never), and body mass index (a combined measure of weight and height).
    - We could not account for factors like heredity, diet or physical activity

Recommendations and next steps

Paulsboro's community water supply is now filtered to remove PFC, including PFNA. The Paulsboro water supply is monitored for PFC by the NJ Department of Environmental Protection

- We recommend you keep a copy of your PFC blood result for you records
- If you have a health care provider, give him or her a copy of your PFC blood result for your medical record and give your doctor a copy of this report
- Screening tests for blood cholesterol are generally recommended for adult men and women at different ages, depending on individual risk levels. Consult with your health care provider about testing your blood cholesterol level.
- Because PFC are slowly excreted from the body, we expect that levels of PFNA among Paulsboro residents will decrease over time.
    - How quickly PFNA is excreted is not known
    - It will most likely take years, so we do not know when levels will return to levels similar to the general population.
- Consider joining a new study conducted by Rutgers (which may shed light on the excretion rates)

This report was prepared by members of the Rutgers Environmental Health and Occupational Health Sciences Institute (EOHSI) and School of Public Health, including:

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This report, and other information about PFC in New Jersey, can be found online at:
http://eohsi.rutgers.edu/news-and-events/community-outreach

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