

Clinical Care for Patients Affected by PFAS Exposure

Maine Academy of Family Medicine Annual Update

Rockport, Maine

March 20, 2026

Rachel Criswell, MD, MS, IBCLC

Attending Physician, Skowhegan Family Medicine, Redington-Fairview General Hospital

Assistant Professor, Tufts University School of Medicine

Adjunct Professor, Department of Epidemiology, Dartmouth Geisel School of Medicine

Overview

- What are PFAS?
 - PFAS in Maine
 - PFAS as a health risk factor
- How to approach a patient with questions about PFAS
 - Who to screen
 - How to order a test
 - What to do next

What are PFAS?

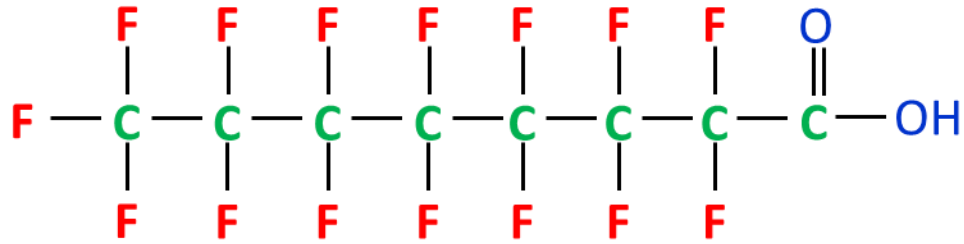
- Per- and polyfluoroalkyl substances
- Added to fabrics, cookware, and food packaging to resist heat, stains, grease, and water



<https://riversideca.gov/press/understanding-pfas>

Slide courtesy of Dr. Abby Fleisch

Alphabet soup

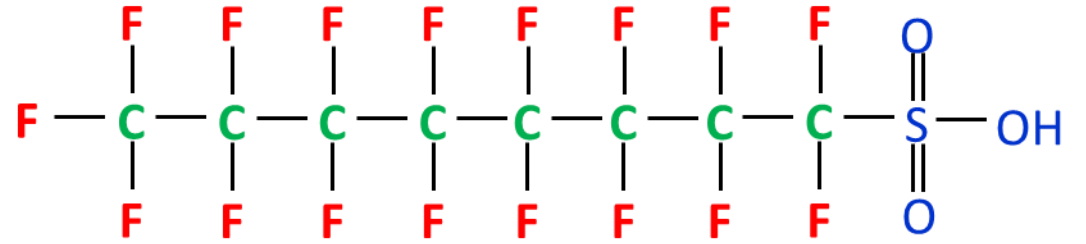


Perfluorooctanoic acid (PFOA)
8 carbons

Perfluoroheptanoic acid (PFHpA)
7 carbons

Perfluorononanoic acid (PFNA)
9 carbons

Perfluorodecanoic acid (PFDA)
10 carbons



Perfluorooctane sulfonic acid (PFOS)
8 carbons

Perfluorohexane sulfonic acid (PFHxS)
6 carbons

Perfluorobutane sulfonic acid (PFBS)
4 carbons

Half lives of PFAS

PFAS	T_{1/2}
PFOA:	4 years
PFOS:	6 years
PFHxS:	8 years
PFNA:	3 years
PFHpA:	60 days

PFAS in the US

- Research suggested that PFOS and PFOA were associated with high cholesterol and cancer
- 3M and Dupont voluntarily began to phase out production of PFOS and PFOA starting in 2000
- Blood levels of long-chain PFAS have decreased but are still detectable in >95% of population
- Short-chain PFAS entering the market
- New federal PFAS water standard but no production regulation

Human PFAS exposure

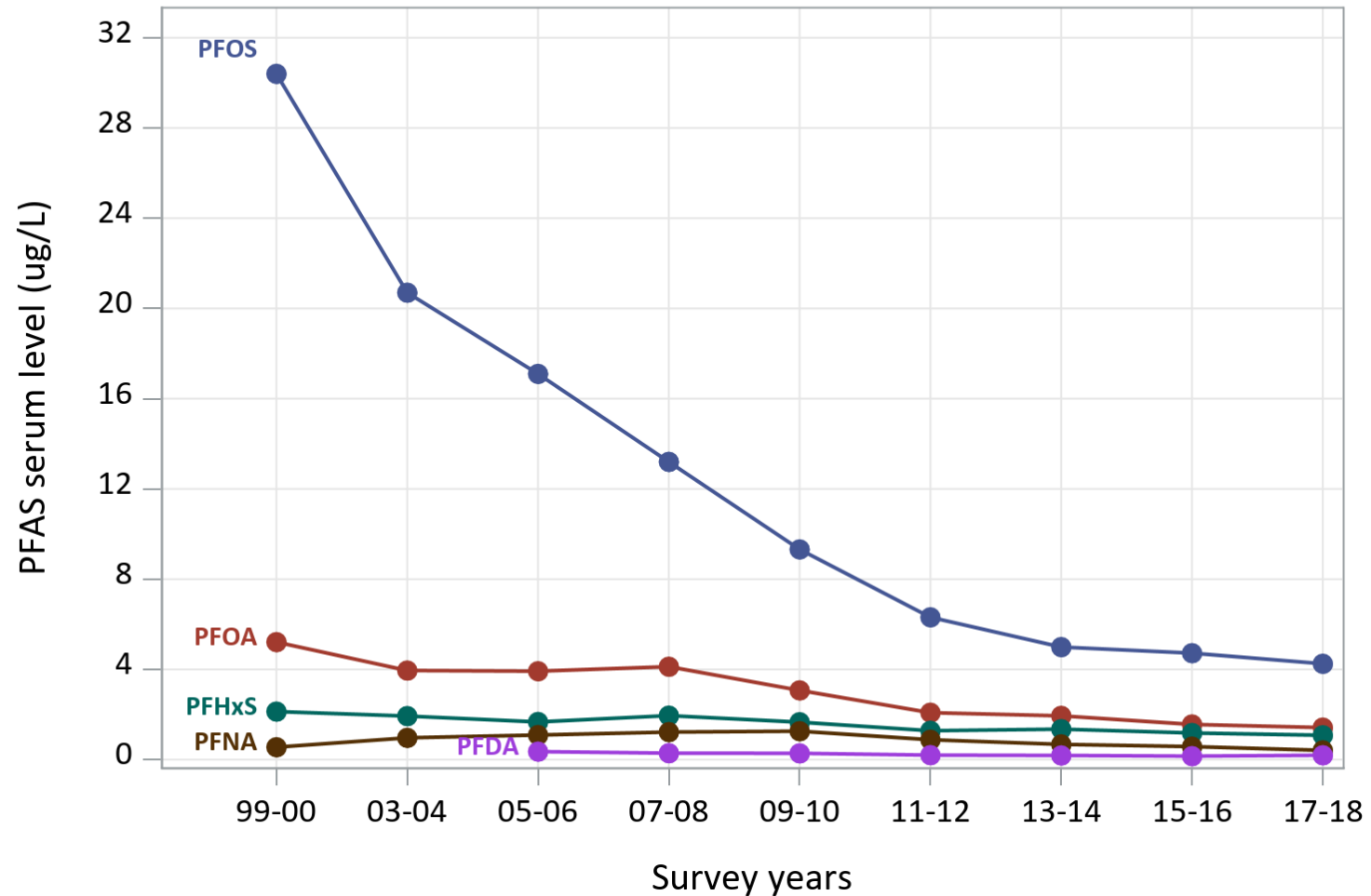
- Humans are exposed mainly through food



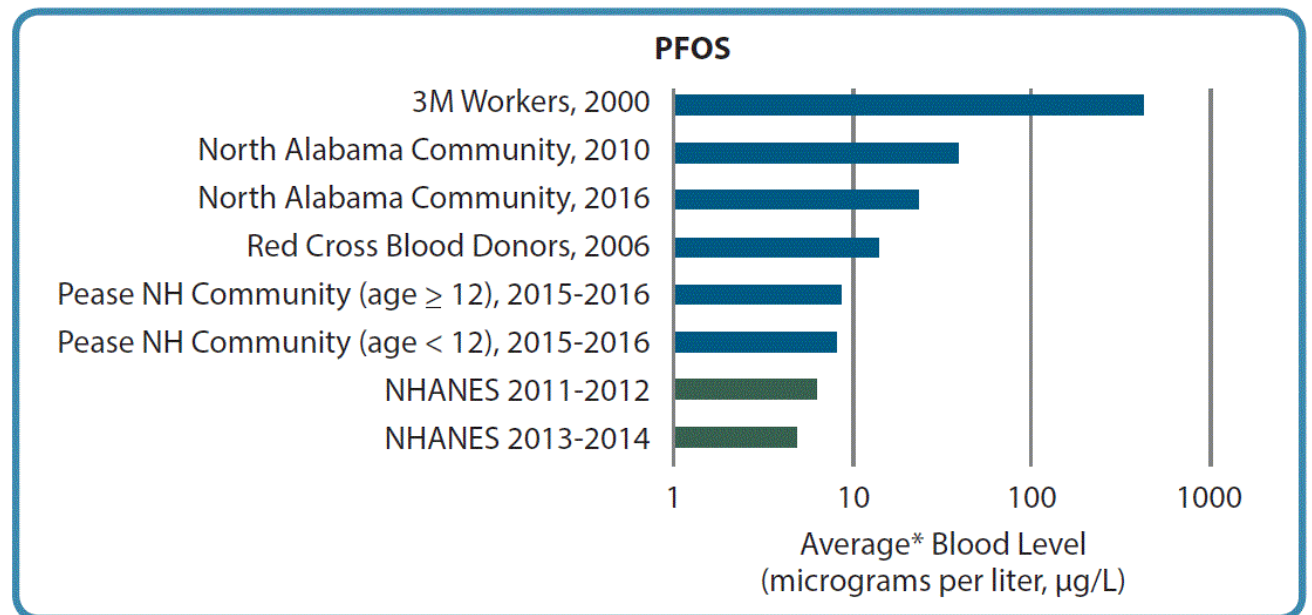
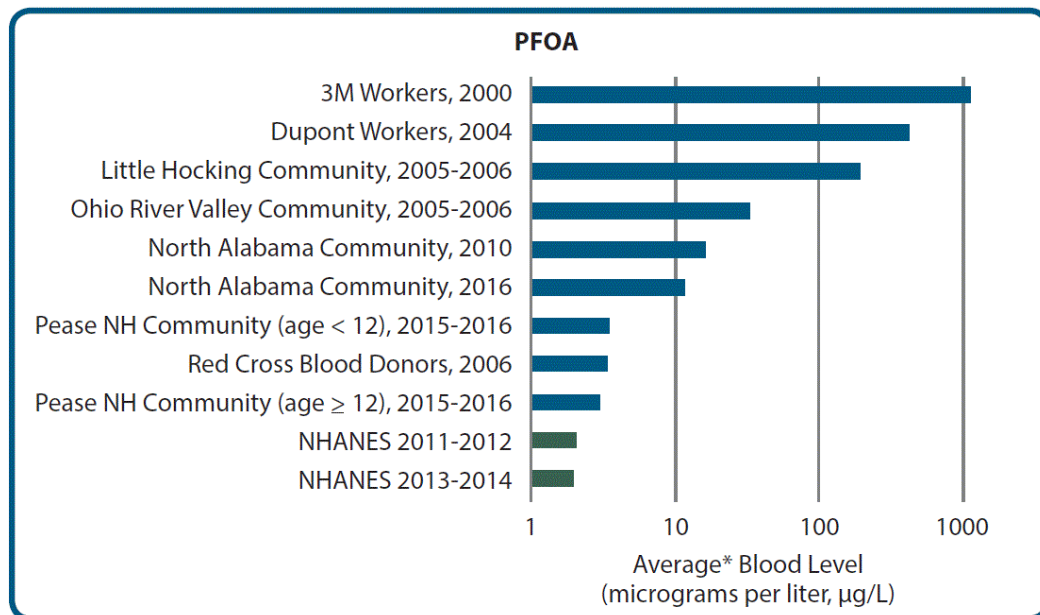
- Communities with high PFAS exposure located near military bases or industries
 - Residents exposed by drinking contaminated water
- >9,550 impacted communities across all states

PFAS in everyone's blood

National biomonitoring - PFOS, PFOA, PFHxS, PFNA and PFDA
Geometric mean serum levels for children 12 years and older and adults



PFAS in blood of highly exposed populations



Health Outcomes Associated with Increased PFAS Exposure

Sufficient evidence

- Decreased antibody response (adults and children)
- Decreased infant and fetal growth
- Dyslipidemia (adults and children)
- Increased risk of kidney cancer (adults)

Limited evidence

Association may be due to chance or bias, more studies needed

- Increased risk of breast cancer (adults)
- Increased risk of testicular cancer (adults)
- Increased risk of ulcerative colitis (adults)
- Increased risk of pregnancy-induced hypertension (gestational hypertension and preeclampsia)
- Liver enzyme alterations (adults and children)
- Thyroid disease and dysfunction (adults)

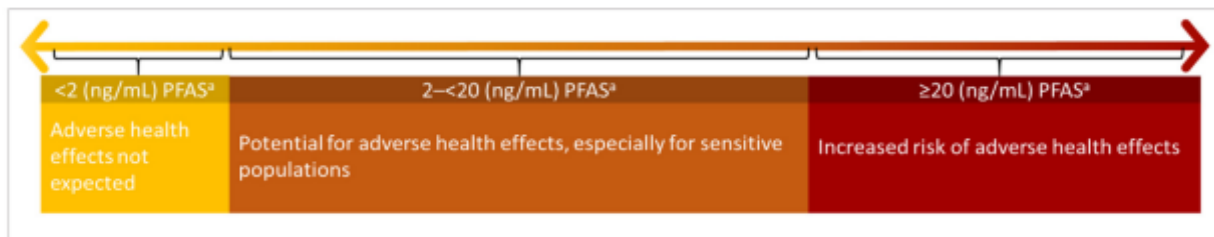


FIGURE 5-5 Graphical display of levels of PFAS to inform clinical care for the sum of MeFOSAA, PFHxS, PFOA (linear and branched isomers), PFDA, PFUnDA, PFOS (linear and branched isomers), and PFNA in serum or plasma.

Figure 3: Range of PFAS Concentrations Detected in Groundwater Samples Statewide

PFAS in Maine

- PFAS-contaminated biosolid spread as fertilizer in central Maine
- DEP measuring PFAS in wells of homes near biosolids application
- Homes with high well water PFAS are near sites of biosolids application
- PFAS concentrations far above health advisories

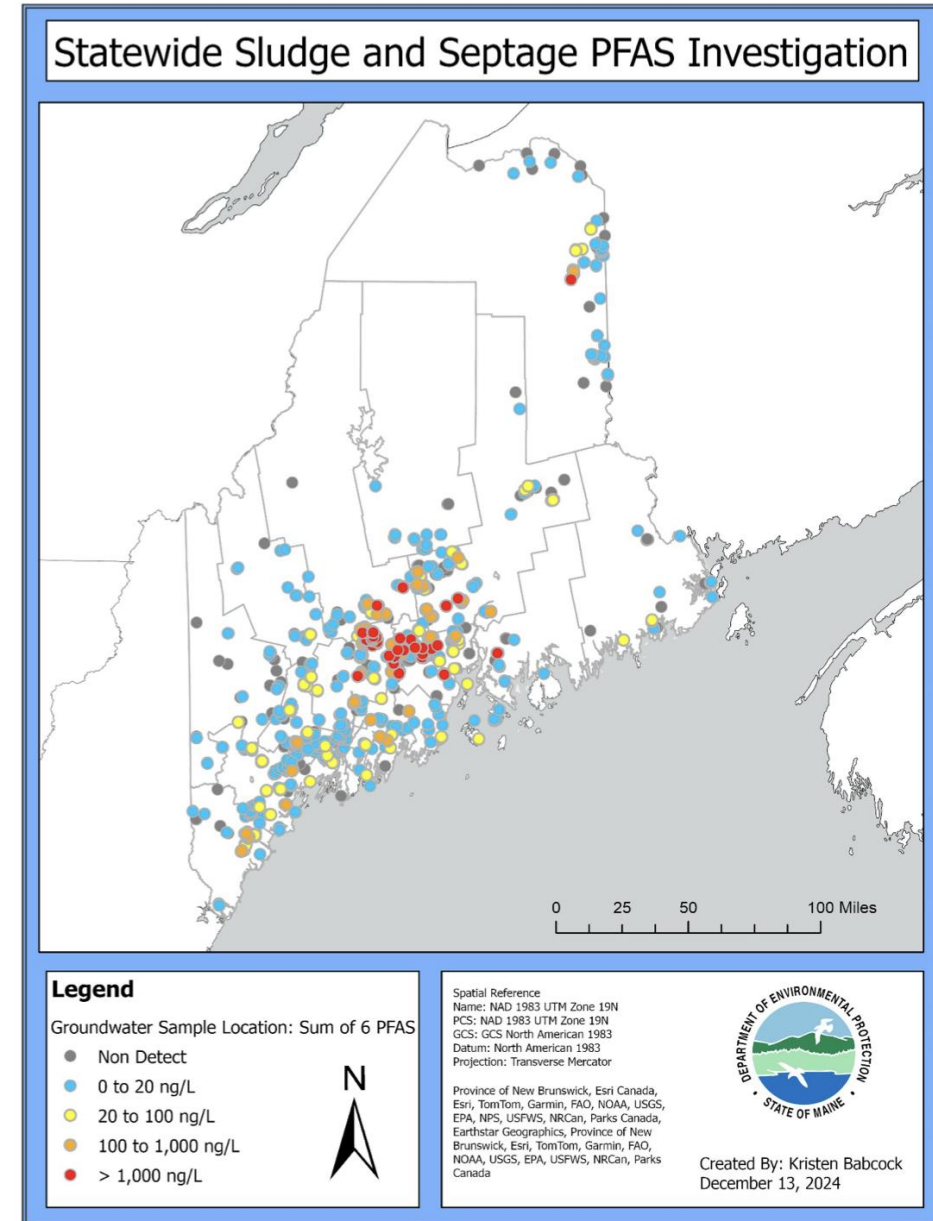


Figure ES-1: Statewide Groundwater Results by Percentage Compared to Maine's Interim Drinking Water Standard

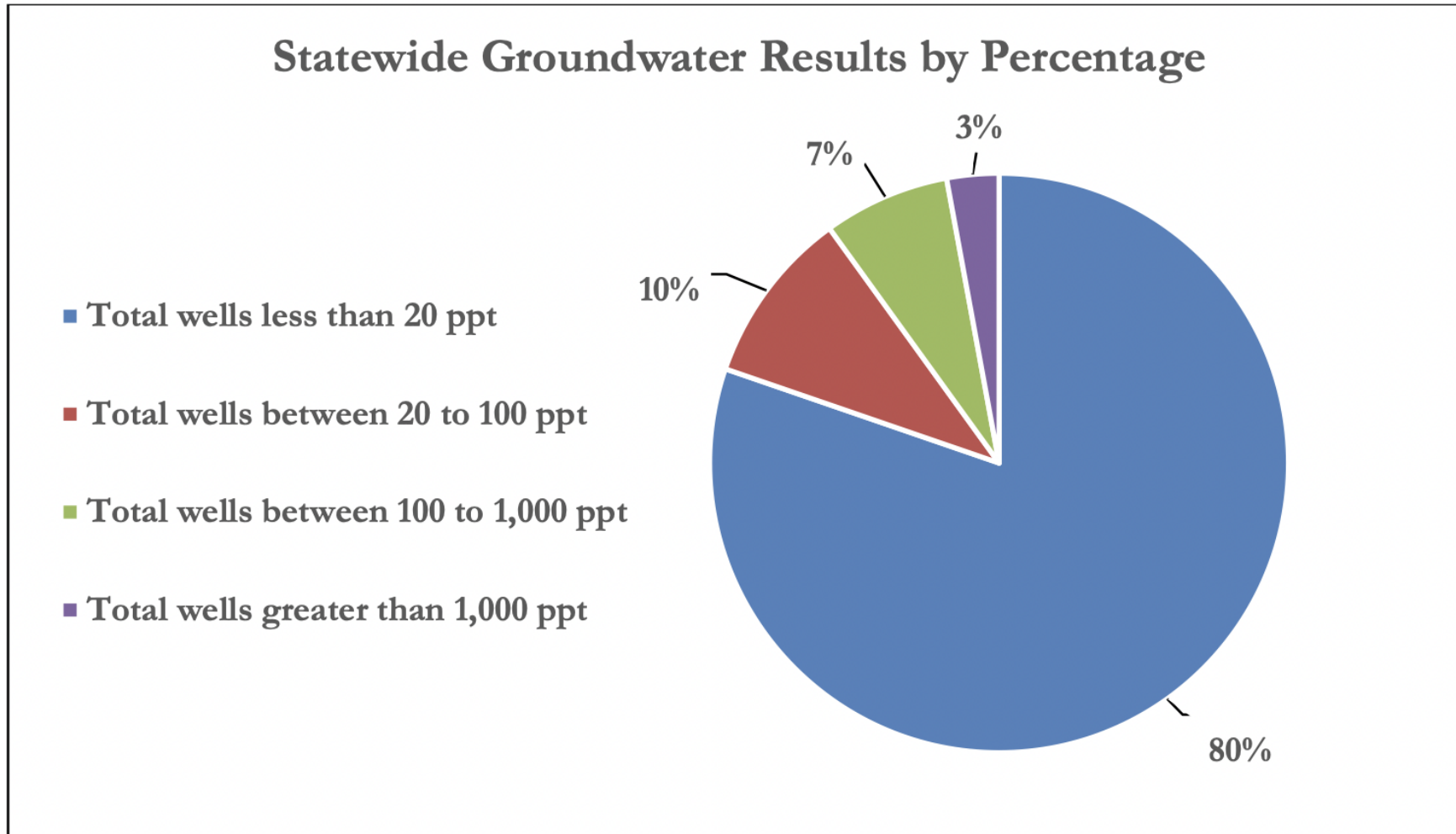
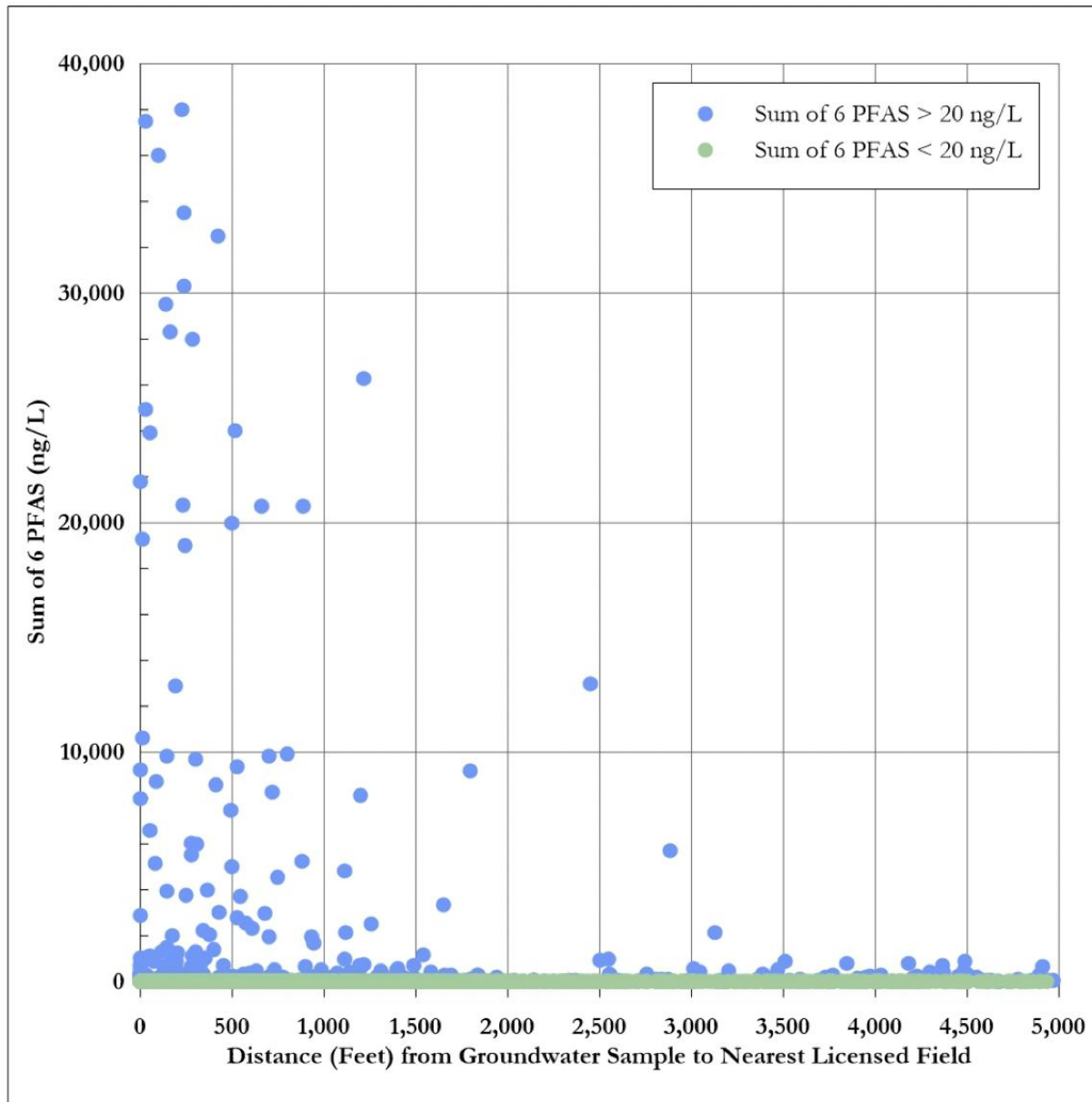


Figure 8: PFAS Concentrations in Groundwater Around Sludge Land Application Sites



[Figure 9](#) shows that Tier 1 sites have had the most significant impact to groundwater. The data collected to date show Class A/Unconfirmed Source sites having the next most significant impact to groundwater. The majority of Class A sites investigated by the Department have been conducted at farms that were receiving and spreading relatively large volumes of Class A materials on a routine schedule (e.g., annually). In most cases, Class A site investigations were initiated due to step-out sampling from an investigation at an adjacent sludge site or were referred to the Department. The Department has also sampled a very limited set of residential gardens that used Class A materials. The limited residential garden dataset showed appreciable detections of PFAS in the soil, but PFAS concentrations

Maine is unique: Possible non-water exposure pathways

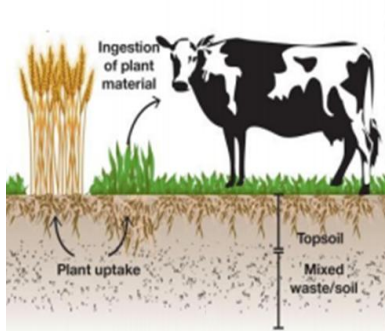


Deer Consumption Advisory

Maine Department of Inland Fisheries and Wildlife, in conjunction with the Maine Center for Disease Control and Prevention (Maine CDC), has detected high levels of PFAS in some deer harvested in the greater Fairfield area and is issuing a do not eat advisory for deer harvested in the area.

On this page:

- [What is the "Do Not Eat" advisory?](#)
- [Why was the advisory issued?](#)
- [What are PFOS and PFAS?](#)
- [Where is the area from which we should avoid eating deer?](#)
- [Why such a large advisory area?](#)
- [What parts of the deer are safe for me to eat?](#)
- [Can't I just cook it to get rid of the PFAS or trim away the fat?](#)
- [How long will the "Do Not Eat" advisory be in place?](#)
- [Why did the state test deer in this area?](#)
- [What animals have been tested for PFAS?](#)
- [What should I do with venison in my freezer from the PFAS "Do Not Eat" advisory area?](#)



PFAS from Biosolids in Maine



Enrolled 147 adults; 58% with high well water PFAS

Serum PFAS concentrations were elevated (e.g., PFOA 4.3 times higher than general U.S. population)

Criswell, et al. Environ Poll. 2025

Drinking water PFAS intake was a strong predictor of serum PFAS

Other strong predictors:

- ▶ Working on a farm where biosolids were applied
- ▶ Eating local eggs

Rokoff, et al. In final preparation. 2025

High water PFAS → greater psychosocial distress

- PFAS-related anxiety, health concerns, stigmatization
- State-dependent anxiety



Scharnetzki & Rokoff, et al. Under Review. 2025

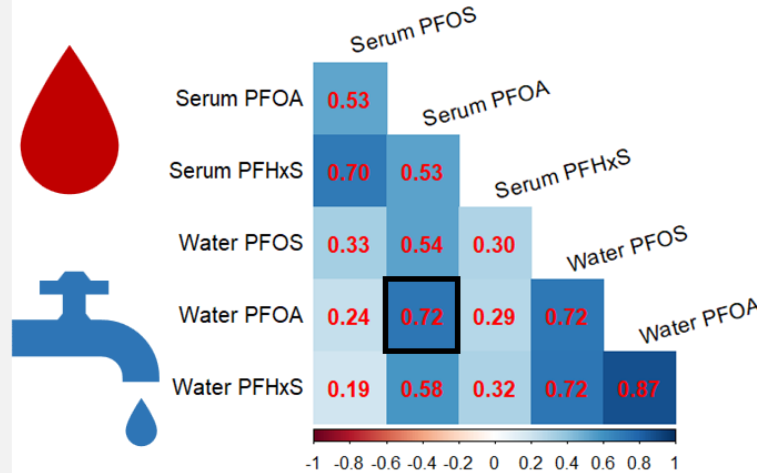


Maine Biosolids Study

Adults (N=145) residing in central Maine where PFAS-contaminated biosolids were historically applied as fertilizer to farmland

- Mean (SD) age: 62 (13) years
- ▶ Drinking well water tested (2020-2023) to determine whether PFAS exceeded Maine's Interim Drinking Water Standard
 - Sum of 6 PFAS (PFOA, PFHpA, PFOS, PFHxS, PFNA, PFDA) $\geq 20\text{ng/L}$: 58% of cohort
- ▶ Had paired measured drinking water and serum PFAS concentrations
 - Six highly detectable **serum PFAS**: PFOA, PFOS, PFHxS, PFNA, PFDA, PFUnDA
 - Of these, three moderately to highly detectable in **water**: PFOA, PFOS, PFHxS

Findings



- ▶ Water and serum **PFOA** concentrations were elevated and strongly correlated
- ▶ Serum **PFOA** was **4.3 times higher** than U.S. general population

Geometric mean of serum PFAS (ng/mL) for present study vs. U.S. adult population

	PFOS	PFOA	PFHxS	PFNA	PFDA	PFUnDA
Maine Biosolids Study (2023)	8.28	6.10	1.36	1.34	0.40	0.17
NHANES 2017-2020	4.21	1.42	1.09	0.47	0.18	0.13

- ▶ Serum PFOS, PFHxS, PFNA, PFDA, and PFUnDA were elevated, but only moderately correlated with water or largely not detected
- ▶ Exposure to these other PFAS may be from non-water pathways

Concentrations of per- and polyfluoroalkyl substances (PFAS) in private well drinking water and serum of individuals exposed to PFAS through biosolids: The Maine Biosolids Study

Criswell, et al. (2025)

PFAS in drinking water

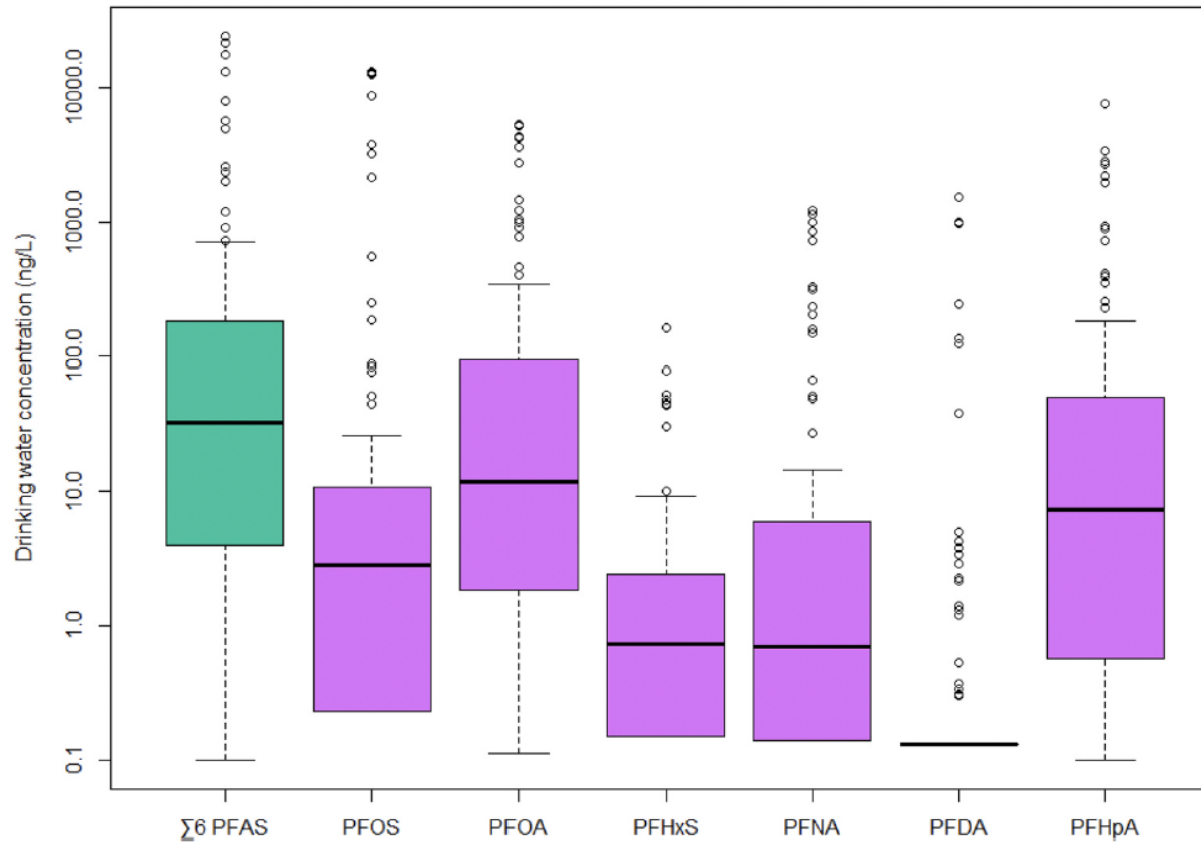


Fig. 1. Distributions of drinking water per- and polyfluoroalkyl substance (PFAS) concentrations (ng/L) (tested from September 2020–November 2023) among 145 participants. Notes: Outlier concentration values were $>75\text{th percentile} + (3 \times \text{IQR})$; see [Table S3](#) for specific distribution values; the Y-axis is on the log-10 scale; PFDA contributes to the $\Sigma 6$ PFAS (i.e., Maine 6: PFOS, PFOA, PFHxS, PFNA, PFDA, PFHpA), but 76 % of samples had concentrations below the limit of detection. Abbreviations: MeFOSAA, 2-(N-Methyl-perfluorooctane sulfonamido) acetic acid; PFDA, perfluorodecanoic acid; PFHpA, perfluoroheptanoic acid; PFOA, perfluorooctanoic acid; PFOS, perfluorooctane sulfonic acid; PFHxS, perfluorohexane sulfonic acid; PFNA, perfluorononanoic acid.

PFAS in serum

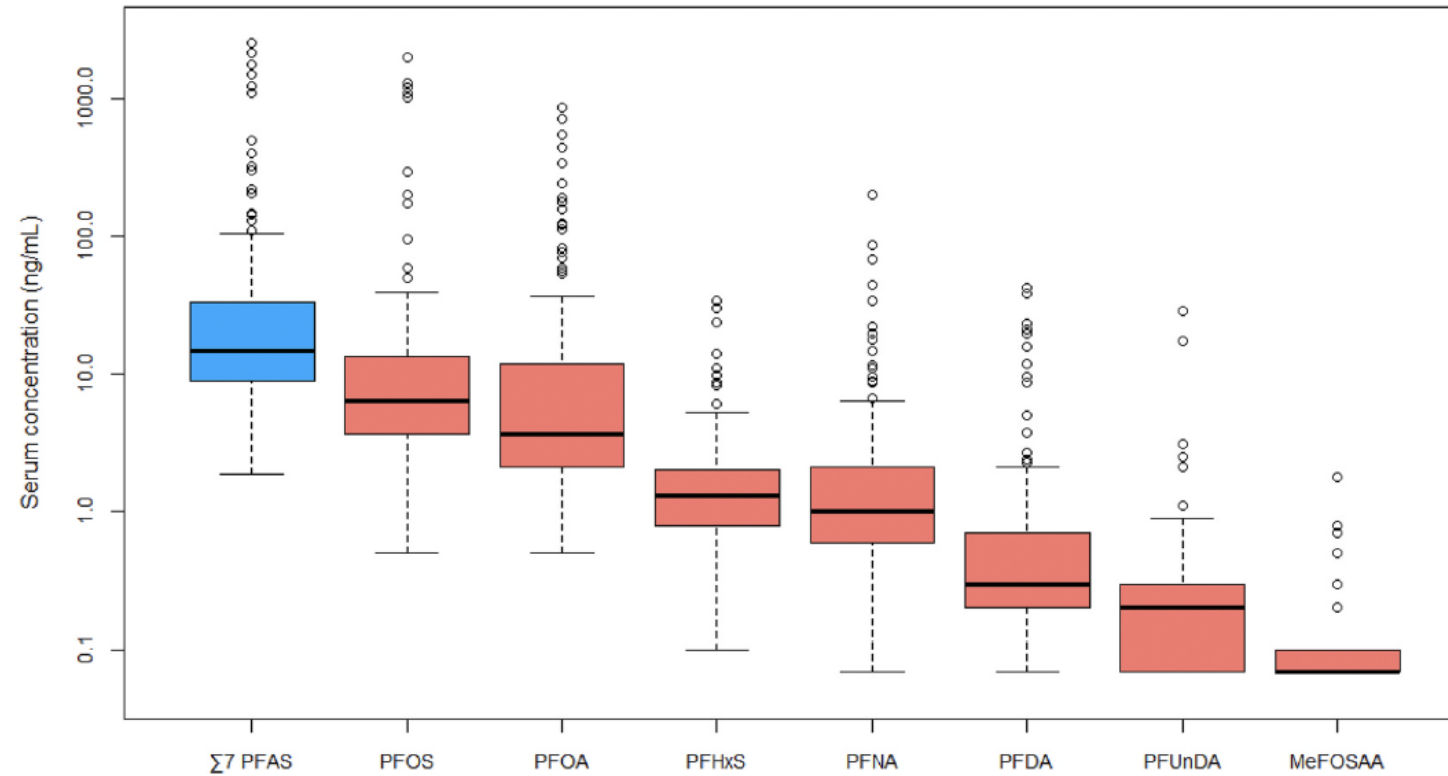


Fig. 2. Distributions of serum PFAS concentrations (ng/mL) (collected from September–December 2023) among 145 participants. Notes: Outlier concentration values were $>75\text{th percentile} + (3 \times \text{IQR})$; see [Table S2](#) for specific distribution values; the Y-axis is on the log-10 scale; MeFOSAA contributes to the $\Sigma 7$ PFAS (i.e., NASEM 7: PFOS, PFOA, PFHxS, PFNA, PFDA, PFUnDA, MeFOSAA), but 74 % of samples had concentrations below the limit of detection. Abbreviations: MeFOSAA, 2-(N-methyl-perfluorooctane sulfonamide) acetic acid; PFAS, per- and polyfluoroalkyl substances; PFDA, perfluorodecanoic acid; PFOA, perfluorooctanoic acid; PFOS, perfluorooctane sulfonic acid; PFHxS, perfluorohexane sulfonic acid; PFNA, perfluorononanoic acid; PFUnDA, perfluoroundecanoic acid.

Does water PFAS predict serum PFAS?

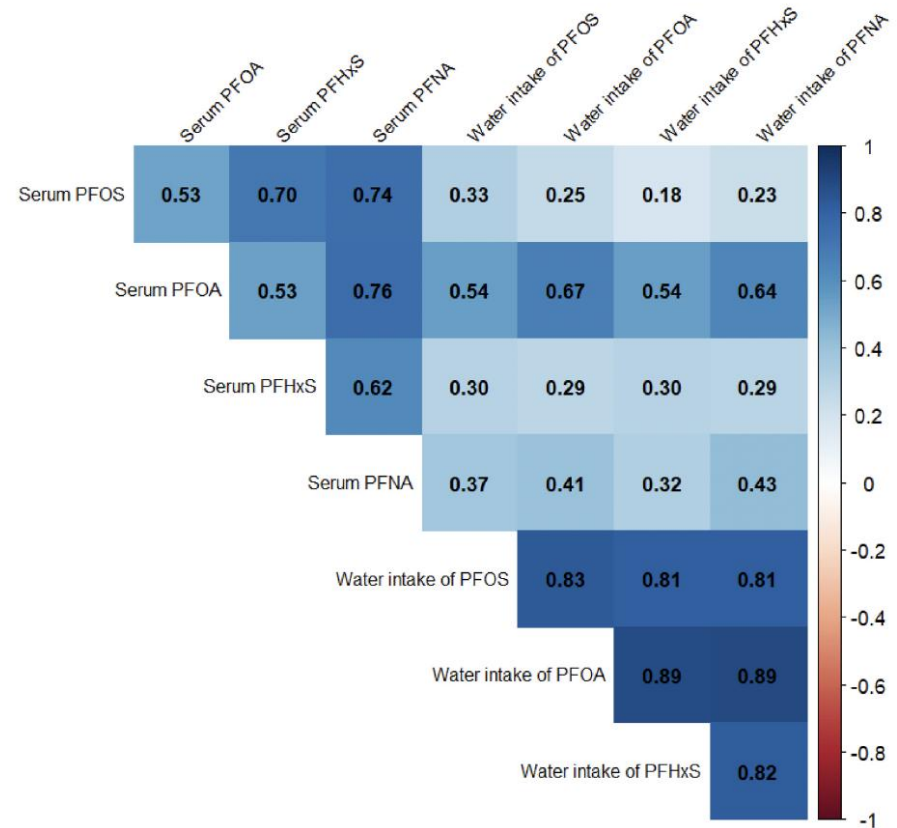


Fig. 4. Spearman correlations between the serum per- and polyfluoroalkyl substance concentrations (collected from September–December 2023) and estimated daily drinking water intake of PFAS prior to having water tested for PFAS among 144 participants. Notes: PFAS concentrations were included in this figure if the specific analyte was detected in >50 % of samples in both serum and water; excluding one participant who did not complete the study survey. Abbreviations: PFOA, perfluorooctanoic acid; PFOS, perfluorooctane sulfonic acid; PFHxS, perfluorohexane sulfonic acid; PFNA, perfluorononanoic acid.

Other exposure routes?



Enrolled 147 adults; 58% with high well water PFAS

Serum PFAS concentrations were elevated (e.g., PFOA 4.3 times higher than general U.S. population)

Criswell, et al. Environ Poll. 2025

Drinking water PFAS intake was a strong predictor of serum PFAS

Other strong predictors:

- ▶ Working on a farm where biosolids were applied
- ▶ Eating local eggs

Rokoff, et al. Under review. 2026

High water PFAS → greater psychosocial distress

- PFAS-related anxiety, health concerns, stigmatization
- State-dependent anxiety



Scharnetzki & Rokoff, et al. IJHEH. 2026



How to care for a patient with PFAS exposure
(or concerns about exposure)

Why are we concerned?

Health outcomes associated with increased PFAS exposure

Sufficient evidence

- Decreased antibody response (adults and children)
- Decreased infant and fetal growth
- Dyslipidemia (adults and children)
- Increased risk of kidney cancer (adults)

Limited evidence

Association may be due to chance or bias, more studies needed

- Increased risk of breast cancer (adults)
- Increased risk of testicular cancer (adults)
- Increased risk of ulcerative colitis (adults)
- Increased risk of pregnancy-induced hypertension (gestational hypertension and preeclampsia)
- Liver enzyme alterations (adults and children)
- Thyroid disease and dysfunction (adults)

Risk depends on blood level

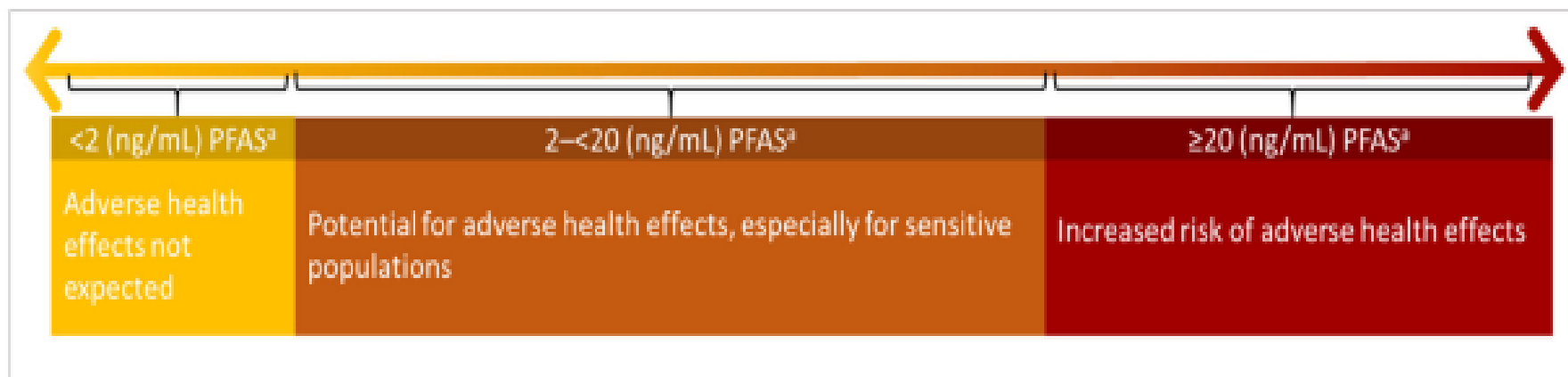
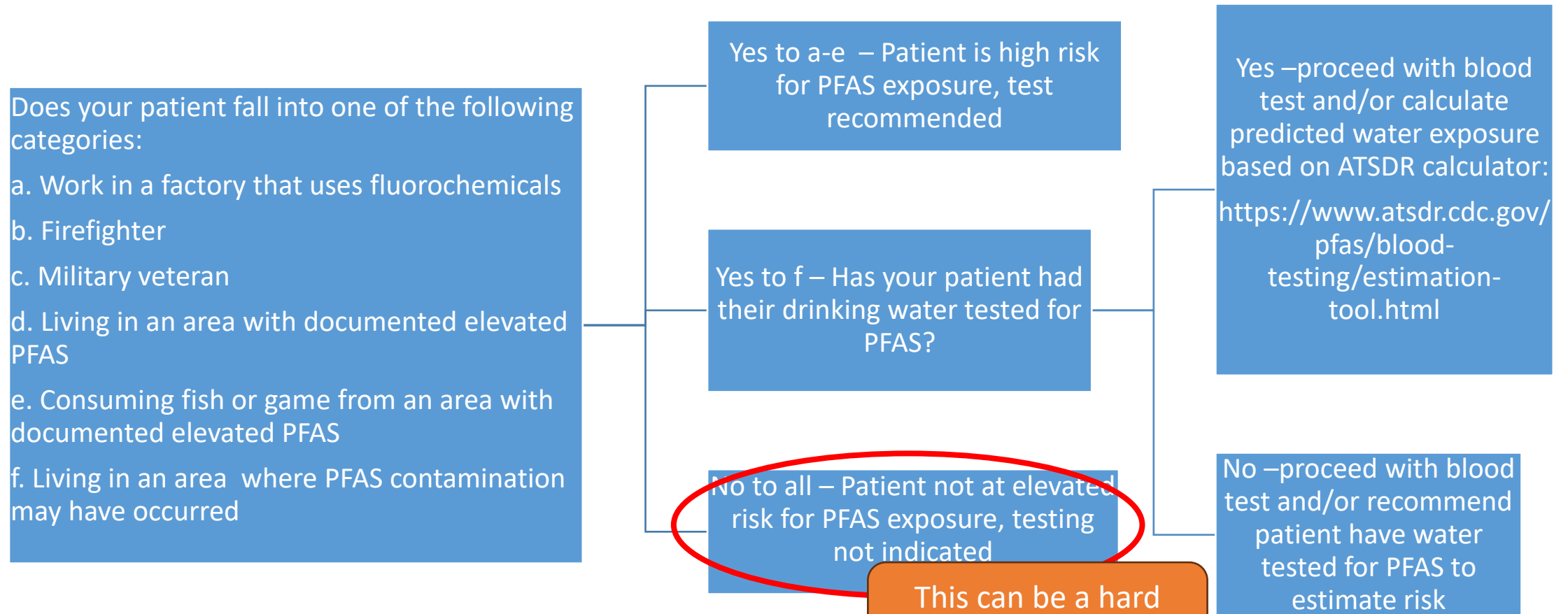


FIGURE 5-5 Graphical display of levels of PFAS to inform clinical care for the sum of MeFOSAA, PFHxS, PFOA (linear and branched isomers), PFDA, PFUnDA, PFOS (linear and branched isomers), and PFNA in serum or plasma.

Who should be tested for PFAS?

- Firefighters
- Military personnel
- People who have worked with fluorochemicals (ie, factories, carpet cleaning)
- People living in areas with known PFAS contamination
- People living in areas where PFAS contamination may have occurred
 - Near airports, military bases, wastewater treatment plants, farms where biosolids have been spread, landfills
- ***Remember, it's not just water contamination!!***

Who should be tested for PFAS?



Coming soon: the PFAS Exposure App for Clinicians

This can be a hard conversation!!

The PFAS Exchange

is an online resource center about PFAS contaminants in drinking water—helping communities understand their **exposures** and **take action** to protect their health.

How to assess blood levels

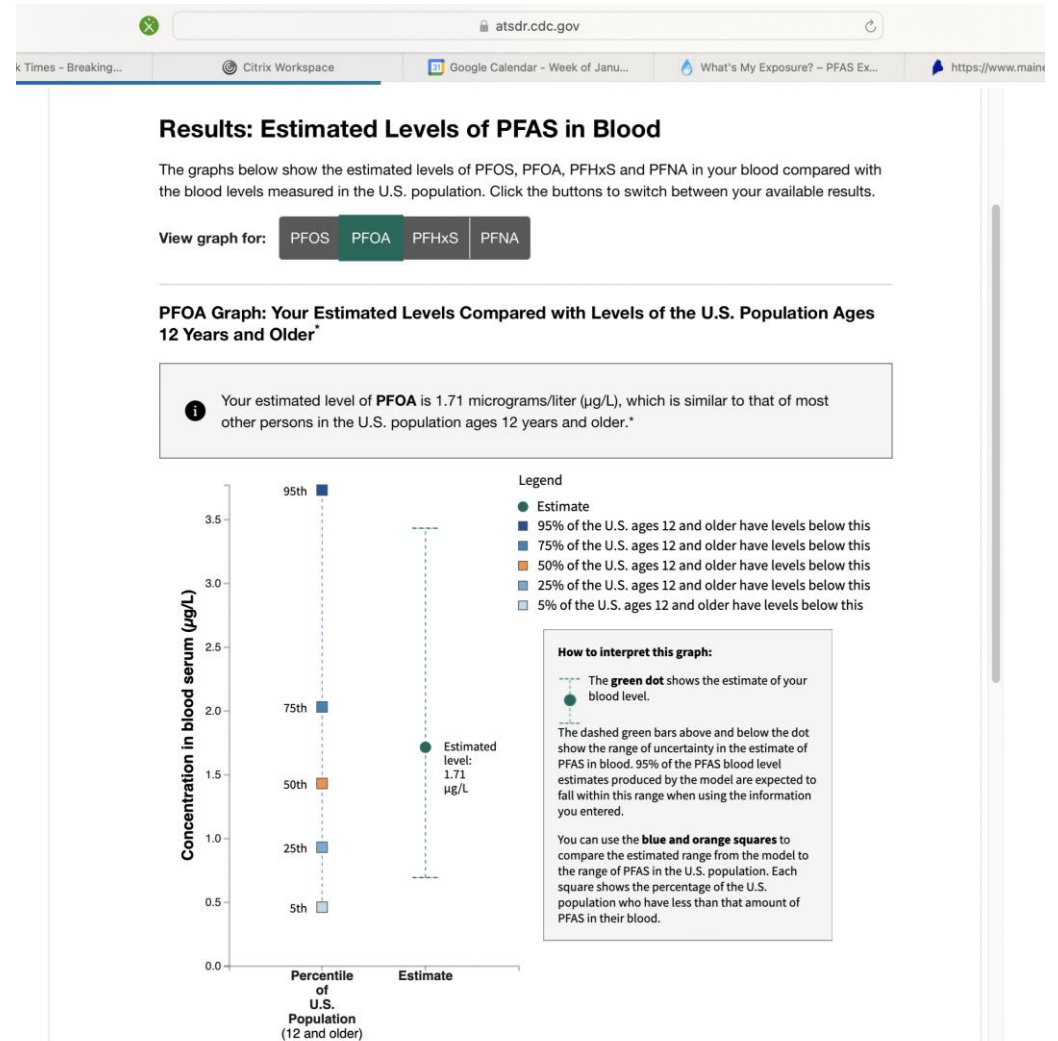
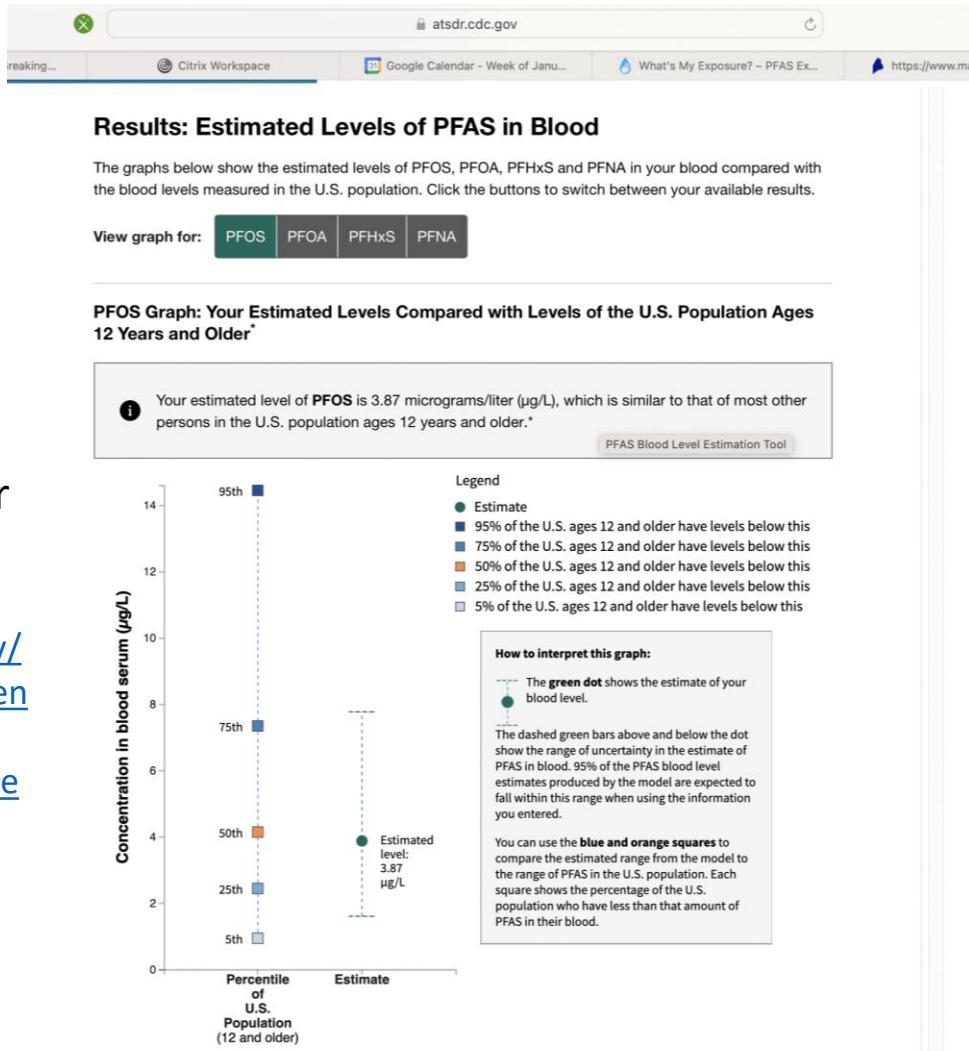
- Commercial laboratory test
 - Quest Diagnostics (direct to consumer and through health facility)
 - NorDx sends to Quest
 - (NMS laboratories)
 - At-home Eurofins capillary tests
- Online toxicokinetic models
 - UC Irvine: [Serum PFAS Calculator | UC Irvine](#)
 - ATSDR: [Estimating Levels of PFAS in Your Blood | Per- and Polyfluoroalkyl Substances \(PFAS\) and Your Health | ATSDR \(cdc.gov\)](#)

ATSDR online model – *Hallowell Feb 2024*

- PFOS: 7.39 ppt
- PFOA: 7.05 ppt
- Female sex
- No recent breastfeeding
- 100% tap water

Source:

<https://www.maine.gov/dhhs/mecdc/environmental-health/dwp/cet/documents/PFASallResults.pdf>;
10/11/2023



How reliable are these tests?

- Quest, NMS, and Eurofins have good agreement with gold standard
- Online calculators well validated, but in one study did not have good agreement with CDC blood test in high exposure cohort
 - Non-water exposure routes?
 - Extremely high levels as compared to general population?
 - Too much variation in excretion times among individuals?



Short communication

Quantifying levels of per- and polyfluoroalkyl Substances (PFAS) in water and serum after contamination from agricultural biosolid application

Rachel L. Criswell^{a,*}, Thomas Simones^b, Madhumita Chatterjee^c, Jasmine Waite^{a,b}, Steven Diaz^a, Andrew Smith^b

^a MaineGeneral Medical Center, Augusta, ME, USA

^b Environmental and Occupational Health Program, Maine Centers for Disease Control and Prevention, Augusta, ME USA

^c Bureau of Public Health Laboratories, Chemistry Program, New Hampshire Division of Public Health Services, Department of Health and Human Services, Concord, NH USA

Lu & Bartell 2020
Carignan 2023 Environ Sci & Technol
Criswell 2024 Environ Int

How to order a PFAS test

- Typically done through Quest and includes the “NASEM-9”
- Use ICD-10 code Z13.88 “Encounter for screening for disorder due to exposure to contaminants”
- CPT code depends on how it is billed (I use 13761 for Quest)
- For NorDx: Order “misc. reference test” with the following details:

Specimen Type	Blood
Specimen Source	Venous
Performing Lab	Other
Performing Lab	“Quest”
Performing Lab Test Code and Test Name	Contact Quest Diagnostics at PFASTesting@questdiagnostics.com to confirm appropriate test information

Who pays for a PFAS test?

- MaineCare covers the cost of PFAS testing!
- Some Medicare plans and private insurance does as well
- Out of pocket cost is \$200-300
- Maine PFAS Fund also covers the cost of testing for certain individuals:
 - Lived/worked on commercial farm or prior farmland where groundwater tested >20ppt for the sum of 6 PFAS (Maine Drinking Water Standard) or soil tested >170 ppb for PFOS within the last 10y

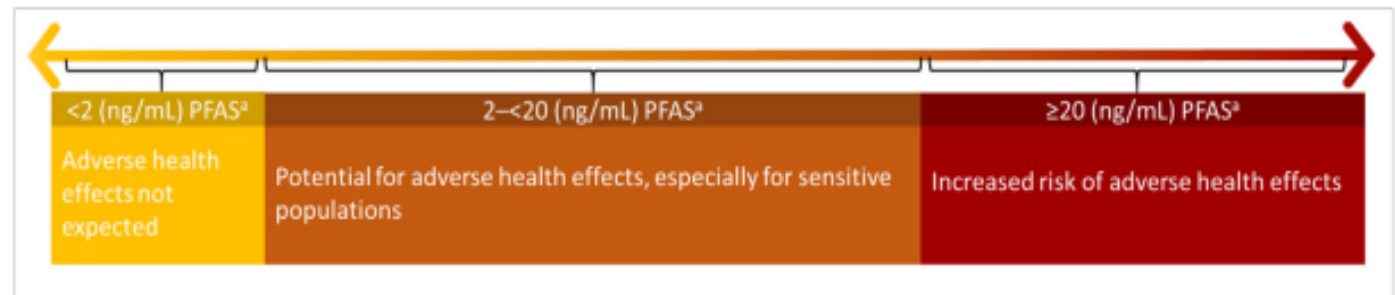
If you believe you meet the [eligibility criteria](#) above but have not received information about how to access blood testing, please email PFASFund.DACF@maine.gov or call 207-313-0962.

How to interpret a PFAS test

Reference Lab Miscellaneous Test - OTHER (Final result)

	Value	Range
Test Result	See below.	
PFAS (Forever Chemicals) Panel 1 AMD		

Test ordered	Result	Cutoff
NASEM Recommended Summation	28.73 H	<20.0 ng/mL
MeFOSAA	NOT DETECTED	<0.1 ng/mL
PFHxS	0.62 H	<0.1 ng/mL
Linear PFOA (n-PFOA)	23.10 H	<0.1 ng/mL
Branched PFOA (SbPFOA)	NOT DETECTED	<0.1 ng/mL
PFDA	0.29 H	<0.1 ng/mL
PFUnDA	0.46 H	<0.1 ng/mL
Linear PFOS (n-PFOS)	1.51 H	<0.1 ng/mL
Branched PFOS (Sm-PFOS)	2.09 H	<0.1 ng/mL
PFNA	0.52 H	<0.1 ng/mL



What to do with high PFAS levels



New Online

Views **4,264** | Citations **0** | Altmetric **60**



Viewpoint

More ▾

August 14, 2024

Clinical Implications of New Drinking Water Regulation for “Forever Chemicals”

Rachel Criswell, MD, MS^{1,2}; Abby F. Fleisch, MD, MPH^{3,4}; Alan Ducatman, MD, MSc⁵

» [Author Affiliations](#) | [Article Information](#)

JAMA. Published online August 14, 2024. doi:10.1001/jama.2024.12705

In April 2024, the US Environmental Protection Agency (EPA) announced its new maximum contaminant levels for some perfluoroalkyl and polyfluoroalkyl substances (PFASs), setting safe drinking water levels for these contaminants at near zero.¹ PFASs encompass a class of thousands of synthetic chemical compounds composed of fluorinated carbon chains of varying lengths. PFASs make consumer and industrial products oil- and water-resistant, and many persist in the environment virtually indefinitely and in the human body with multiyear half-lives. The new EPA regulations for specific PFASs reflect what years of epidemiologic and basic science research have shown concerning cancer and other outcomes. This has prompted lay media attention to the dangers of the most commonly studied of these “forever chemicals” as endocrine disrupters and their link to a surprising range

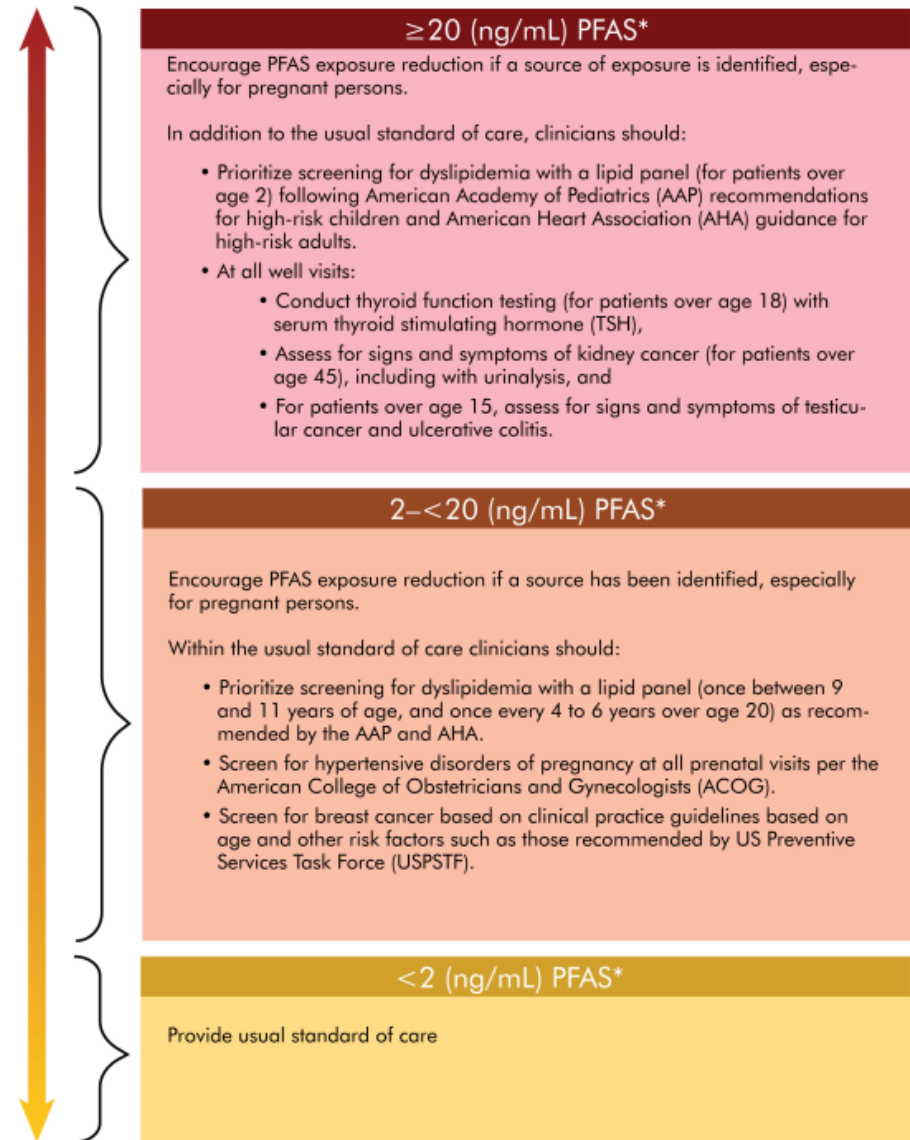
A Call for Pediatric Clinicians to Address Environmental Health Concerns in Rural Settings

Rachel Criswell, MD, MS^{a,b,c,*}, Kelsey Gleason, ScD, MS^d, Ahlam K. Abuawad, PhD^b, Margaret R. Karagas, PhD^b, Kathleen Grene, MD, MPH^e, Ana M. Mora, MD, PhD^f, Brenda Eskenazi, MA, PhD^f, Katie Senechal, SM^{g,h}, Anne M. Mullin, BS^c, Lisa B. Rokoff, PhD^{c,h}, Abby F. Fleisch, MD, MPH^{c,h,i}

KEYWORDS

- Wood stove
- Well water
- Biosolids
- Pesticides
- Environmental health
- Rural health

Continued



* Simple additive sum of MeFOSAA, PFHxS, PFOA (linear and branched isomers), PFDA, PFUnDA, PFOS (linear and branched isomers), and PFNA in serum or plasma

FIGURE 2 Clinical guidance for follow-up with patients after PFAS testing.

PFAS levels >20 ng/ml

- Routine standard of care plus:
- Cholesterol screening according to “high risk guidelines” over the age of 2
- Annual thyroid screening for all patients over the age of 18
- Assess for signs and symptoms of kidney cancer over the age of 45
- Assess for signs and symptoms of ulcerative colitis over the age of 15
- Assess for signs and symptoms of testicular cancer over the age of 15

- ***Other considerations:*** liver function tests, pre-eclampsia screening and prevention
- ***Don't forget!*** Mental health, breast/chest/bodyfeeding

Support from Maine CDC

PFAS in serum is a notifiable condition:

As of June 4, 2025, PFAS detectable in serum is a notifiable condition. The Control of Notifiable Diseases and Conditions Rule specifies that clinicians and medical laboratories are required to report results with positive PFAS detections to the Maine CDC. Laboratory reporting must be completed electronically through HL7 messaging. Otherwise, health care providers can fax results to the Maine CDC Disease Surveillance reporting line at 1-800-293-7534.

Don't forget mental health!



Enrolled 147 adults; 58% with high well water PFAS

Serum PFAS concentrations were elevated (e.g., PFOA 4.3 times higher than general U.S. population)

Criswell, et al. Environ Poll. 2025

Drinking water PFAS intake was a strong predictor of serum PFAS

Other strong predictors:

- ▶ Working on a farm where biosolids were applied
- ▶ Eating local eggs

Rokoff, et al. In final preparation. 2025

High water PFAS → greater psychosocial distress

- PFAS-related anxiety, health concerns, stigmatization
- State-dependent anxiety



Scharnetzki & Rokoff, et al. Under Review. 2025



Slide courtesy of Dr. Abby Fleisch

Cohort and Methods

Study population: Maine Biosolids Study participants ($n=146$)

- Adults residing in central Maine (USA) whose private well water was tested for PFAS due to historical application of PFAS-contaminated biosolids to nearby farmland



Exposure: High vs. low drinking well water PFAS

- Water PFAS exceeding Maine Interim Drinking Water Standard of $\sum 6$ PFAS (PFOA, PFOS, PFNA, PFHxS, PFHpA, PFDA) ≥ 20 ng/L



Outcomes: Psychosocial scale scores assessing:

- PFAS-related anxiety
- PFAS Health risk perceptions
- Perceived PFAS stigmatization
- State-dependent anxiety



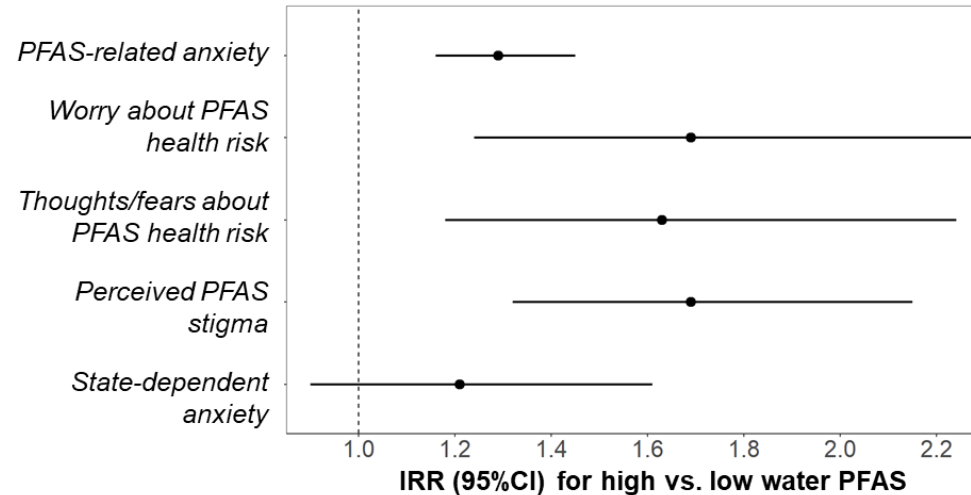
Statistical analysis: Negative binomial mixed effects regression

Findings



58% with high well water PFAS

35% with pre-existing mental health diagnosis



► Participants with high water PFAS had greater psychosocial distress related to PFAS

► Stronger associations with worry and state-dependent anxiety among those with no prior mental health diagnosis

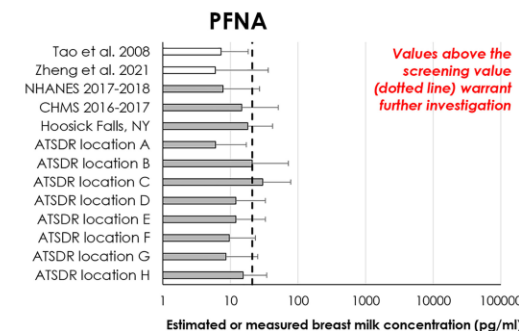
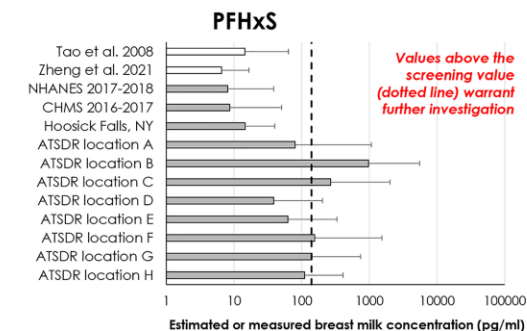
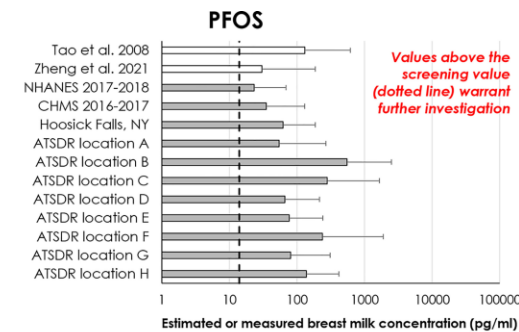
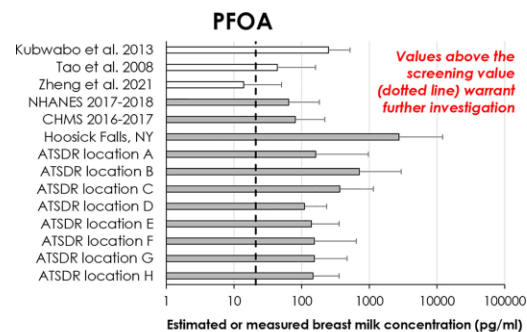
Conclusion: High drinking water PFAS was associated with increased psychosocial distress among an agricultural community

Residing in a rural PFAS-contaminated community: psychological distress among individuals living in homes with versus without well water PFAS contamination

Scharnetzki & Rokoff, et al. (2025)

PFAS and breast/chest/bodyfeeding

- PFAS is present in human milk, even among those with background exposure
- Potential latent effects on health from early life exposure
- Benefits of breastfeeding outweigh the risk of PFAS exposure



Criswell et al 2023 Environ Sci & Technol
LaKind 2022 Environ Health Persp
Blake and Fenton 2020 Toxicology
Mukhtar 2010 J Environ Health
Van den Berg 2017 Arch Toxicol

Are you breastfeeding or pumping in Maine?

Is your baby 3 months old
or younger?



You may be able to help us learn
about PFAS in human milk!

If you participate in this research study:

- You will be asked to complete two 10-minute surveys
- You will be asked to send us a sample of your breastmilk

You can choose to get the PFAS test results from your breastmilk.

Call or text 731-859-2166 or email
pfasbreastfeedingstudy@gmail.com for details
on how to participate.

Reducing PFAS body burden

- Exposure reduction
 - NSF International has rankings of water filters
- **Cholestyramine**
- Serial phlebotomy
- Folate
- High fiber diet
- Unclear if removing PFAS decreases health risk

Buckley 2024

Deng 2022

Ducatman 2020

Dzierlenga 2021

Gasiorowski 2022

Moller 2024

Morgan 2023

Sultan 2023

Zhang 2023 Lancet Planet

Health, Zhang 2023 JAMA

Netw Open, Zhang 2023

Environ Sci Technol

PFAS and Medical Guidance

Learn about a harmful class of contaminants and help strengthen medical education. Complete a FREE Continuing Medical Education (CME) course online anytime for 1 APA or AOA credit.



How to participate

- 1** Complete the PFAS CME and our questions
 - Follow the link to create a free account and complete the CME anytime.
- 2** Join the discussion on PFAS medical monitoring
 - Be interviewed by the research team (\$100 gift card)
 - Join a focus group with clinicians and healthcare professionals (\$100 gift card)
 - Connect with a national network of clinicians and professionals

Get started!

tinyurl.com/rwjf-pfas-cme



Practitioners and students in medicine, nursing, and public health are welcome

Our research team provides evidence-based resources about PFAS blood tests, medical monitoring, and clinical care. Help our research team better understand how these resources support clinical practice and how they can be improved.

Supported by the Robert Wood Johnson Foundation

Any questions? Contact Aaron Maruzzo, maruzzo@silentspring.org



Thank you!

rcriswell@rfgh.net

Resources

- DACF's Maine PFAS Fund: <https://www.maine.gov/dacf/ag/pfas/pfas-fund-health.shtml>
- Maine CDC: <https://www.maine.gov/dhhs/mecdc/healthy-living/health-and-safety/pfas-in-maine>
- National Academies of Science PFAS Guidance: <https://www.nationalacademies.org/publications/26156>
- ATSDR Guidance: <https://www.atsdr.cdc.gov/pfas/hcp/clinical-overview/index.html>
- PFAS-REACH: <https://pfas-exchange.org>