

Assessing the utility of healthcare claims data to determine potential health impacts of PFAS exposure with public drinking water

Gonza Namulanda

National Center for Environmental Health

Division of Environmental Health Science and Practice

Environmental Public Health Tracking

Amy Lavery

Agency for Toxic Substances and Disease Registry

Office of Innovation and Analytics

Geospatial Research, Analysis and Services Program

Suzanne Condon

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

Office of the Director

Delaware PFAS Conference

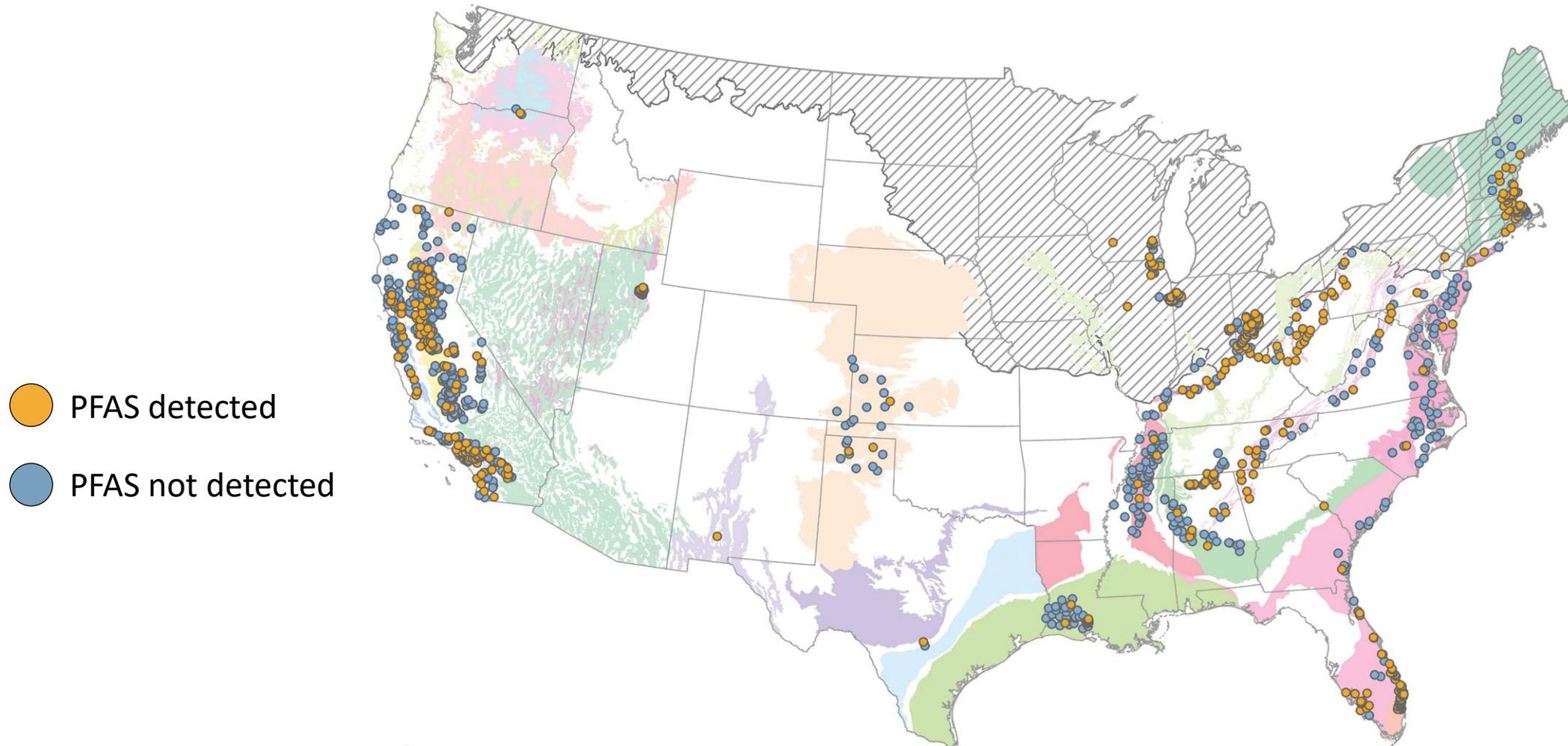
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Disclaimer

- **The findings and conclusions in this presentation are those of the author(s) and do not necessarily represent the official view of the Centers for Disease Control and Prevention/Agency for Toxic Substances and Disease Registry.**

INTRODUCTION

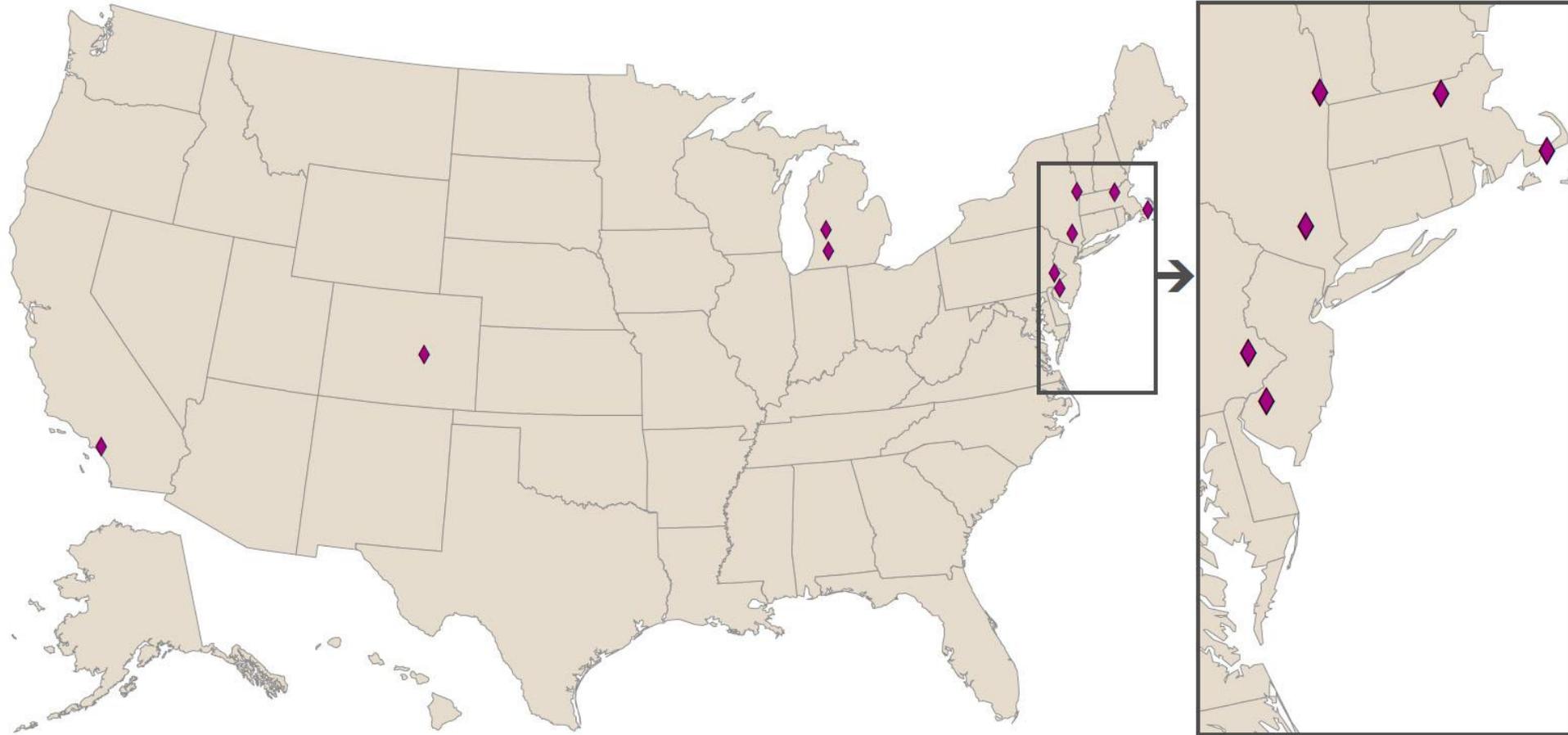
PFAS in Groundwater



From Tokranov et al. 2024 - Principal aquifers of the United States and groundwater sample locations analyzed for PFAS. Principal aquifers of the United States (25) are overlain by PFAS sampling locations (circles) used for model training. Orange circles indicate PFAS detected; blue circles indicate PFAS not detected.

<https://www.science.org/doi/10.1126/science.ado6638#F1>

ATSDR Multi-Site Study



◆ ATSDR-funded Multi-site Study Sites



Healthcare claims data may enable a cost-effective means to bridge this gap and supplement data from other disease surveillance systems.

- **Timely**
- **Geographically refined**
- **Longitudinal**
- **Contain additional information, e.g., risk factors, co-diagnosis, and laboratory test results**

Assessing the utility of healthcare claims data to determine potential health impacts of PFAS exposure with public drinking water

- Gonza Namulanda, Suzanne Condon, Terri Lynn Palmer, Elizabeth Ellis, Fuyuen Yip, Christopher M. Reh, Patrick Breysse
- Environmental Epidemiology
- Published March 3, 2025
- https://journals.lww.com/environepidem/fulltext/2025/04000/assessing_the_utility_of_healthcare_claims_data_to.6.aspx



Purpose

- **To evaluate the utility of healthcare claims data from an All-Payer Claims Data (APCD) to support timely surveillance of health outcomes related to PFAS exposures from public drinking water as a proof of concept.**

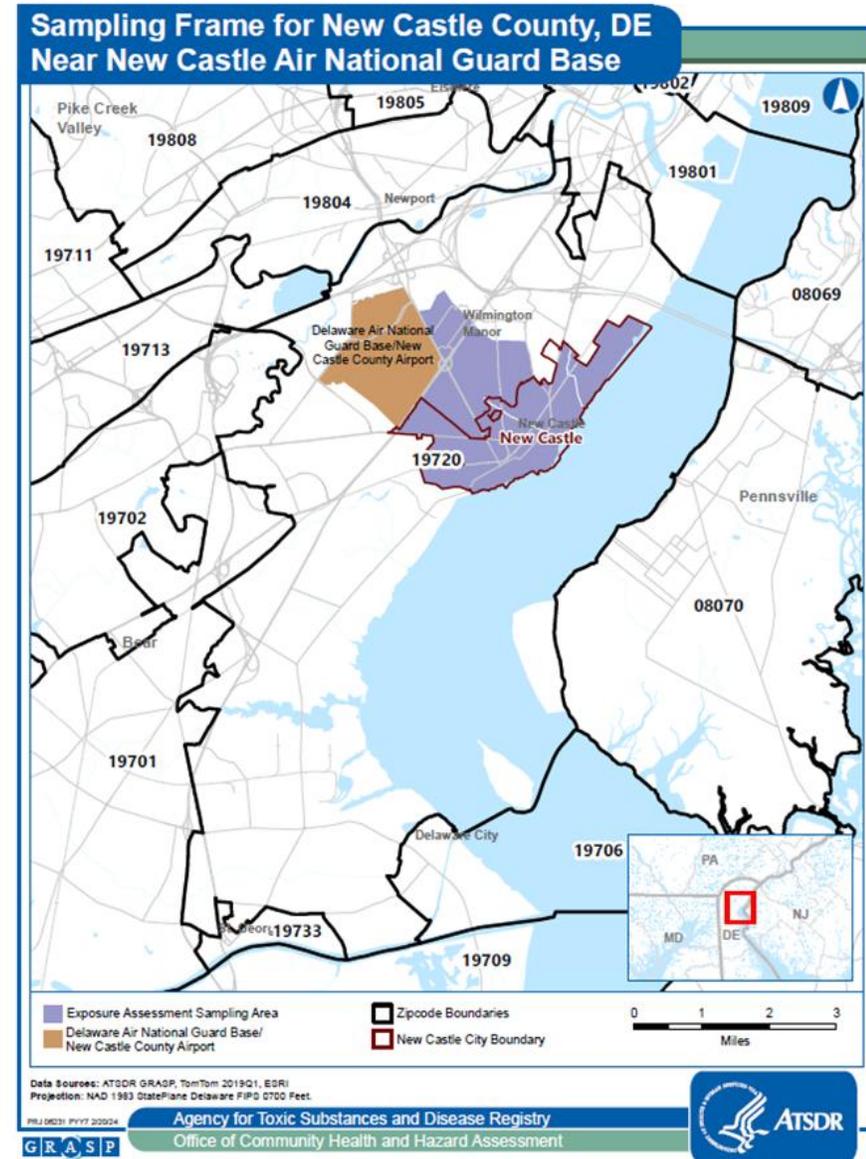
Exposure Assessments

- **New Castle City 2009**
- **EPA Unregulated Contaminant Monitoring Rule (UCMR3)**
- **Delaware Air National Guard Base**
- **Testing of residents**

METHODS

Population and Zip code of interest

- **Population:** health care plan members who resided in New Castle County during the period 2014 – 2019
- **Area/zip code of interest:** 19720



Data source and health outcomes

- **Data Source:** Delaware Health Information Network (DHIN), DE Healthcare Claims Database (DE HCCD)
- **Health outcomes:**
 - type 2 diabetes
 - hypertension
 - hypertensive diseases
 - coronary artery disease
 - stroke
 - hypercholesterolemia
 - high triglycerides, and
 - thyroid disease

Data validation

- Compared diagnosis information from the study claims dataset with diagnosis information from clinical data from their Health Level 7 (HL7) Admit, Discharge, and Transfer (ADT) database

Statistical analysis

- **Poisson regression**
- **Estimated risk ratios for each health outcome**
 - Each year (2014 – 2019)
 - Combined period
- **Covariates**
 - age group, sex or year
- **Sensitivity analysis**
 - Continuous health coverage from 2014 to 2019

RESULTS

Data validation

From a sample of 707 clinical records, 62% were in the claims dataset

>90%

- Stroke – 100%
- Hypertension – 96%
- Type 2 Diabetes – 91%

70% - 90%

- Coronary artery disease – 86%
- Hypertensive diseases – 77%
- Any thyroid disease – 73%
- Mixed and other hyperlipidemia – 71%
- Hyperthyroidism – 70%

30%- <70%

- Hypothyroidism – 68%
- Hypercholesterolemia – 56%
- High triglycerides – 33.3%,

Disease frequency for all years 2014 - 2019

	Exposed				Unexposed				
Health Outcome	With disease	%	Without disease	%	With disease	%	Without disease	%	Total
Type 2 Diabetes	4,111	2.73%	146,536	97.27%	29,701	2.52%	1,151,193	97.48%	1,331,541
Hypertension	8,643	6.73%	119,820	93.27%	67,074	6.78%	921,574	93.22%	1,117,111
Hypertensive Diseases	1,899	1.12%	167,113	98.88%	11,213	0.85%	1,301,471	99.15%	1,481,696
Coronary Artery Disease	2,654	1.63%	160,422	98.37%	20,277	1.62%	1,232,963	98.38%	1,416,316
Stroke	2,472	1.47%	165,801	98.53%	20,548	1.60%	1,263,885	98.40%	1,452,706
Hypercholesterolemia	2,211	1.34%	162,976	98.66%	21,431	1.72%	1,227,037	98.28%	1,413,655
High Triglycerides	406	0.23%	175,072	99.77%	3,421	0.25%	1,343,133	99.75%	1,522,032
Mixed and other Hyperlipidemia	8,267	5.82%	133,773	94.18%	69,876	6.54%	998,800	93.46%	1,210,716
Any Thyroid Disease	3,941	2.46%	155,983	97.54%	34,386	2.83%	1,182,278	97.17%	1,376,588
Hypothyroidism	2,911	1.78%	160,824	98.22%	26,900	2.16%	1,217,024	97.84%	1,407,659
Hyperthyroidism	505	0.29%	174,465	99.71%	3,098	0.23%	1,341,946	99.77%	1,520,014

Risk ratios of health outcomes based on new claims for residents living in ZIP code 19720 in New Castle County compared to residents living in the rest of New Castle County for the period 2014 – 2019

All years: 2014-2019		
Health Outcome	Unadjusted	Adjusted ^a
Type 2 Diabetes	1.09 (1.05-1.12)	1.20 (1.16-1.23)
Hypertension	0.99 (0.97-1.01)	1.11 (1.09-1.13)
Hypertensive Diseases	1.32 (1.25-1.38)	1.47 (1.40-1.55)
Coronary Artery Disease	1.01 (0.97-1.05)	1.13 (1.09-1.18)
Stroke	0.92 (0.88-0.96)	1.05 (1.00-1.09)
Hypercholesterolemia	0.78 (0.75-0.81)	0.84 (0.80-0.88)
High Triglycerides	0.91 (0.82-1.01)	0.92 (0.83-1.02)
Mixed and other Hyperlipidemia	0.89 (0.87-0.91)	0.96 (0.94-0.98)
Any Thyroid Disease	0.87 (0.84-0.90)	0.92 (0.89-0.95)
Hypothyroidism	0.82 (0.79-0.85)	0.87 (0.83-0.90)
Hypothyroidism (Females only)	0.82 (0.79-0.86)	0.87 (0.83-0.91)
Hypothyroidism (Males only)	0.81 (0.75-0.87)	0.86 (0.80-0.93)
Hyperthyroidism	1.25 (1.14-1.38)	1.29 (1.17-1.41)

^aAdjusted for age group, sex and year

Bold= p<0.05

DISCUSSION

Advantages and challenges of using claims data

- **Advantages**

- Provided information on more health outcomes and at finer geographic levels
- Data could be timelier
- Demographic data
- Representativeness
- Longitudinal data

- **Challenges**

- Case identification
- Lack of race and ethnicity information
- Data validation

Collaboration between public health and Health Information Exchange programs

- **Collaboration**
 - Data insights
 - Their application in public health
 - Protect PII
- **Study challenges**
 - Water system boundaries
 - Data completeness and representativeness

Thank you!

For more information, contact CDC

1-800-CDC-INFO (232-4636)

TTY: 1-888-232-6348 [cdc.gov](https://www.cdc.gov) [atsdr.cdc.gov](https://www.atsdr.cdc.gov)

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