CDPH
California Department of Public Health

BIOMONITORING CALIFORNIA

Program Update

Presentation to the Scientific Guidance Panel
March 4, 2026
Nerissa Wu

Program Updates

- Community-focused studies
- Surveillance
- Laboratory work
- Outreach and communications

BIOMONITORING CALIFORNIA

Updates on Community-Focused Studies

- ACE: Asian/Pacific Islander Community Exposures Project
- BiomSPHERE: Biomonitoring component of the San Joaquin Valley Pollution and Health Environmental Research Study
- CHAIRS-LA: Community Health and Air Quality Implications of Refinery Retirements in Los Angeles

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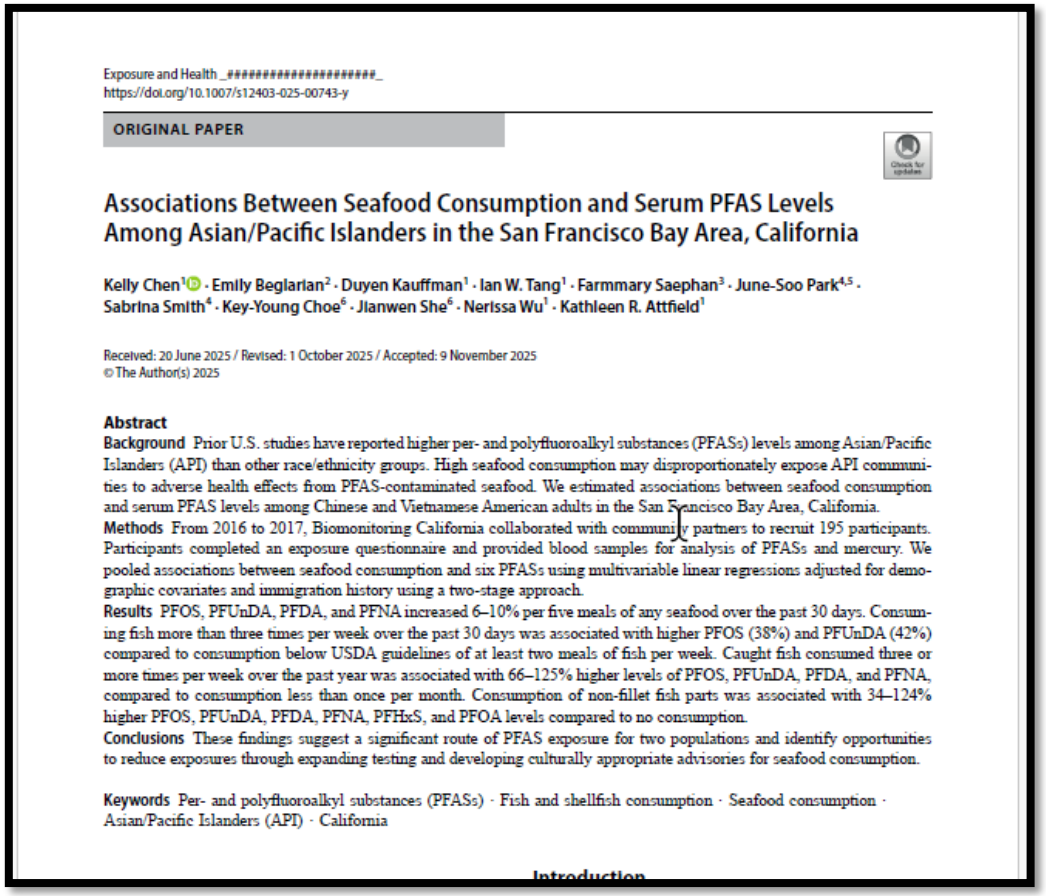
ACE Project



Exposure and Health _####################_
https://doi.org/10.1007/s12403-025-00743-y

ORIGINAL PAPER

Associations Between Seafood Consumption and Serum PFAS Levels Among Asian/Pacific Islanders in the San Francisco Bay Area, California

Kelly Chen[1] · Emily Beglarian[2] · Duyen Kauffman[1] · Ian W. Tang[1] · Farmmary Saephan[3] · June-Soo Park[4,5] · Sabrina Smith[4] · Key-Young Choe[6] · Jianwen She[6] · Nerissa Wu[1] · Kathleen R. Attfield[1]

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Abstract

Background Prior U.S. studies have reported higher per- and polyfluoroalkyl substances (PFASs) levels among Asian/Pacific Islanders (API) than other race/ethnicity groups. High seafood consumption may disproportionately expose API communities to adverse health effects from PFAS-contaminated seafood. We estimated associations between seafood consumption and serum PFAS levels among Chinese and Vietnamese American adults in the San Francisco Bay Area, California.

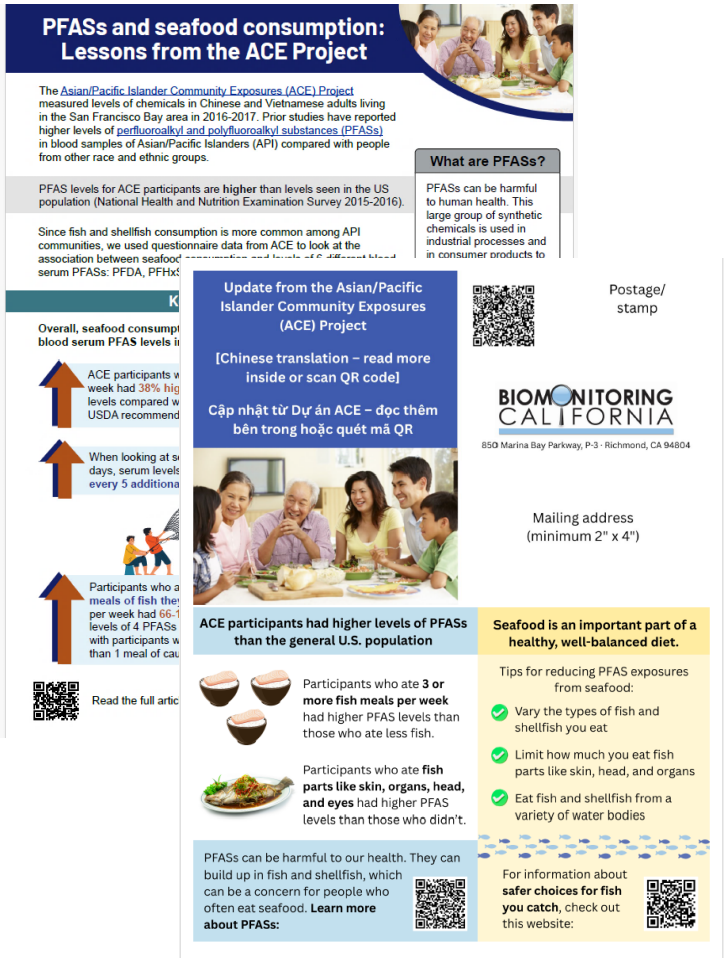
Methods From 2016 to 2017, Biomonitoring California collaborated with community partners to recruit 195 participants. Participants completed an exposure questionnaire and provided blood samples for analysis of PFASs and mercury. We pooled associations between seafood consumption and six PFASs using multivariable linear regressions adjusted for demographic covariates and immigration history using a two-stage approach.

Results PFOS, PFUnDA, PFDA, and PFNA increased 6–10% per five meals of any seafood over the past 30 days. Consuming fish more than three times per week over the past 30 days was associated with higher PFOS (38%) and PFUnDA (42%) compared to consumption below USDA guidelines of at least two meals of fish per week. Caught fish consumed three or more times per week over the past year was associated with 66–125% higher levels of PFOS, PFUnDA, PFDA, and PFNA, compared to consumption less than once per month. Consumption of non-fillet fish parts was associated with 34–124% higher PFOS, PFUnDA, PFDA, PFNA, PFHxS, and PFOA levels compared to no consumption.

Conclusions These findings suggest a significant route of PFAS exposure for two populations and identify opportunities to reduce exposures through expanding testing and developing culturally appropriate advisories for seafood consumption.

Keywords Per- and polyfluoroalkyl substances (PFASs) · Fish and shellfish consumption · Seafood consumption · Asian/Pacific Islanders (API) · California

Introduction



PFASs and seafood consumption: Lessons from the ACE Project

The Asian/Pacific Islander Community Exposures (ACE) Project measured levels of chemicals in Chinese and Vietnamese adults living in the San Francisco Bay area in 2016-2017. Prior studies have reported higher levels of perfluoroalkyl and polyfluoroalkyl substances (PFASs) in blood samples of Asian/Pacific Islanders (API) compared with people from other race and ethnic groups.

PFAS levels for ACE participants are **higher** than levels seen in the US population (National Health and Nutrition Examination Survey 2015-2016).

Since fish and shellfish consumption is more common among API communities, we used questionnaire data from ACE to look at the association between seafood

serum PFASs: PFDA, PFHx

What are PFASs?

PFASs can be harmful to human health. This large group of synthetic chemicals is used in industrial processes and in consumer products to

Update from the Asian/Pacific Islander Community Exposures (ACE) Project

[Chinese translation – read more inside or scan QR code]

Cập nhật từ Dự án ACE – đọc thêm bên trong hoặc quét mã QR

Postage/ stamp

BIOMONITORING CALIFORNIA

850 Marina Bay Parkway, P-3 · Richmond, CA 94804

Mailing address (minimum 2" x 4")

Overall, seafood consumpt blood serum PFAS levels i

ACE participants w week had 38% hig levels compared w USDA recommend

When looking at s days, serum levels every 5 additiona

Participants who a meals of fish the per week had 66-1 levels of 4 PFASs with participants w than 1 meal of ca

Read the full artic

ACE participants had higher levels of PFASs than the general U.S. population

Participants who ate **3 or more fish meals per week** had higher PFAS levels than those who ate less fish.

Participants who ate **fish parts like skin, organs, head, and eyes** had higher PFAS levels than those who didn't.

PFASs can be harmful to our health. They can build up in fish and shellfish, which can be a concern for people who often eat seafood. **Learn more about PFASs:**

Seafood is an important part of a healthy, well-balanced diet.

Tips for reducing PFAS exposures from seafood:

- Vary the types of fish and shellfish you eat
- Limit how much you eat fish parts like skin, head, and organs
- Eat fish and shellfish from a variety of water bodies

For information about **safer choices for fish you catch**, check out this website:

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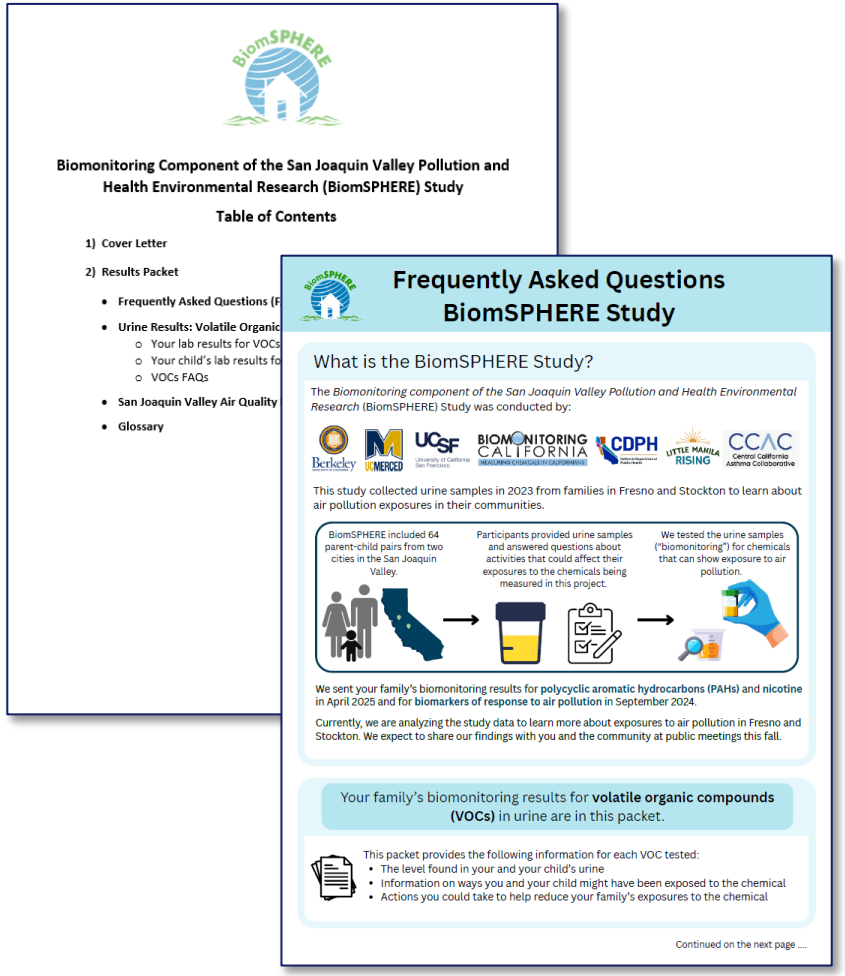
BiomSPHERE

- Community meeting planned for April 2026
- Results return evaluation (UC Merced and Central California Asthma Collaborative)– data analysis in progress
- Publications (in preparation):
  - Urinary Biomarkers of Air Pollutants
  - Indoor Air Pollutants and Urinary Biomarkers of Response



Biomonitoring Component of the San Joaquin Valley Pollution and Health Environmental Research (BiomSPHERE) Study

Table of Contents

1) Cover Letter
2) Results Packet
   - Frequently Asked Questions (F
   - Urine Results: Volatile Organic
     - Your lab results for VOCs
     - Your child's lab results fo
     - VOCs FAQs
   - San Joaquin Valley Air Quality
   - Glossary

Frequently Asked Questions
BiomSPHERE Study

What is the BiomSPHERE Study?

The *Biomonitoring component of the San Joaquin Valley Pollution and Health Environmental Research* (BiomSPHERE) Study was conducted by:

This study collected urine samples in 2023 from families in Fresno and Stockton to learn about air pollution exposures in their communities.

BiomSPHERE included 64 parent-child pairs from two cities in the San Joaquin Valley.

Participants provided urine samples and answered questions about activities that could affect their exposures to the chemicals being measured in this project.

We tested the urine samples ("biomonitoring") for chemicals that can show exposure to air pollution.

We sent your family's biomonitoring results for **polycyclic aromatic hydrocarbons (PAHs)** and **nicotine** in April 2025 and for **biomarkers of response to air pollution** in September 2024.

Currently, we are analyzing the study data to learn more about exposures to air pollution in Fresno and Stockton. We expect to share our findings with you and the community at public meetings this fall.

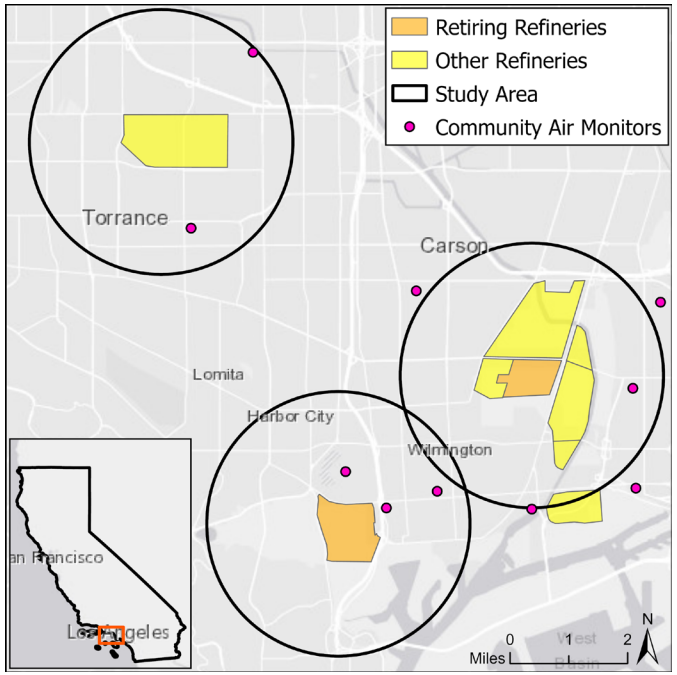
Your family's biomonitoring results for **volatile organic compounds (VOCs)** in urine are in this packet.

This packet provides the following information for each VOC tested:
- The level found in your and your child's urine
- Information on ways you and your child might have been exposed to the chemical
- Actions you could take to help reduce your family's exposures to the chemical

Continued on the next page ....

CHAIRS-LA: Community Health and Air Quality Implications of Refinery Retirements in Los Angeles Study

- Recruited 180 participants who live near oil refineries in Wilmington, Carson, and Torrance
  - Fresh Air wristbands
  - Blood pressure, lung function, and airway inflammation
- Collected urine samples from 86 participants



UCLA

Yale

CHAIRS
Community Health & Air Quality Implications of Refinery Retirements

CHAIRS-LA: Biomonitoring Next Steps

- Urine samples are currently being analyzed for metals, specific gravity, and creatinine
- Early notification planned for participants with elevated levels of arsenic, mercury, or cadmium
- Aliquots will be stored for potential analyses for volatile organic compounds (VOCs) and polycyclic aromatic hydrocarbons (PAHs)
- Two additional samples will be collected from each participant in Fall 2026

Surveillance Studies

- CARE: California Regional Exposure Study
- MAMAS: Measuring Analytes in Maternal Archived Samples
- STEPS: Studying Trends in Exposure in Prenatal Samples

CARE Study
California Regional Exposure Study

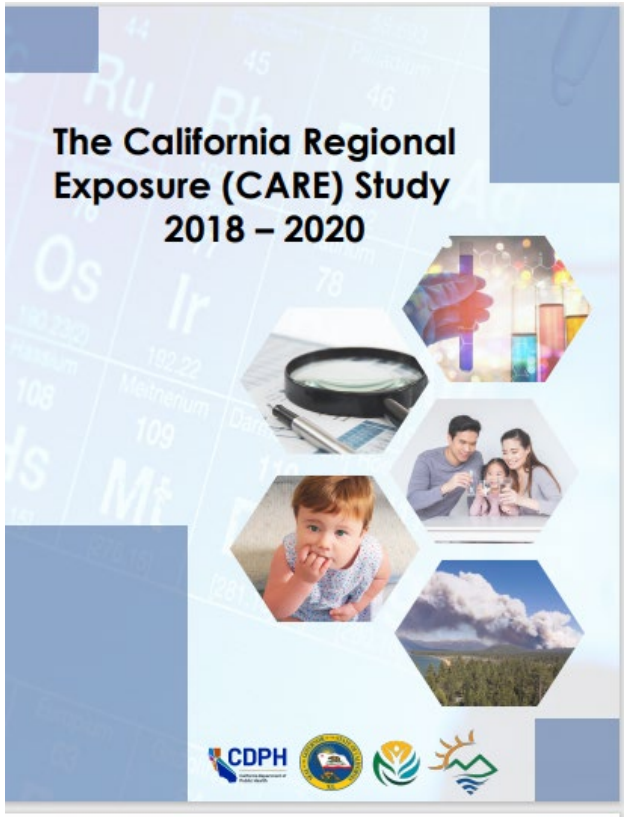
MAMAS

STEPS

Surveillance Studies

Study	Coverage	Sample Collection	Analytes
CARE: California Regional Exposure Study	3 regions	2018 – 2020	Perfluoroalkyl and polyfluoroalkyl substances (PFASs), metals, phenols, 1-nitropyrene
MAMAS: Measuring Analytes in Maternal Archived Samples	3 regions	2012, 2015-2016	PFASs, Persistent Organic Pollutants (POPs)
STEPS: Studying Trends in Exposure in Prenatal Samples	3 counties	2015 – 2027	PFASs
Future Surveillance	TBD	2028 onward	TBD

California Regional Exposure (CARE) Study Report



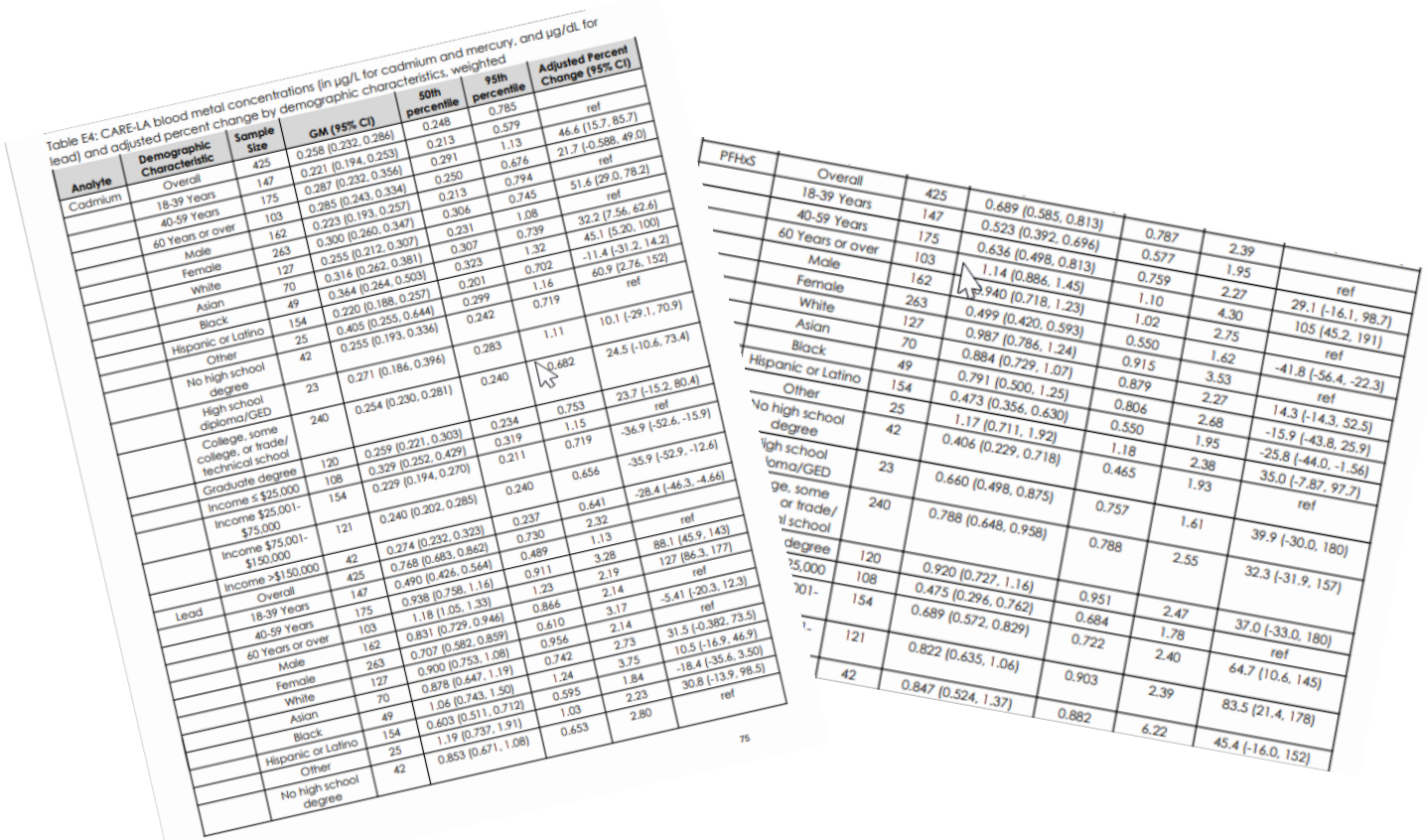


Table E4: CARE-LA blood metal concentrations (in µg/L for cadmium and mercury, and µg/dL for lead) and adjusted percent change by demographic characteristics, weighted

Analyte	Demographic Characteristic	Sample Size	GM (95% CI)	50th percentile	95th percentile	Adjusted Percent Change (95% CI)
Cadmium	Overall	425	0.258 (0.232, 0.286)	0.248	0.785	
	18-39 Years	147	0.221 (0.194, 0.253)	0.213	0.579	ref
	40-59 Years	175	0.287 (0.232, 0.356)	0.291	1.13	46.6 (15.7, 85.7)
	60 Years or over	103	0.285 (0.243, 0.334)	0.250	0.676	21.7 (-0.588, 49.0)
	Male	162	0.223 (0.193, 0.257)	0.213	0.794	ref
	Female	263	0.300 (0.260, 0.347)	0.306	0.745	51.6 (29.0, 78.2)
	White	127	0.255 (0.212, 0.307)	0.231	1.08	ref
	Asian	70	0.316 (0.262, 0.381)	0.307	0.739	32.2 (7.56, 62.6)
	Black	49	0.364 (0.264, 0.503)	0.323	1.32	45.1 (5.20, 100)
	Hispanic or Latino	154	0.220 (0.188, 0.257)	0.201	0.702	-11.4 (-31.2, 14.2)
	Other	25	0.405 (0.255, 0.644)	0.299	1.16	60.9 (2.76, 152)
	No high school degree	42	0.255 (0.193, 0.336)	0.242	0.719	ref
	High school diploma/GED	23	0.271 (0.186, 0.396)	0.283	1.11	10.1 (-29.1, 70.9)
	College, some college, or trade/ technical school	240	0.254 (0.230, 0.281)	0.240	0.682	24.5 (-10.6, 73.4)
	Graduate degree	120	0.259 (0.221, 0.303)	0.234	0.753	23.7 (-15.2, 80.4)
	Income ≤ $25,000	108	0.329 (0.252, 0.429)	0.319	1.15	ref
	Income $25,001-$75,000	154	0.229 (0.194, 0.270)	0.211	0.719	-36.9 (-52.6, -15.9)
	Income $75,001-$150,000	121	0.240 (0.202, 0.285)	0.240	0.656	-35.9 (-52.9, -12.6)
	Income >$150,000	42	0.274 (0.232, 0.323)	0.237	0.641	-28.4 (-46.3, -4.66)
Lead	Overall	425	0.768 (0.683, 0.862)	0.730	2.32	ref
	18-39 Years	147	0.490 (0.426, 0.564)	0.489	1.13	88.1 (45.9, 143)
	40-59 Years	175	0.938 (0.758, 1.16)	0.911	3.28	127 (86.3, 177)
	60 Years or over	103	1.18 (1.05, 1.33)	1.23	2.19	ref
	Male	162	0.831 (0.729, 0.946)	0.866	2.14	-5.41 (-20.3, 12.3)
	Female	263	0.707 (0.582, 0.859)	0.610	3.17	ref
	White	127	0.900 (0.753, 1.08)	0.956	2.14	31.5 (-0.382, 73.5)
	Asian	70	0.878 (0.647, 1.19)	0.742	2.73	10.5 (-16.9, 46.9)
	Black	49	1.06 (0.743, 1.50)	1.24	3.75	-18.4 (-35.6, 3.50)
	Hispanic or Latino	154	0.603 (0.511, 0.712)	0.595	1.84	30.8 (-13.9, 98.5)
	Other	25	1.19 (0.737, 1.91)	1.03	2.23	
	No high school degree	42	0.853 (0.671, 1.08)	0.653	2.80	ref

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PFHxS						
	Overall	425	0.689 (0.585, 0.813)	0.787	2.39	
	18-39 Years	147	0.523 (0.392, 0.696)	0.577	1.95	ref
	40-59 Years	175	0.636 (0.498, 0.813)	0.759	2.27	29.1 (-16.1, 98.7)
	60 Years or over	103	1.14 (0.886, 1.45)	1.10	4.30	105 (45.2, 191)
	Male	162	0.940 (0.718, 1.23)	1.02	2.75	ref
	Female	263	0.499 (0.420, 0.593)	0.550	1.62	-41.8 (-56.4, -22.3)
	White	127	0.987 (0.786, 1.24)	0.915	3.53	ref
	Asian	70	0.884 (0.729, 1.07)	0.879	2.27	14.3 (-14.3, 52.5)
	Black	49	0.791 (0.500, 1.25)	0.806	2.68	-15.9 (-43.8, 25.9)
	Hispanic or Latino	154	0.473 (0.356, 0.630)	0.550	1.95	-25.8 (-44.0, -1.56)
	Other	25	1.17 (0.711, 1.92)	1.18	2.38	35.0 (-7.87, 97.7)
	No high school degree	42	0.406 (0.229, 0.718)	0.465	1.93	ref
	High school ploma/GED	23	0.660 (0.498, 0.875)	0.757	1.61	39.9 (-30.0, 180)
	ge, some or trade/ l school	240	0.788 (0.648, 0.958)	0.788	2.55	32.3 (-31.9, 157)
	degree	120	0.920 (0.727, 1.16)	0.951	2.47	37.0 (-33.0, 180)
	5,000	108	0.475 (0.296, 0.762)	0.684	1.78	ref
	001-	154	0.689 (0.572, 0.829)	0.722	2.40	64.7 (10.6, 145)
		121	0.822 (0.635, 1.06)	0.903	2.39	83.5 (21.4, 178)
		42	0.847 (0.524, 1.37)	0.882	6.22	45.4 (-16.0, 152)

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Available at:
https://biomonitoring.ca.gov/sites/default/files/downloads/CARE_Report.pdf

Planning for Future Surveillance

- Meeting with the California Health Information Survey to discuss study parameters
- Exploring alternative sample collection methods
- Working to streamline and standardize processes
- Pilot testing Silent Spring Institute's Digital Exposure Report-Back Interface (DERBI)

Intra-Program Pilot (IPP) Study: Micro-sampling Devices

- Enrolled 40 participants
- Designed to compare two micro-sampling devices with venipuncture
  - Do micro-sampling devices collect sufficient volume?
  - Is the blood/serum collected usable by labs?
  - Are micro-samplers acceptable to participants?
  - Are there differences between samples collected by venipuncture and micro-samplers?

TAP micro-sampler

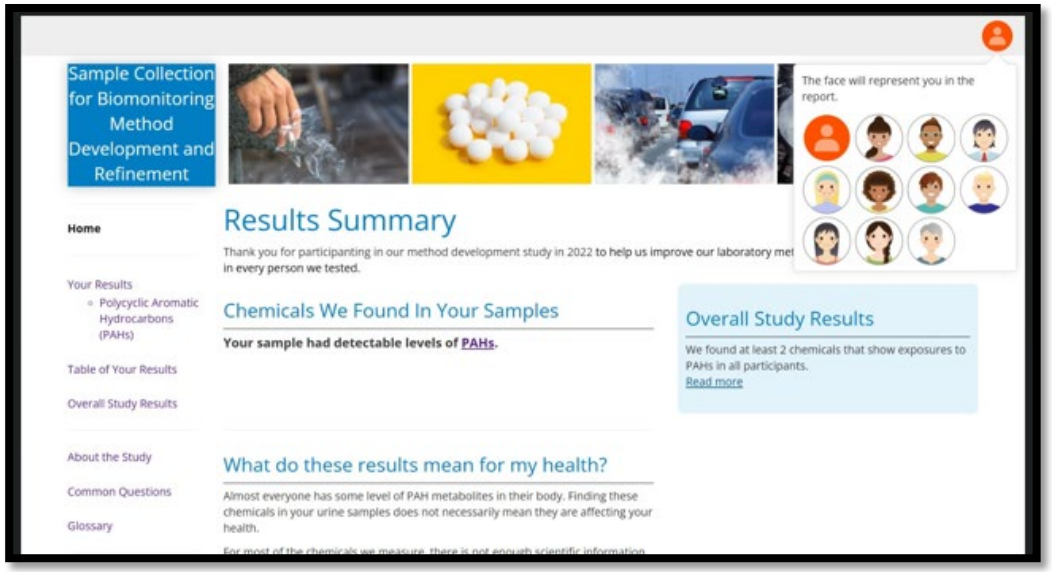
Tasso+ device

Issues with Micro-sampling Devices

- Participant experience
- Volume
- Sample quality
  - Potential for contamination
  - Coagulation of whole blood samples
- Capillary vs. venous samples

Digital Exposure Report-Back Interface (DERBI)

- Silent Spring Institute platform
- Pilot tested by OEHHA and CDPH staff



DERBI (continued)

- Impact on staff
  - Reduces workload related to results return
  - Facilitates return of multiple rounds of results

- Impact on participants
  - Enables participants to explore data in different ways
  - Allows Program to embed videos, images, and links to support participants

- Challenges – IT department/data security

Laboratory Activities

- Participating in IPPs to support lab and field method development
  - PAH metabolite results have been returned to participants
  - VOC metabolite results reported
  - Aliquots shared with external laboratory for ultrashort PFAS analysis
  - Samples collected from micro-sampling devices next in queue

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Laboratory Activities: Method Development/Refinement

- IPP samples were analyzed using improved PAH method
- New method uses unique internal standards for each analyte (except 9-FLUO)
- Corrects for extraction inefficiencies, loss due to chemical reaction during solvent evaporation, matrix effects, and instrument fluctuations

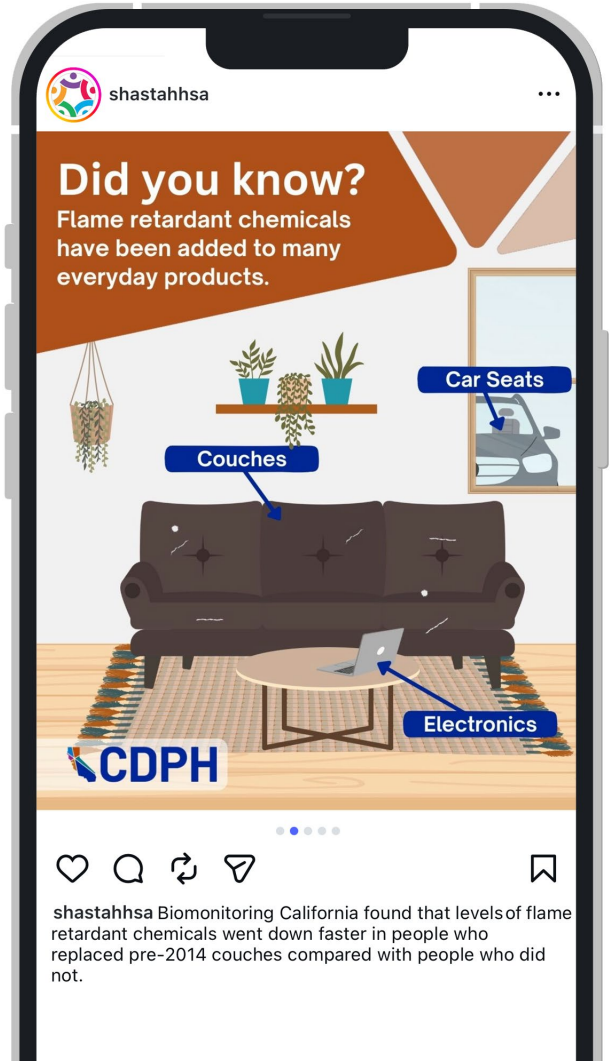
Analyte	Internal Standard (Old Method)	Internal Standard (New Method)
1-NAP	2-NAP-D_7	1-NAP-$^{13}C_6$
2-NAP		2-NAP-$^{13}C_6$
2-FLUO	2-FLUO-D_8	2-FLUO-$^{13}C_6$
3-FLUO		3-FLUO-$^{13}C_6$
9-FLUO		2-FLUO-$^{13}C_6$
1-PHEN	3-PHEN-$^{13}C_6$	1-PHEN-$^{13}C_4$
2-PHEN		2-PHEN-$^{13}C_6$
3-PHEN		3-PHEN-$^{13}C_6$
1-PYR	1-PYR-D_8	1-PYR-$^{13}C_6$

Laboratory Activities (continued)

- CHAIRS-LA Study: Urinary metals analyses in progress (n=187)
- CARE-2: Phenols analyses expected to begin in Spring 2026 (n=194)
- STEPS – Orange County: Data pending review for 2015-2021 samples

Outreach and Communications

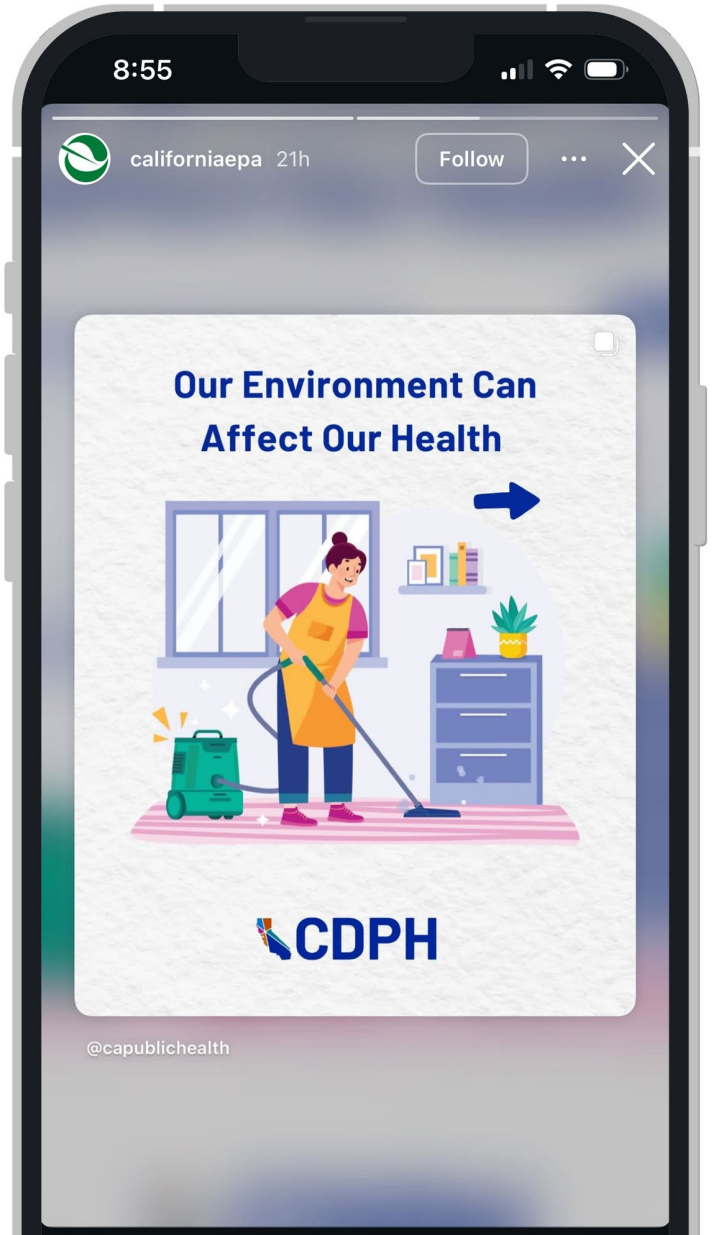
- Developed social media content that reached new audience of more than 10K
- **Reposted by:**
  - California Environmental Protection Agency
  - Madera County Public Health
  - Shasta County Health and Human Services Agency
  - And others



More Social Media

- **Reposted by:**
  - Medi-Cal
  - Humboldt County Department of Health & Human Services
  - Salt Lake County Health Department
  - Long Beach Health Department
  - Kern County Public Health
  - Get Healthy San Mateo County

- Featured in **CDPH's 2026 Social Media Best Practices Guide**



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Staff Update

Dinesh Adhikari
Kathleen Attfield
Hyoung Gee Baek
Paramjit Behniwal
Rebecca Belloso
Lily Borak
Kelly Chen
Key-Young Choe
Josephine DeGuzman
Dina Dobraca
Julian Edwards
Toki Fillman

Songmei Gao
Qi Gavin
Ranjit Gill
Emily Gokun
Weihong Guo
Susan Hurley
Xiaowen Ji
Stephanie Jarmul
Duyen Kauffman
Junhe Lu
Ana Mejia
Kiera Melton

Meltem Musa
Bishnu Neupane
June-Soo Park
Michelle Pearl
Eimi Percival
Aalekhya Reddam
Martha Sandy
Maya Shattuck
Jianwen She
Alex Shing^
Wenlu Song
Justin Sturgess

Dan Sultana
Sayaka Takaku-Pugh
Ian Tang
Darcy Tarrant
McKenna Thompson
Jeff Wagner
Miaomiao Wang
Shizhong Wang
Yunzhu (Judy) Wang
Nerissa Wu
Ruihong Xiao
Mylanah Yolangco

^ New staff
*** Departed staff**

BIOMONITORING CALIFORNIA

MEASURING CHEMICALS IN CALIFORNIANS

Questions?