MeCAP: Martinsville Environmental Community Action Project

(NIH-R2A-Martinsville)

Addressing Tetrachloroethylene Exposure in an Impacted Community: Residents' Concerns, Neurotoxic Effects, & Exposure Reduction

(Grant ID# 1R01ES033486-01)

Engagement Team

Purdue University
Exposure Assessment

Sa Liu, MPH, PhD

University of Illinois Chicago
Health/Exposure Associations
- Neurocognitive and Visual Assmt
- Cancer Study

Linking Research to Community Action

Mary Turyk, MPH, PhD

Eve Pinsker, PhD

Stephanie Littell
Project Community
Education Specialist

Bethaney Latham
Project Director

Field / Outreach Workers

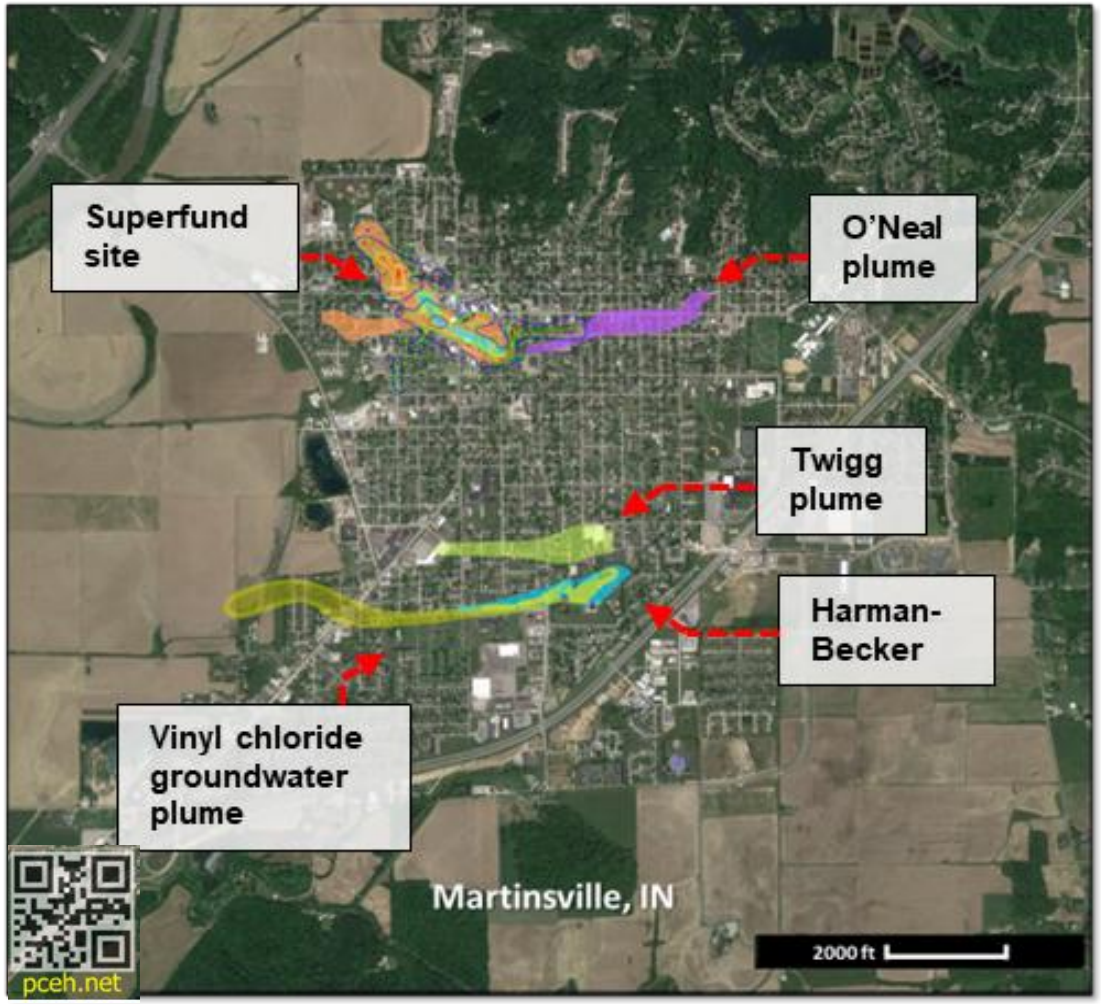
Clinical Evaluators

What do we want to know?

Goals of our work.

- **Detect** elevated exposure that needs to be addressed right away
- **Understand** health effects of low level, long-term PCE exposure
- **Address** community's concerns about contaminations
- **Protect** community health in Martinsville and beyond

Groundwater Contamination in Martinsville, Indiana



Martinsville, Indiana

- Municipal water system serves ~15,000 people
- Four known groundwater contamination "plumes"

Contaminants – known neurotoxin, possible carcinogen

- Tetrachloroethylene (PCE)
- Trichloroethylene (TCE)

Timeline – the EPA Superfund site

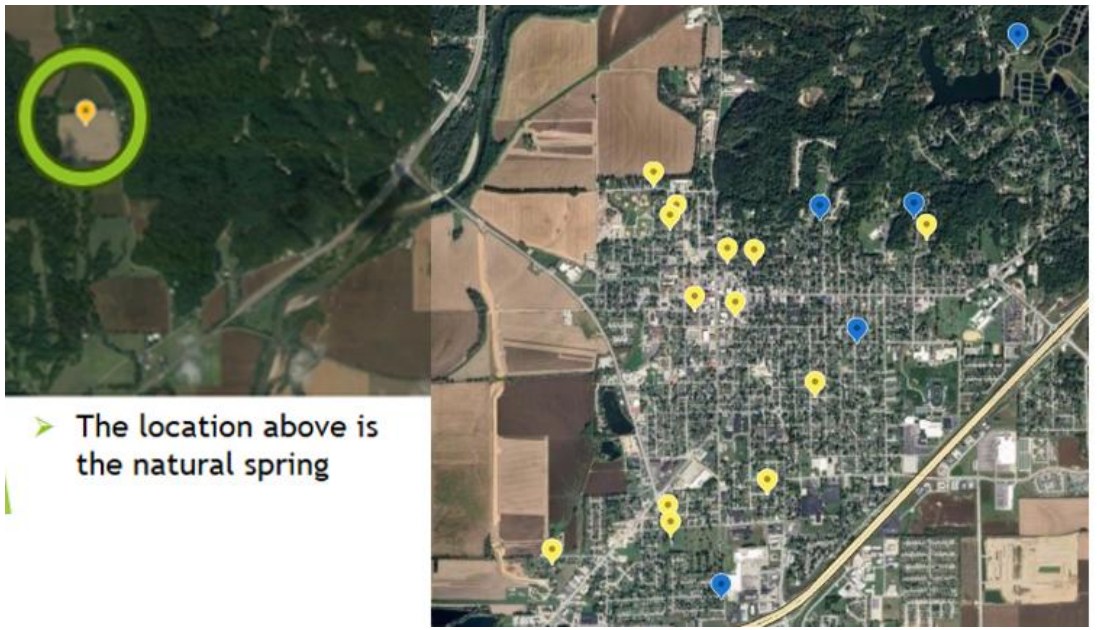
1986-1991	Dry cleaner operated
2002	PCE found in municipal Well#3
2005	Carbon filtration installed
2013	EPA NPL Superfund site
2021	Record of Decision (3/11/2021)
2024-25	EPA conducting a pilot study (Nov '24 - Summer '25); completing remedial design (late 2025)

Projects

- Well Water Study: Groundwater contamination and community health equity (*2020 – 2023,* Robert Wood Johnson Foundation Grant)
- Children's Study: Tetrachloroethylene contamination and neurobehavioral health among children in Martinsville, IN (*2020 – 2022,* Showalter Trust Research Grant)
- Adult Study: Addressing Tetrachloroethylene Exposure in an Impacted Community: Residents' Concerns, Neurotoxic Effects, & Exposure Reduction (2022 – 2028, NIEHS Grant)
- Cancer Biomarker Study: Bridging the gap between epidemiological studies and basic research for rare cancer mechanisms with the help of community members from Martinsville, IN (2024-2026, IU Melvin and Bren Simon Comprehensive Cancer Center Grant)

PCE/TCE not detected Martinsville tap water since 2021

Chemical	Nov-2019	Aug-2021	Oct-2021	May-2023
	(10 homes)	(4 locations, including the natural spring)	(5 properties, including 3 on residential wells)	(10 properties, only 5 tested for metals)
PCE	0.4 - 0.9 µg/L	<0.26 µg/L (non-detectable)	<0.26 µg/L (non-detectable)	<0.26 µg/L (non-detectable)
TCE	<0.26 µg/L (non-detectable)	<0.26 µg/L (non-detectable)	<0.26 µg/L (non-detectable)	<0.26 µg/L (non-detectable)
Toxic metals	NOT TESTED	Not concerned	NOT TESTED	Not concerned

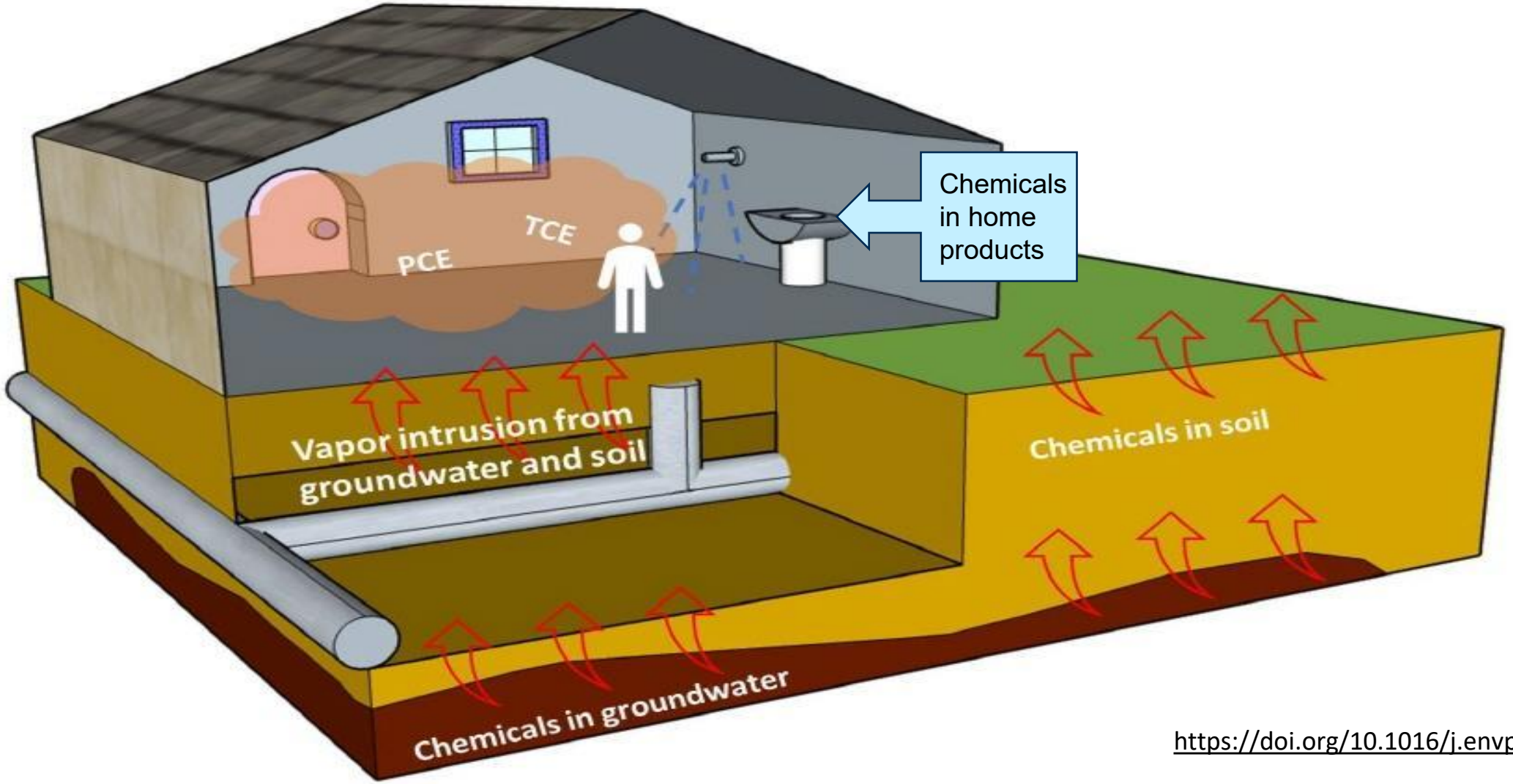


tested for PCE, TCE and metals

tested for PCE and TCE, but not metals

- **µg/L is microgram per liter**
- **1 µg/L = 1 ppb**
- **Action Level for PCE in drinking water is 5 ppb.**

What is vapor intrusion?



https://doi.org/10.1016/j.envpol.2021.118756

How do we test for PCE exposure?

- We collect exhaled breath in polypropylene bags:
  - Blow through straw to inflate bag.
  - Bag is transported to a mobile lab for analyzing.
- We measure air in homes
- Mobile van with PTR-MS
  - Proton Transfer Reaction Mass Spectrometry is a recently developed technique of measuring VOCs in air in real-time.

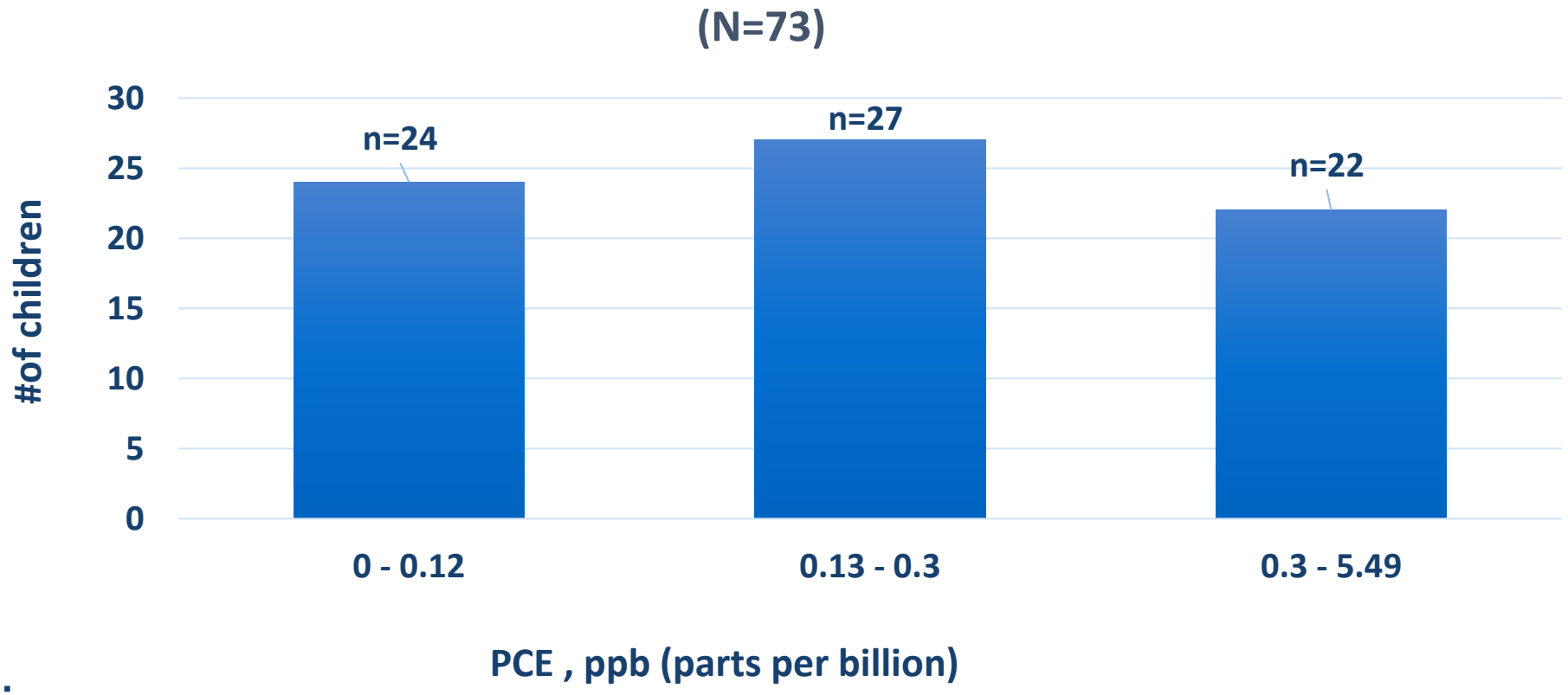
PCE exposure, visual and cognitive functions

- Measuring PCE in exhaled breath & some homes
- Measuring visual and cognitive functions in adults and children
  - NIH toolbox for cognition testing (Children & Adult)
  - Visual tests -- color vision and contrast sensitivity (Adult only)
- Collect health surveys and questionnaires
- Over 300 Martinsville residents have participated

Lanthony 15 Hue desaturated panel

What do we know so far?

PCE in Children's Exhaled Breath



Notes:

1) There are no regulatory standards or guidelines for PCE in exhaled breath.
2) Results for the adult study are preliminary and do not include all participants to date.

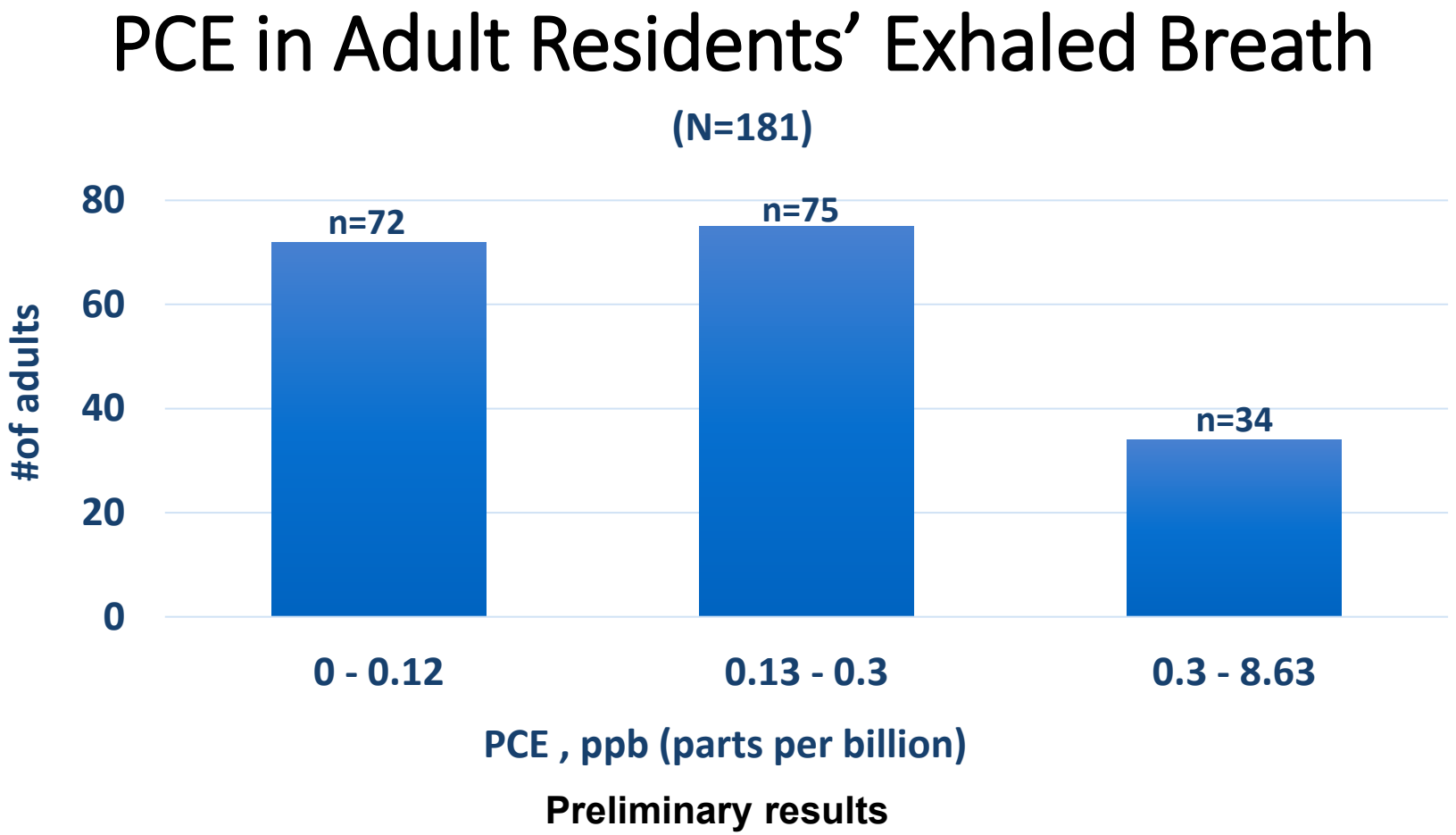
Children's Study findings

- PCE was detected in 93% of 73 child participants, with the PCE levels being generally low.

- Children with higher PCE exposure scored lower on tests measuring cognitive.

- Further research is needed to confirm these findings and investigate long term effects of low-level PCE exposure.

What do we know so far?



Notes:

1) There are no regulatory standards or guidelines for PCE in exhaled breath.
2) Results for the adult study are preliminary and do not include all participants to date.

Adult Study findings

- PCE was detected in 100% of adult participants, with the PCE levels being generally low.

- Analysis is underway regarding any connection between exposure levels and cognitive/vision deficiencies.

What else do we need to know?

Do people living in plume areas have higher PCE concentrations in their breath?

- Children's Study
  - Only 14 of the 73 children were from plume areas
  - We did not see higher PCE among those living in plume areas
- Adult Study
  - Only 54 of the 297 adults were from plume or buffer areas (within 50 meters of the plume footprint)
  - We did not see higher PCE among those living in plume or buffer areas

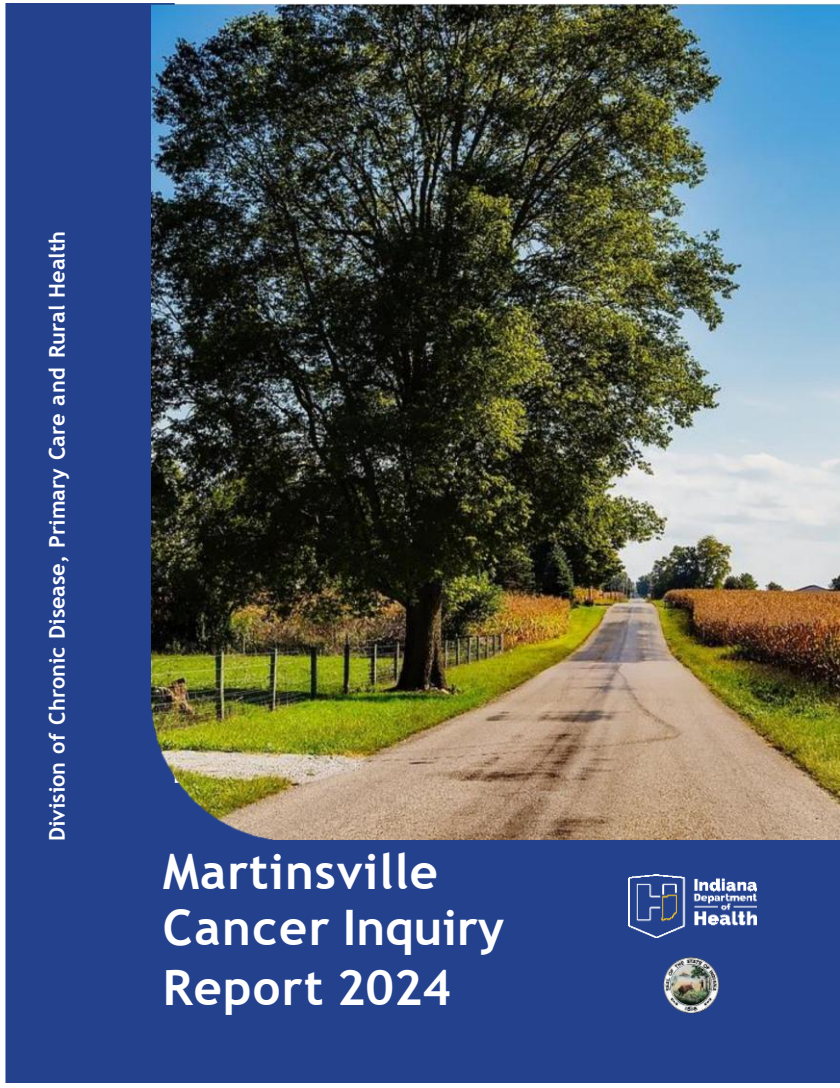
- We need more participants from plume areas to confirm this observation

Some types of cancers are more common in Martinsville than in the State of Indiana

Martinsville had higher than expected amounts of multiple types of cancer, including kidney and renal pelvis, leukemia, and myeloma.

The Indiana State Cancer Registry concluded that there is not a cancer cluster in Martinsville at this time.

The Registry will update the analysis for PCE related cancers when newer data becomes available.



Pilot Cancer Study

We collected blood and urine samples from 40 adults who participated in the adult study

Goals:

- To collect preliminary data to apply for a larger grant to:
  - Understand how PCE causes cancer
  - Develop markers to identify people with increased cancer risk from PCE exposures

What is next?

Community Action Phase

Action proposals will be based on findings from Years 1 - 3 on both exposure and community concerns and follow-up discussion with Community Engagement Team and CAB.

Possibilities include:

- Design and conduct community educational sessions to:
  - Dispel common misinformation
  - Tell people how they can minimize exposure to PCE/CVOCs
  - Promote PCE/CVOC testing & installation of mitigation systems when needed
- Work with tenants and landlords to create increased receptivity to testing and mitigation.
- Development of policy changes or funding needed to support mitigation for both people living outside and inside the EPA plume area.

What Can You Do To Reduce Your Exposure?

- PCE can be absorbed through the skin, but inhaling PCE vapors is the most common type of exposure.
- PCE/TCE can be found in brake cleaners, degreasers, adhesives, dry-cleaning chemicals, metal cleaners and polishes, aerosol spray paints and sealants, and some spot and stain removers for carpets and upholstery.
- Before buying or using any cleaning product, check the label for perchloroethylene, tetrachloroethylene, PERC, PCE, PerSec, Tetravec, or the chemical number 127-18-4. Be cautious with older cleaning products and dispose of PCE-containing products according to local hazardous materials protocol.

Healthier Products = Healthier Homes

- MeCAP is building a list of safer products for residents to purchase
  - List will appear on MeCAP's website
  - Cleaning Products, Air Fresheners, Cosmetics, etc.
  - Available locally or easy online purchase
  - We are personally testing the products for effectiveness
- Ventilate home on a regular basis by opening doors & windows
- Remove products from the home/garage.
- Install mitigation system if deemed necessary.

How can you help?

- Help reduce barriers
  - Tell people about this issue and the projects to increase awareness
- Volunteer for Action Phase of adult study
  - Attend MeCAP community events
- Join our Community Advisory Board (In-person 1-2 per year)
  - Hear updates from MeCAP and help determine best ways to disseminate material to the public
- Join our Engagement Team (Zoom 8pm, 1st and 3rd Thursdays)
- Join our FB group and share information as it is released.

MeCAP Contact Information

https://www.mecap.us

Join our Facebook group