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Air Pollution and Health

- Ubiquitous exposure
  - Long-term exposure → mortality, CVD, respiratory morbidity, asthma, lung cancer
  - Short-term exposure → asthma exacerbations, mental health, stroke, MI
- Disproportionately elevated in environmental justice communities
  - Nearby traffic, industrial sources, and others
  - Residents of these communities also experience higher rates of many diseases
- National Ambient Air Quality Standards (NAAQS)
  - Regulations for annual and 24-hour concentrations
  - Regulatory monitoring may not accurately reflect neighborhood level air pollution
    - Sparsely located
    - 24-hour integrated sampling

Low-Cost Air Sensors

- Advances in low-cost air sensors provides new opportunities to measure air pollutants
  - Deployable in networks
  - Easier to maintain and operate than traditional monitors
  - Indoor and personal monitoring
    - Increase awareness and inform exposure reduction strategies

Outdoor Air Network

PurpleAir

- Real-time $PM_{2.5}$ using Plantower PMS5003 laser sensors
- Mass concentrations at 5-second resolution
- Accurate, reliable
- Wifi data transmission & MicroSD storage

Personal Air Sampling

Airbeam

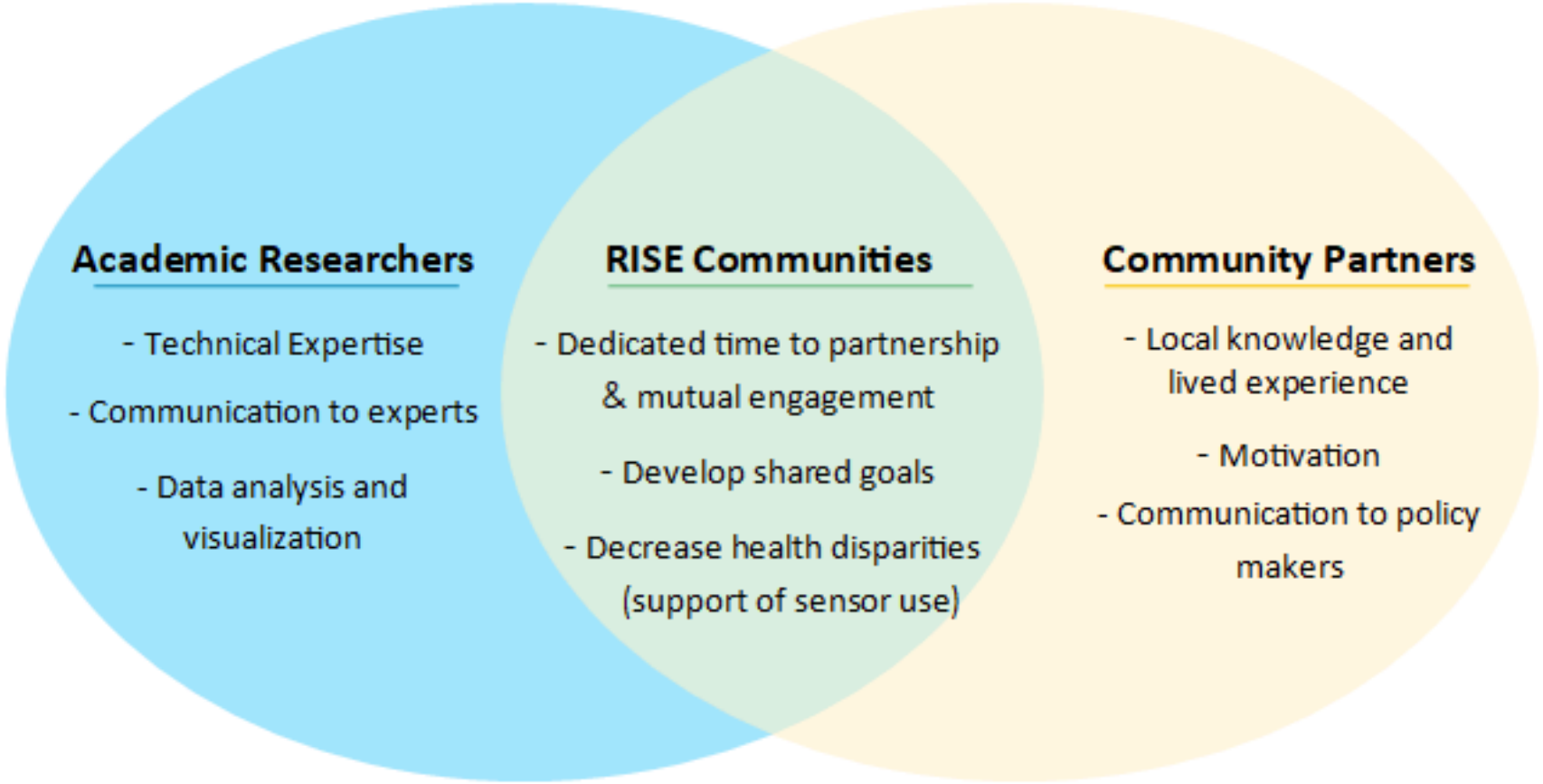
- Optical counting – light scattering sensor
- Mass concentrations at 1-second resolution
- Small, palm-sized, wearable
- Bluetooth link to smartphone app

Challenges in the Use of Low-Cost Sensors

- Which sensor should I use?
  - Pollutant(s) of concern
  - Personal sampling?
  - Indoor Sampling?
- Where should I put the sensor?
- How do I know if the sensor is giving me good data?
- Why doesn’t the sensor give me data like I expect?
- What does this data mean?
- How to I present the data?

Motivation

- Encourage strong community-academic partnerships in the use of low-cost sensors



Specific Aims

1. Foster community-academic partnerships through research education, training, and team development activities

2. Provide technical training in the application of low-cost sensors for indoor, outdoor, and personal air monitoring in EJ communities

3. Establish a community of practice to address air quality in communities nationwide

Intended Audience

1. Community partner

2. Academic partner

3. Trainee(s)

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Training Activities & Resources

1. *an intensive summer session located on the campuses of the University of Cincinnati and Cincinnati Children's Hospital Medical Center in Cincinnati, Ohio* designed to provide training and team building for community-academic research teams with an interest in monitoring air quality using sensor technology;

2. *monthly webinars* participants will attend for at least 1 year, or longer if they wish for continued engagement across RISE Communities cohorts; and

3. *an interactive website* to facilitate continued interaction and serve as a repository and resource for participants

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In-Person Training

- Held in Summer
- Cincinnati, OH
  - No cost to participants
- In addition to training, teams receive PurpleAir sensors

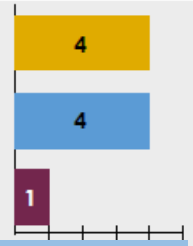
TOPIC	FACILITATOR(S)
Team Development • Science of Team Science • Communication Strategies (Colors) • Academic-Community Partnerships • Team Charters	Jack Kues, PhD
Principles of CEnR • Benefits and Challenges • Ethics • Building Trust • Environmental Justice Communities	Lori Crosby, PsyD
Improving Data Collection Through Community-Academic Partnerships • Establishing Research Questions and Hypotheses • Continuum of Community-based Research • Building Strong and Productive Partnerships • Ethics and IRB in Collecting Health Data	Christina Fuller, Sc. D
PurpleAir Sensors Introduction • Considerations of PurpleAir data collection vs. EPA • Conversion factors/ why dual laser counters?	PurpleAir
Responsible Conduct of Research	Angela Braggs-Brown, MA
Sensor Stories	Katrina Korfmacher, PhD
Using Low-Cost Sensors in EJ Communities • Overview of sensor technologies • How it works, what it can collect • Case Study Examples • Program Participant Experiences with Sensor Research	Elizabeth Kamai, PhD and Dayane Barahona, BA
Sensor Data from the PurpleAir Website • Collection and Management • Data export from website • Analysis and Interpretation in Excel	PurpleAir with Kendall Kubis
Sensor Data Visualization in R	Cole Brokamp, PhD and Stephen Colegate, PhD
Field Trip to Community Research Location: **Groundwork Ohio River Valley**	Jaeydah Edwards, BS

Cohort 1 Feedback

- Five community-academic teams
  - Communities impacted by industrial sources, traffic, metals recycling, and greenspace infrastructure

Participants (pre n=9; post n=8)

1. When you think about the individuals working on your project together, how would you characterize the stage of the team at this moment?



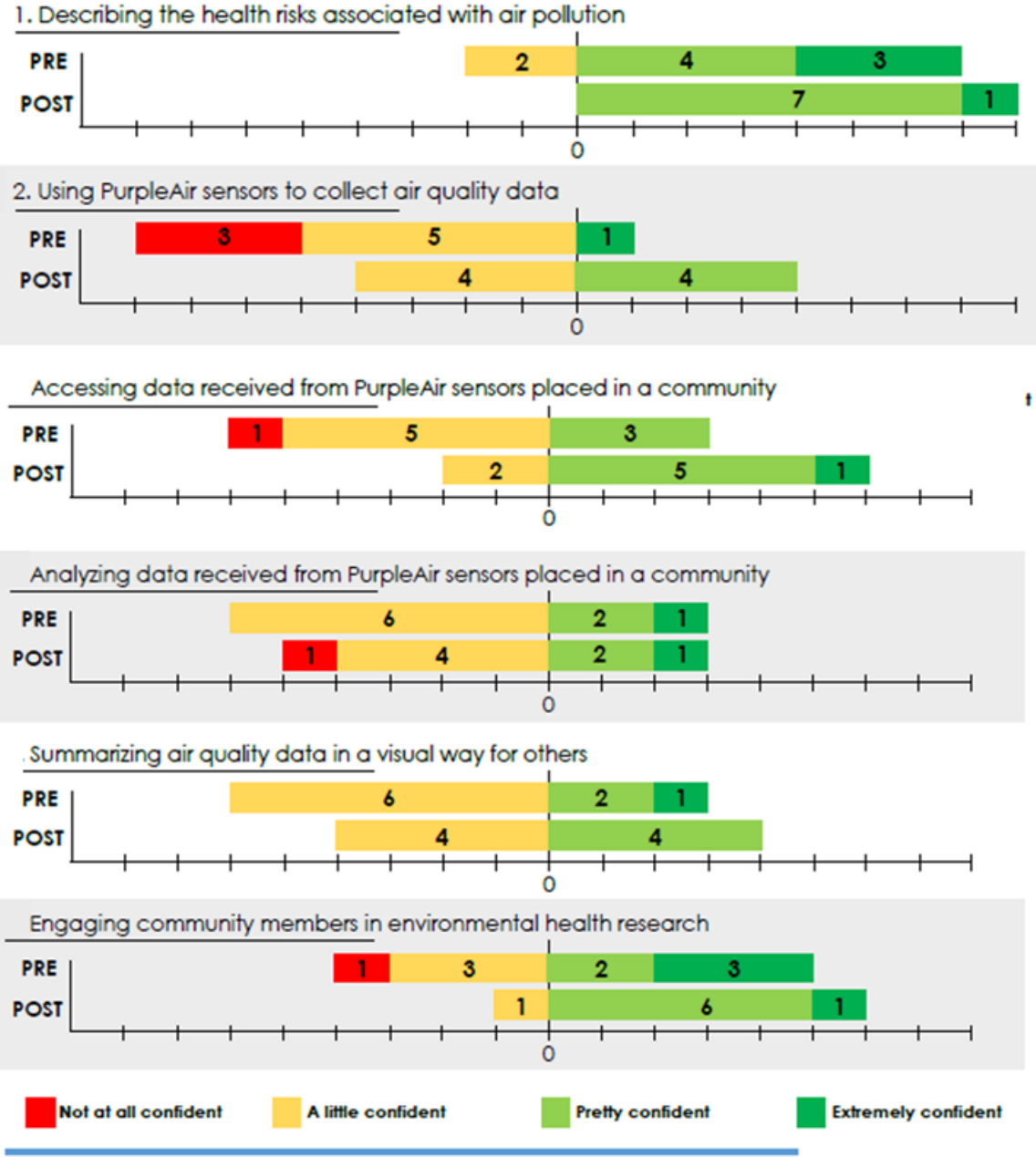
There was lots of good information presented in the training and getting access to these sensors will make a difference in the community.

This program presents a unique opportunity for community organizations to form relationships with academic partners to study and influence change in air quality in low-income communities.

This is an excellent training workshop that helps you connect not only with your partner but with other teams. The size was perfect for building connections. The topics were wide-ranging and highly relevant. The workshop was so well-organized. I am so thrilled to be taking part!

I was really impressed by the program. It was very organized and flowed nicely. I liked the opportunity to spend time with other community teams and hear their stories. It was time well spent for me and I have gained confidence in my ability to lead a citizen scientist community project. Well done!

Please indicate your level of confidence with the following areas of knowledge or skill:



Ongoing Monthly Webinars

- Cohort 1 community-academic teams identify areas of need and barriers to project progress
  - Monthly webinars are intended to address these needs and help grow a community of practice
  - Monthly topics so far have included:

Date	Topic
October 2023	Project updates from teams, discussion of barriers and needs
November 2023	Health and Equity in Charlotte: Report from a community-partnered air quality monitoring project
December 2023	Creating and Maintaining Strong Community-Academic Research Partnerships for Environmental Public Health
January 2024	Data Expert Panel: Q&A in data collection, analysis, and visualization
February 2024	Project updates from teams, discussion of barriers and needs

More Information and Application for 2024

www.ejsensors.com

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