

# Community Biomonitoring Update

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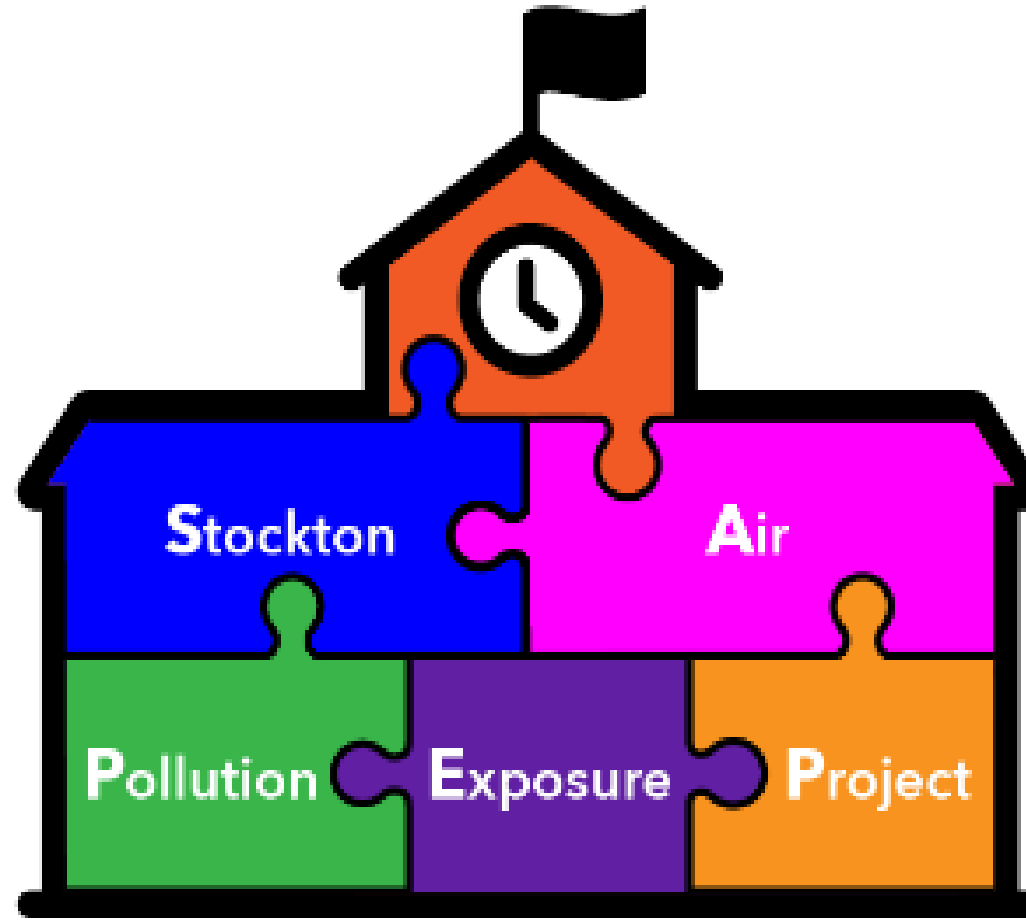
Safer Alternatives Assessment and Biomonitoring Section (SAABS)  
Office of Environmental Health Hazard Assessment (OEHHA)

Presentation at the Scientific Guidance Panel Meeting

July 22, 2022

# Overview of presentation

- Update on current studies
  - Stockton Air Pollution Exposure Project (SAPEP)
  - **Biom**onitoring component of the **San Joaquin Valley Pollution and Health Environmental Research Study (BiomSPHERE)**
- Planning for future studies
  - Short term
  - Long term





# Stockton Air Pollution Exposure Project (SAPEP)

Learn more about air pollution exposures to schoolchildren in Stockton

Evaluate effectiveness of school air filtration at reducing children's air pollution exposures



# SAPEP fieldwork completed

- Conducted at a school in Stockton, CA
  - Monday (12/6/21) – Tuesday (12/7/21)
  - Monday (12/13/21) – Tuesday 12/14/21)
- Collected:
  - Urine samples for biomonitoring
  - Air quality data
  - Survey data



# SAPEP biomonitoring data

- Urine samples have been analyzed for:
  - Metabolites of polycyclic aromatic hydrocarbons (PAHs), volatile organic compounds (VOCs), and nicotine
  - Biomarkers of oxidative stress and inflammation
- Currently, we are:
  - Conducting descriptive analyses of biomonitoring data
  - Preparing results return packets



# Air quality data

- Continuous air monitoring
  - Fine particulate matter (PM<sub>2.5</sub>)
  - Black carbon (BC)
- Integrated air sampling
  - Polycyclic aromatic hydrocarbons (PAHs)
  - Volatile organic compounds (VOCs)
  - Particle source analysis



# Air monitoring data

Measurement devices for PM<sub>2.5</sub> and BC co-located at six sites throughout the school, including:

- Two outdoor locations on school grounds
- Four indoor locations
  - Two classrooms with portable stand-alone air filtration
  - Two classrooms without portable stand-alone air filtration





# Stand-alone IQAir filtration



- Stand-alone filtration units (IQAir HealthPro Plus) were deployed in two classrooms
- These IQAir units are certified to filter  $\geq 99.97\%$  of particles  $\geq 0.3$  microns
- Teachers were instructed not to turn off the IQAir filtration units





# PM<sub>2.5</sub> and BC air monitoring locations

Classrooms 1 and 2: No IQAir filtration  
Classrooms 3 and 4: IQAir filtration





# Fine Particulate Matter (PM<sub>2.5</sub>) monitoring



## ➤ PurpleAir sensors

- Provided continuous, real-time PM<sub>2.5</sub> measurements
- Were calibrated to a local federal regulatory monitor
- Will continue to operate and provide publicly available data on PM<sub>2.5</sub>



# Black carbon (BC) monitoring

## Aerosol Black Carbon Detectors (ABCDs)

- Provided real-time black carbon concentrations at one-second intervals
- Based on optical reading of particles collected on a glass fiber filter





# PM<sub>2.5</sub> and BC data: preliminary analyses

- Analyses focused on data collected:
  - During week one (Mon 12/6/21 – Tues 12/7/21)
  - 8 am Monday through 3 pm Tuesday
- Measured data were converted to hourly averages prior to analyses

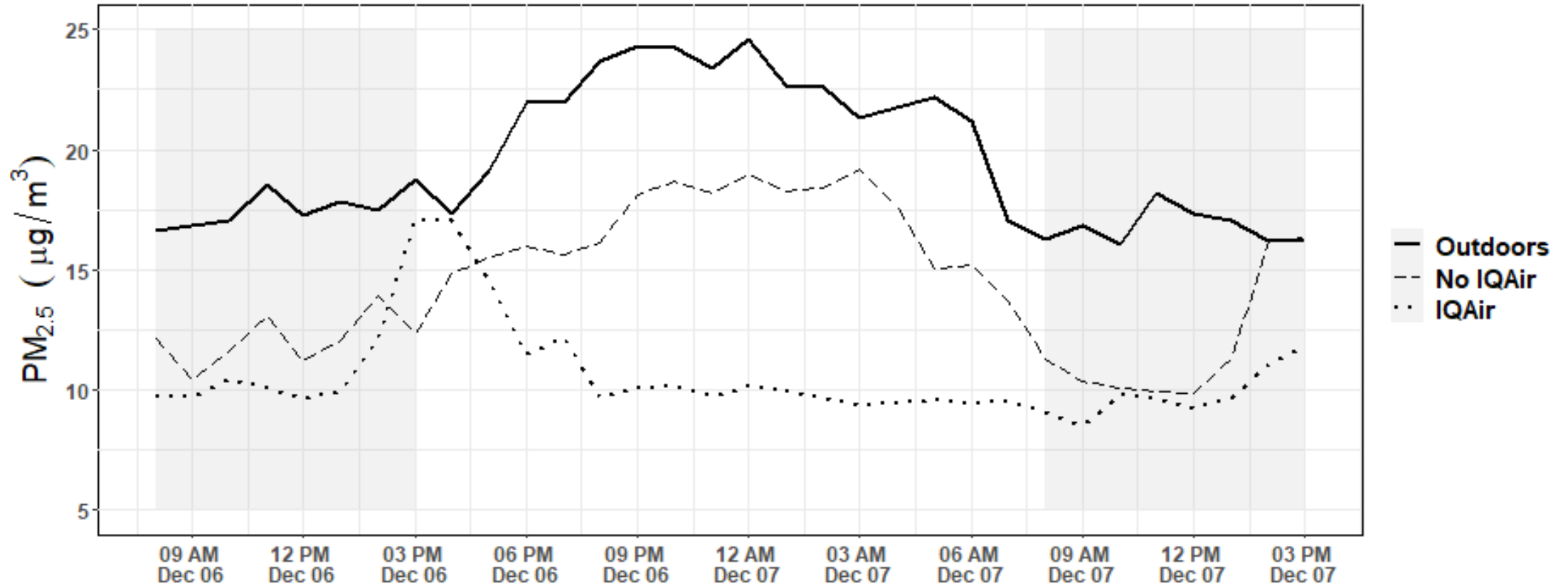


# PM<sub>2.5</sub> and BC data: preliminary analyses (cont'd)

- Evaluated temporal trends
- Compared air concentrations:
  - In classrooms with IQAir filtration
  - In classrooms without IQAir filtration
  - Outdoors on school premises



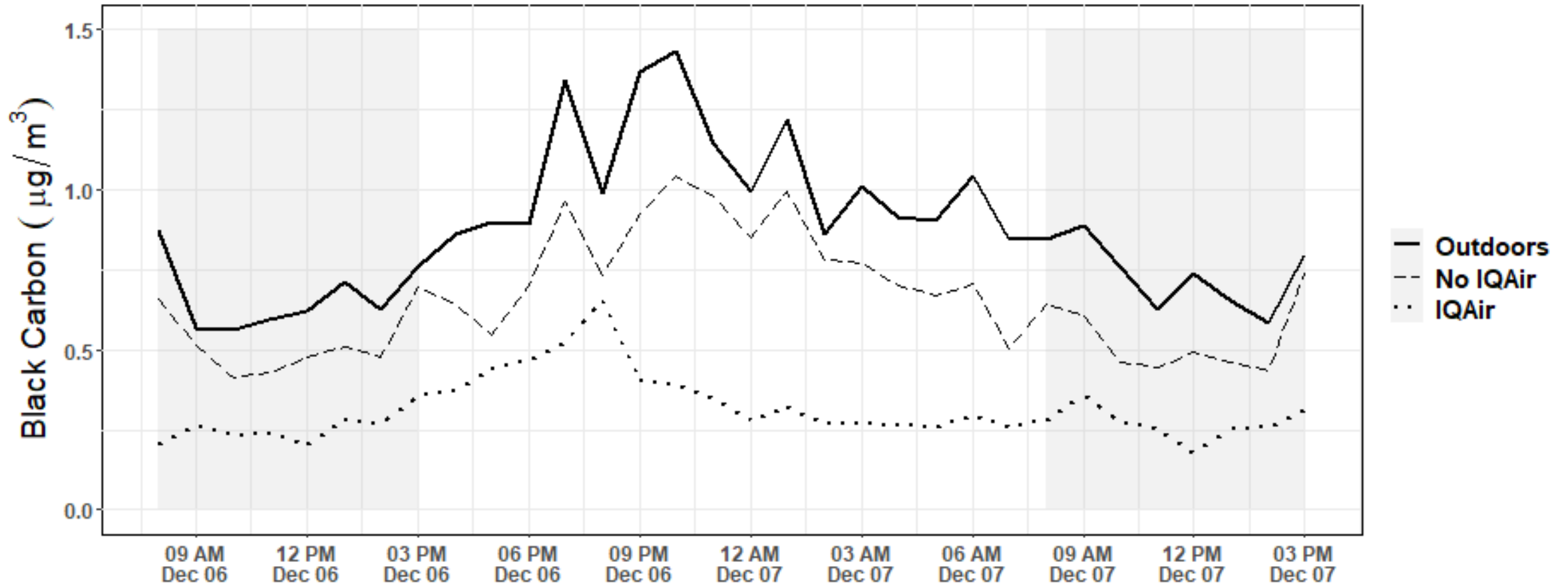
# PM<sub>2.5</sub> temporal trends

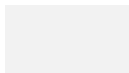


 = hours school is in session



# BC temporal trends

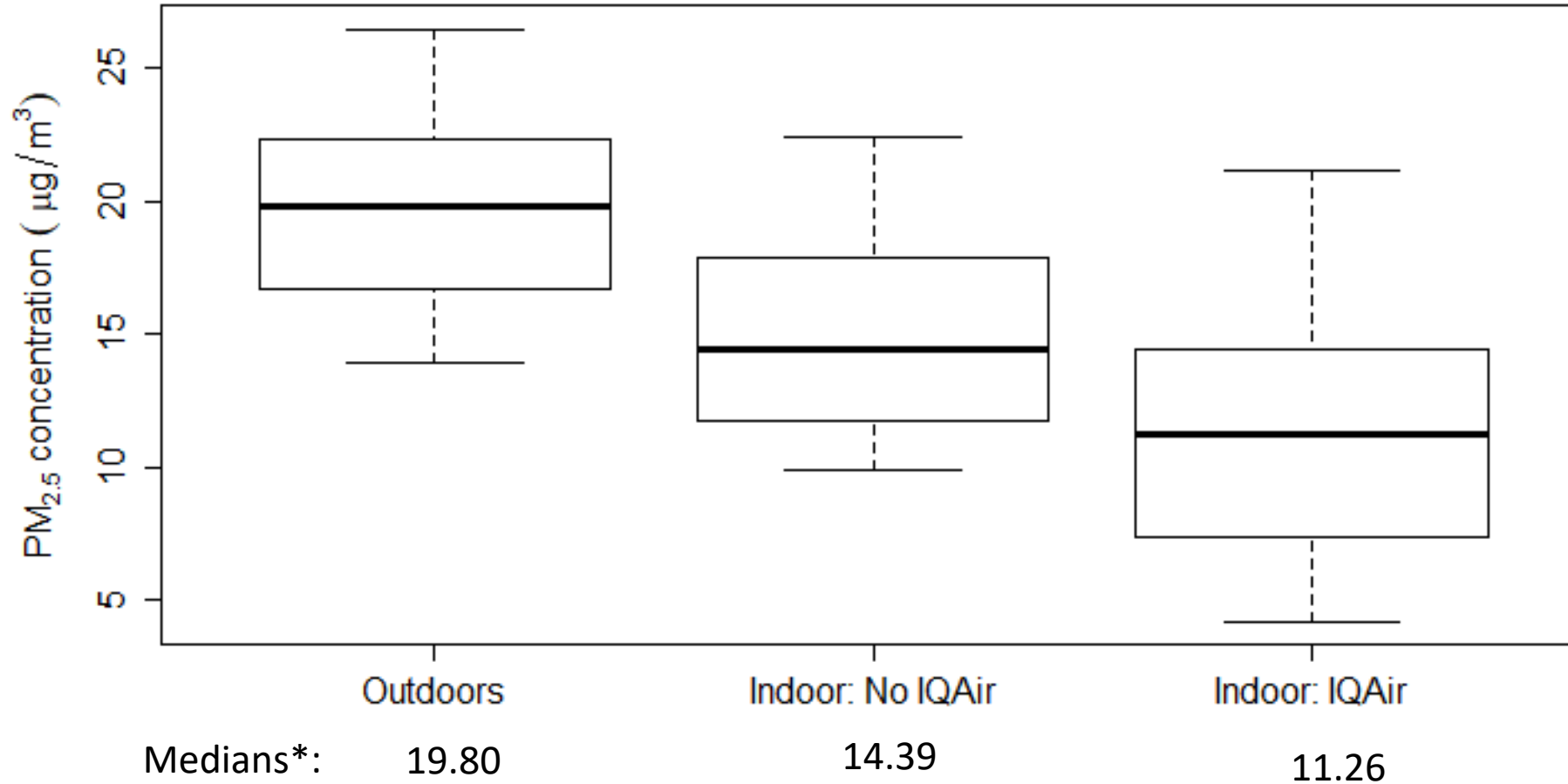


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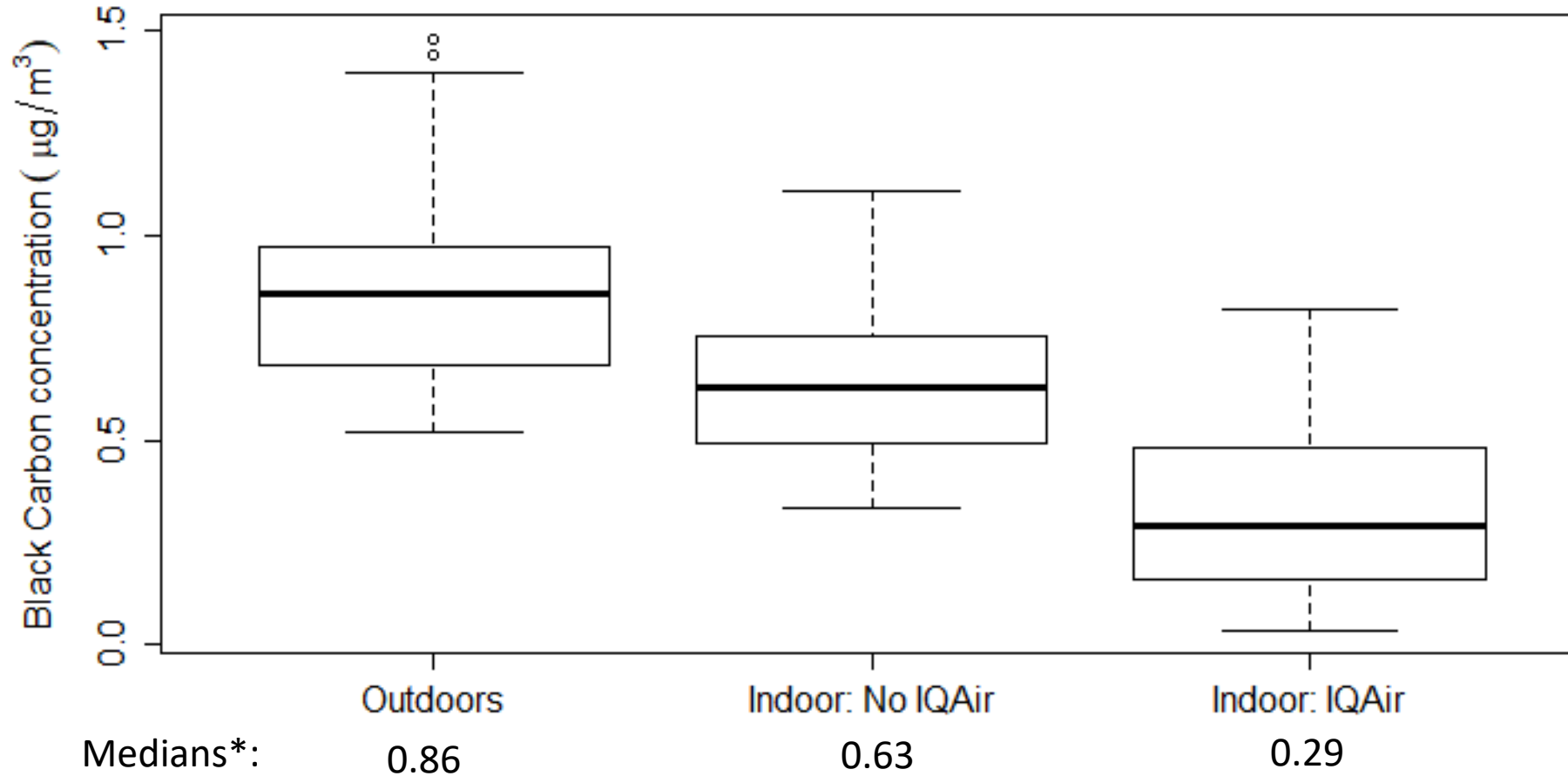
# PM<sub>2.5</sub> distribution: outdoors and indoors, with and without IQAir filtration



\* All medians significantly differ (Wilcoxon Rank Sum Test  $p$ -value < 0.05)



# BC distribution: outdoors and indoors, with and without IQAir filtration



\* All medians significantly differ (Wilcoxon Rank Sum Test  $p$ -value  $< 0.05$ )



# Air monitoring: summary of results

- Levels of  $PM_{2.5}$  and BC were higher outdoors than indoors
- Air quality was improved in classrooms with IQAir filtration compared to those without IQAir filtration
  - $PM_{2.5}$  median concentration was 22% lower in classrooms with IQAir
  - BC median concentration was 54% lower in classrooms with IQAir



# Next steps

- Prepare packets with children's individual biomonitoring results and distribute to parents
- Give presentations at community meetings to disseminate initial study findings
- Conduct descriptive analyses of biomonitoring data for posting on Program website
- Conduct integrated analyses of biomonitoring, air quality, and questionnaire data to address the project's research questions
- Disseminate final study findings to relevant stakeholders (e.g., community members, policy/decision-makers, scientific researchers)

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# BiomSPHERE: Biomonitoring component of the San Joaquin Valley Pollution and Health Environmental Research Study (SPHERE)

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# Overview of SPHERE\*

- Will assess exposures to air pollutants and noise among 90 parent-child pairs living in Fresno and Stockton
- Includes:
  - Household air monitoring/sampling for selected criteria air pollutants, black carbon, and VOCs
  - Personal air sampling for PM<sub>2.5</sub>
  - Measurement of noise levels
  - Administration of questionnaire to collect exposure survey data



**Fresno, CA**  
*Photo credit: John Walker, Fresno Bee*



**Port of Stockton, Stockton, CA**  
*Photo credit: Stockton Record*

\* Funded by: California Air Resources Board Contract #20RD012;  
original project title "Total Exposures to Air Pollutants and Noise"



# Overview of BiomSPHERE

- All SPHERE participants will be invited to provide urine samples
- Urine samples will be analyzed for:
  - Metabolites of PAHs, VOCs, and nicotine
  - Biomarkers of oxidative stress and inflammation
- Additional air sampling will be conducted to help interpret the biomonitoring results



# Planning for future community biomonitoring studies



# Short-term planning

The plan for our next community biomonitoring project is to add a biomonitoring component to an existing research study that:

- Focuses on an underserved and heavily burdened community
- Expands the Program's geographic coverage
- Has community engagement activities already in place
- Is collecting complementary air exposure and/or health data
- Offers opportunities to provide results that can be translated into actions to reduce exposures

# Long-term planning

- We plan to develop a Request for Information (RFI) to identify opportunities for future community biomonitoring studies
- The RFI will:
  - Provide a systematic and transparent mechanism for gathering information to help design community biomonitoring studies
  - Likely be issued in 2023 to develop studies that would be supported by contract funds from FY 2024-25 (and beyond)

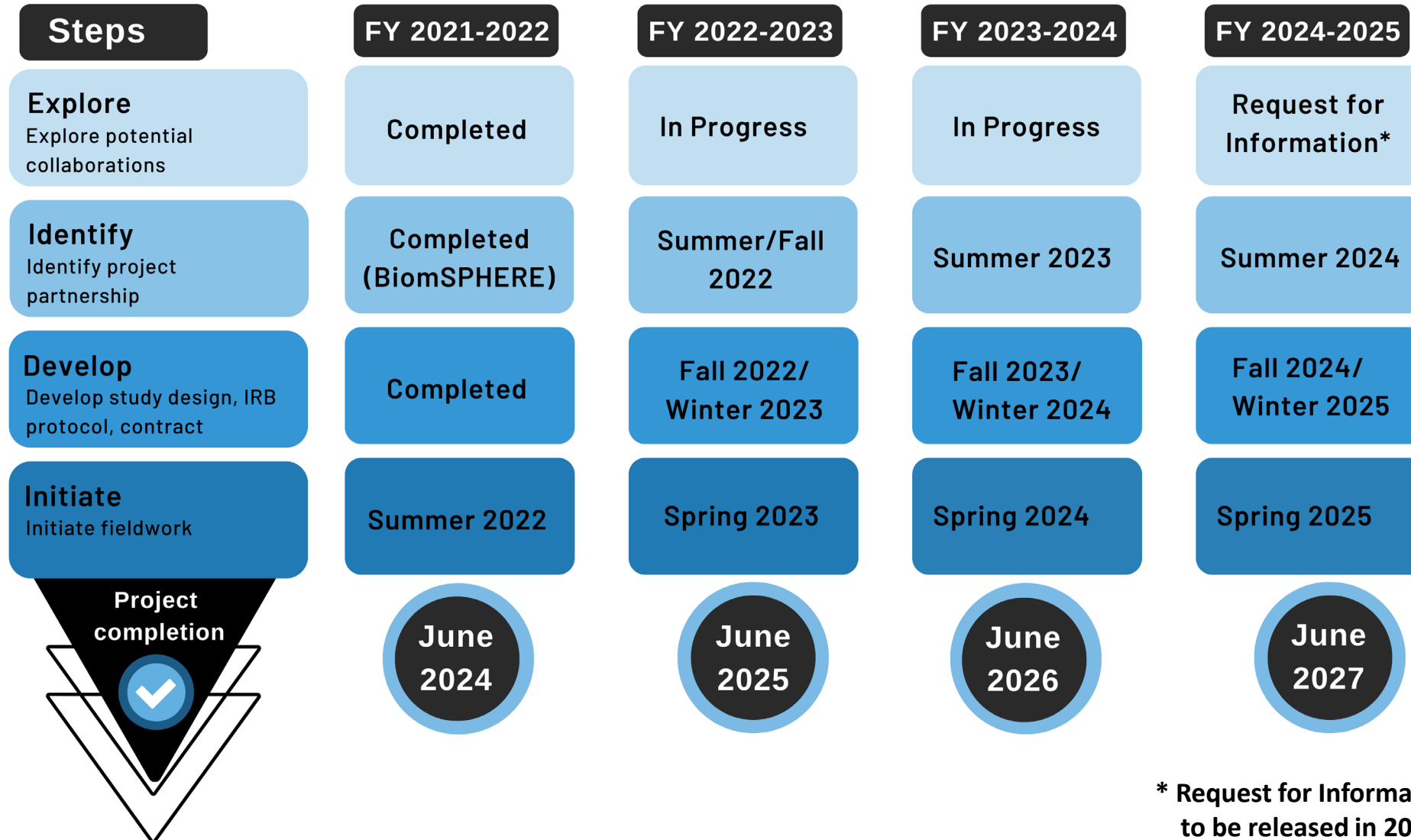
# Prior Program RFIs

- Aimed at soliciting proposals for laboratory partnerships from academic researchers
- Sought to identify studies that had recently collected blood or urine samples from California residents
- Goals were to:
  - Support ongoing epidemiologic or exposure assessment studies
  - Provide the Program with additional data to support its goals

# Developing a community biomonitoring RFI

- To solicit ideas from:
  - Community leaders and organizations
  - Academic researchers
- To identify projects that address:
  - Air pollutants of concern
  - Other environmental chemicals of concern in California
- To consider projects that include:
  - Designing a new biomonitoring study
  - Adding a new biomonitoring component to an existing study

# Planning future community biomonitoring studies



\* Request for Information (RFI) to be released in 2023

**Thank You!**

**Questions from SGP and the public?**

# Topics for Discussion:

## Increasing the impact of our study findings

After a community biomonitoring study is completed, what additional steps could the Program take to maximize the impact of our study? For example, how might we provide information:

- To other communities beyond where the study took place
- That help communities better understand and take steps to achieve reductions in their air pollution exposures
- That could support policy changes to reduce air pollution

# Topics for discussion - developing an RFI

We plan to release a Request for Information (RFI). It might be open to both community organizations and academic researchers – or it may be two separate RFIs

- What types of information should we collect to help evaluate the feasibility and impact of potential projects?
- What should the RFI process look like? (e.g., a one-time process, a continuously open process, cyclic process...)
- The goal is to gather information to identify opportunities where biomonitoring can inform and have an impact on public and community health – not to select “a winner”
  - What should the follow-up process look like?
  - How do we set and convey expectations?