AB 617 Biomonitoring Update and Planning

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Presentation at the Scientific Guidance Panel Meeting

March 25, 2022

Overview of presentation

- Update
  - Stockton Air Pollution Exposure Project (SAPEP)
  - **BiomSPHERE: Biom**onitoring component of the **S**an Joaquin Valley **P**ollution and **H**ealth **E**nvironmental **Re**search Study (SPHERE)
- Planning for future community biomonitoring studies
- Discussion topics

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 biomonitoring

- Enrolled 18 parent-child pairs
- Child participants provided urine samples before and after one school day in each of two consecutive weeks
- Parent participants completed two on-line questionnaires
- 75 urine samples sent for lab analyses of:
  - Metabolites of selected polycyclic aromatic hydrocarbons (PAHs) and volatile organic compounds (VOCs)
  - Biomarkers of oxidative stress and inflammation
  - Cotinine

All Saints Academy of Stockton

Air monitoring and sampling

- Air monitoring
  - Fine particulate matter ($PM_{2.5}$)
  - Black carbon
- Air sampling
  - Polycyclic aromatic hydrocarbons
  - Volatile organic compounds
  - Particle source analysis
- Locations
  - Participating classrooms
  - Two selected outdoor locations on school grounds

Standalone air filtration

- Standalone IQAir filtration units installed in:
  - Two classrooms during week one
  - An additional four classrooms during week two

Week 1

Kindergarten

Classroom 1

MEMS
ABCD
PA

Grade 1

Classroom 2

MEMS
ABCD
PA
PPS

Grade 2

Classroom 3

MEMS
ABCD
PA

IQAir F

Grades 3-4

Classroom 4

Grades 5-6

Classroom 5

MEMS
ABCD
PA
PPS

IQAir F

Grades 7-8

Classrooms 6-8

LEGEND

MEMS = PAH samplers

ABCD = Black carbon sensors

PPS = Passive particle samplers

PA = Purple Air sensors

IQAir F = Air filtration installed

= 1 participant

Week 2

Kindergarten

Classroom 1

MEMS
ABCD
PA
VOC

Grade 1

Classroom 2

MEMS
ABCD
PA
PPS
VOC

Grade 2

Classroom 3

MEMS
ABCD
PA
VOC

IQAir F

Grades 3-4

Classroom 4

IQAir F

Grades 5-6

Classroom 5

MEMS
ABCD
PA
PPS
VOC

IQAir F

Grades 7-8

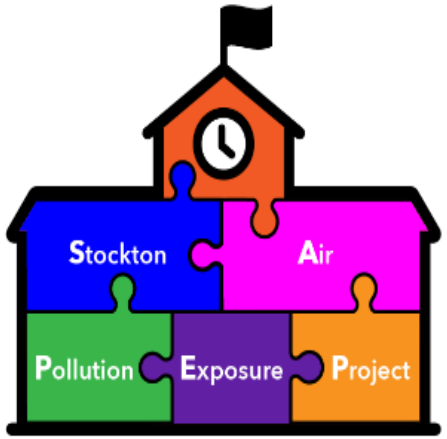
Classrooms 6-8

IQAir F

LEGEND

MEMS = PAH samplers **ABCD** = Black carbon sensors **PPS** = Passive particle samplers **PA** = Purple Air sensors

VOC = VOC sampling devices **IQAir F** = Air filtration installed = 1 participant



Timeline

✓ = completed

Nov 2021

- Recruited and enrolled participants ✓

Dec 2021

- Collected urine samples and questionnaires
- Conducted air monitoring and collected air samples ✓

Jan-April 2022

- Analyze urine and air samples
- Conduct initial analyses of air and questionnaire data

May-Aug 2022

- Conduct initial biomonitoring data analyses
- Prepare packets with children's individual biomonitoring results and distribute to parents

Fall 2022

- Give presentations at community meetings to communicate main findings of the study

BiomSPHERE: Biomonitoring component of the **S**an Joaquin Valley **P**ollution and **H**ealth **E**nvironmental **Re**search Study (SPHERE)*

* Formerly called “Total Exposures to Air Pollutants and Noise”

Overview of SPHERE

- Assess exposures to air pollutants and noise among families living in Fresno and Stockton
- Study of 90 child-parent pairs that includes:
  - Household air monitoring/sampling for selected criteria air pollutants ($PM_{2.5}$, ozone, nitrogen dioxide, carbon monoxide), black carbon, and VOCs
  - Personal air sampling for the selected criteria air pollutants
  - Measurement of noise levels
  - Collection of exposure survey data

Fresno, CA
Photo credit: John Walker, Fresno Bee

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

Overview of BiomSPHERE

- Collect up to 270 urine samples from the SPHERE participants, including some repeat samples in a subset of households
- Analyze urine samples for:
  - Metabolites of PAHs and VOCs
  - Biomarkers of oxidative stress and inflammation
  - Cotinine
- Augment SPHERE air sampling with measurements of PAHs and related compounds to help interpret the biomonitoring results

BiomSPHERE goals

- Directly evaluate air pollution exposures to families living in the highly burdened communities of Stockton and Fresno
- Examine differences in exposures between individuals, within individuals over time, and across the two communities
- Better map hyperlocal air pollution exposures in the two communities
- Provide comparative data to refine the interpretation of results from SAPEP
- Build San Joaquin Valley community capacity as partners in biomonitoring studies

Planning for future community biomonitoring studies

- Proposed FY 22-23 state budget includes $350K/year of ongoing funding for targeted biomonitoring studies designed to:
  - Complement and validate ongoing air monitoring in communities heavily burdened by air pollution
  - Increase understanding of local exposures and potential health risks faced by residents
  - Evaluate specific emission/exposure reduction measures
- Ongoing funding will allow us to serve diverse communities
  - Geography
  - Types of chemical exposures and sources
  - Demographic characteristics
  - Socioeconomic stressors

Selected community priorities

- Actively engage with communities to design and implement biomonitoring studies
- Provide education and resources to build community capacity for partnering in biomonitoring studies
- Measure more chemicals across the state
- Address multiple chemical exposures and synergistic effects
- Produce actionable results that can be:
  - Linked to potential health outcomes
  - Used to develop and evaluate policies and strategies to reduce chemical exposures

Community concerns - exposure sources

- Freeway and road traffic
- Truck idling
- Port and warehouse activities
- Backyard burning
- Residential wood burning
- Agricultural activities
- Oil and gas development (e.g., refineries, fracking)
- Metal processing facilities

Community concerns – air pollutants

- Criteria air pollutants, such as $PM_{2.5}$
- PAHs
- VOCs
- Pesticides
- Metals

Choosing a project — some key considerations

- Nature of the air pollutant exposures
  - Can the chemicals of concern be biomonitored?
  - Are there specific strategies for exposure reduction that could be evaluated?
  - Are the types of exposures relevant to other communities?
- Characteristics of the community heavily burdened by air pollution
  - Geographic location
  - Demographics
  - Socioeconomic stressors
  - Multiple chemical exposures and other environmental hazards
- Availability of community partners
- Availability of academic partners

Identifying project opportunities

- Engage with communities
  - Proactively reach out to community leaders/organizations
- Engage with researchers
  - Identify existing research projects relevant to the goals of AB 617 that could benefit from adding a biomonitoring component
- Create a public and transparent process for communities, researchers, and other stakeholders to propose project ideas (e.g., issue a Request for Information [RFI])
- Identify/develop capacity to measure additional biomarkers related to air pollution exposures:
  - Seek assistance from other state biomonitoring programs
  - Contract with researchers to develop new methods

Discussion topics

- Identifying existing research projects to which a biomonitoring component could be added to further the goals of AB 617. For the near-term, these projects would be:
  - Working with a community partner
  - Enrolling participants over the next year
  - In new regions
  - Collecting complementary exposure and health information
- Options for collecting and evaluating project ideas
- Options to identify/develop laboratory capacity to measure additional biomarkers related to air pollution exposures