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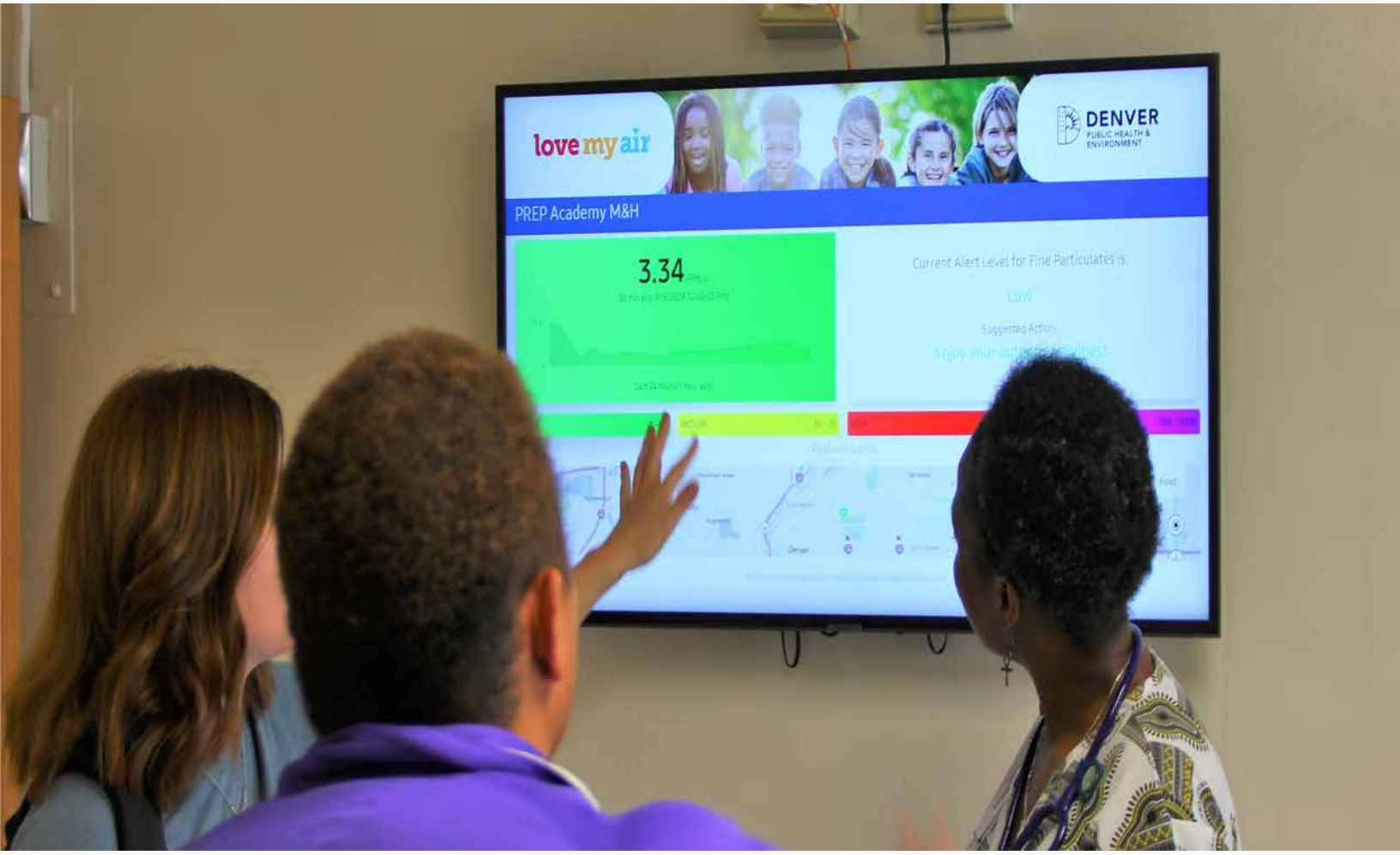
Participatory Science Data Management Case Studies

"Love My Air" Network



***Environmental Protection Agency [Contract No. GS-35F-410DA] to Information Associates, INC.**

“Love My Air” Network

Improving Data Management for Participatory Science

The “Love My Air” Program’s network is an open, replicable system that uses low-cost sensors, a custom data platform, correction algorithms, reference data and dashboards to provide air quality information. Partnering with schools to manage childhood asthma, the Denver pilot provides air quality data, nurse toolkits, classroom materials, and optional mitigation strategies.

Issue:
Air pollution & environmental justice

Location:
Denver, Colorado

Tools:
Low-cost air sensors, custom data platform

Contact:
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Project Overview & Goals

The Love My Air Program is a program of the Denver Department of Public Health & Environment (DDPHE). Since its inception in 2018, the program has been funded by the Bloomberg Philanthropies’ Mayors Challenge Grant for Innovation. By partnering with schools and providing useful information from air quality data, as well as community engagement and education, the goal is to decrease the instance of asthma among public school children. On Denver Public School campuses, low-cost PM2.5 (fine particulate matter) sensors are placed outside and informational digital dashboards are placed in high traffic areas inside. Love My Air works with school nurses, administrators, and teachers to provide educational resources and mitigation options. It has been built as an open system that can be replicated and used in other municipalities and/or in partnership with community groups, schools, recreation centers, etc. A recent grant from the National Institutes of Health will expand the use of the data platform into other health areas, like cardiovascular health issues related to air quality.

Role of Project Participants

The city partners with Denver schools to place sensors at key locations on campus. The program was developed with significant input from the school communities through focus groups, community events, and feedback surveys. The toolkits and curricula, as well as the public website, are intended to engage the community and address the needs of the individual schools and neighborhoods. Key partners within each school, usually the school nurse or a teacher, assume the role of project champion.

Data Management

The customized data platform can be replicated and adapted to other locations, environments (e.g., nursing homes or recreation centers), pollutants, and health concerns. In the Denver pilot, low-cost sensors were placed on the campuses of more than 30 schools. Love My Air dashboards, displayed via in-school TV monitors or on a website, provide actionable information to students, teachers, school nurses, school administrators, and parents. The data platform combines the low-cost sensor data with reference data, including AirNow data that reports air quality data using the Air Quality Index (AQI). EPA’s NowCast algorithm, a method for relating hourly data to the AQI, is used to process the data and calculate an AQI value in a customized data platform. Raw and processed data are stored in the cloud. Part of the technology developed for this program involves a series of data quality (correction) algorithms that consider several factors that can impact the data, including sensor type, installation environment, and

use case. Nightly email reports and alerts are used to verify data quality.

Data Use

The data is available through a dashboard designed for each school, which can be viewed inside the school and on a public website. A mobile app is also being developed. Schools may use the data in the classroom as part of science and math curricula, which are provided with the Love My Air program. Raw and processed data are open and transparent.

Issues and Lessons Learned

Technical issues included calibrating the sensors, moving the equipment while keeping it stable, and coordinating the installation of the equipment in schools where there were already preferred vendors for electrical installation, IT, etc. Non-technical issues revolved around changes to personnel in the schools, localizing the approaches and mitigations to fit the school and neighborhood environments, and addressing funding and sustainability of the program beyond foundation grants.

Outcomes and Success Factors

Love My Air engaged with stakeholders early and often to create support in developing the fundamentals of the program. A strong data foundation and a focus on community engagement was established. As a result, the project created a brand and suite of materials that others can modify for their own unique uses. Finally, the project increased awareness in Denver and beyond about the importance of air quality, and ways to engage communities around it. Love My Air is a model for other cities to follow.

Opportunities

- Boilerplate language or a template for what should be included in an RFP to ensure data ownership and the requirements of contractors producing air monitoring data.
- Funding that supports pilots that are ready to expand or become operational rather than funding only new development.
- Support for the development of more enterprise-level infrastructure.
- Support for a large-scale collaboration on standardized health messaging based on AQI.
- Consistent monitoring methodology and access of data sets across regions to build public trust and access.