Comparison of Ambient Air Pollutants in Varying Income Tracts Using a Constructed, Portable Device That Precisely Measures Ambient Air Concentrations (PAQMS)

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Almost the entire global population breathes unhealthy air (World Health Organization, 2022) and it disproportionately affects lower-income communities (World Health Organization, 2022). Some primary sources of air pollution are particulate matter measuring less than 2.5 micrometers in aerodynamic diameter (PM2.5), carbon dioxide (CO2), and nitrogen dioxide (NO2). Health effects from high concentrations of each pollutant, CO2 indirectly via causing higher temperatures, range from nausea and coughing to cardiopulmonary issues and lung cancer. The inadequacy of spatial resolution of federal air quality sensors creates a difficulty to obtain accurate concentrations of pollutants that people are directly exposed to. The knowledge of these pollutants' concentrations is vital to communities but unavailable. This problem was addressed by constructing a handheld device that records the concentration of PM2.5, CO2, and NO2 at the press of a button and displays the data visually through a screen or a colored LED. Data from this device was then recorded across Oregon (Corvallis, Albany, Eugene, Salem, Bend, repeated for Corvallis, Albany, and Bend) at parks and grade schools in areas varied by median household income (determined through 2010 census blocks). Following this methodology, a slight correlation was found between high PM2.5 concentrations and lower-income neighborhoods, and high NO2 concentrations in higher-income neighborhoods, with little significant correlation for CO2. This device can be applied in our home state, Oregon, during wildfire season, and applied worldwide in countries that have poorer air quality and limited air quality data.

Awards Won: