About the Measure	
Domain:	Social Determinants of Health
Measure:	Air Quality Index
Definition:	The Air Quality Index is a location-based estimation of air pollution that can be used as a proxy for exposure (i.e., exposure risk) to air pollution.
Purpose:	The US Environmental Protection Agency Air Quality Index includes several air pollutants that have been shown to cause respiratory disease and adverse pulmonary effects (e.g., decreased lung function, chronic bronchitis, and asthma) and have been linked to cardiovascular disease (e.g., stroke onset). Additionally, long-term exposure to fine particulate matter increases premature death risk among people age 65 and older, even when exposure is at levels below the National Ambient Air Quality Standards.
Essential PhenX Measures:	Current Address
Related PhenX Measures:	Air Contaminants in the Home Environment Exposure at Work and in Daily Life
Measure Release Date:	

About the Protocol	
Protocol Release Date:	
PhenX Protocol Name:	Air Quality Index
Keywords:	Environmental Protection Agency Air Quality Index, Air Quality index, AQI
Protocol Name from Source:	Environmental Protection Agency (EPA) Air Quality Index
Description:	This protocol is based on extracting air quality data from the U.S. Environmental Protection Agency (EPA) AirData Air Quality Index Summary Report. This summary report displays an annual summary of Air Quality Index (AQI) values for states, counties or cities (defined by core based statistical areas (CBSA)). The AQI is determined using measured concentrations of carbon monoxide (CO), Nitrogen Dioxide (NO2), ozone (O3), particulate matter with a diameter of less than 2.5 micrometers (PM2.5), and sulfur dioxide (SO2). Standard EPA formulas convert the measured pollutant concentrations to an AQI value between 0 and 500. AQI values are associated with risk categories (e.g., Good, Moderate, Unhealthy). The pollutant with the highest AQI is reported as the overall AQI value for the day. Each row of the AQI Summary Report lists several qualitative measures (e.g., days with "good" air quality) and descriptive statistics (e.g., median AQI value, for example) for one year for one county or core based statistical area.
Specific Instructions:	None

Protocol:	**US Environmental Protection Agency Air Quality Index Report** The US Environmental Protection Agency Air Quality Index Report (https://www.epa.gov/outdoor-air-quality-data/about-air-data-reports#aqi) includes the annual summary of AQI values for counties or core based statistical areas (CBSA). The report includes the following columns. **# Days with AQI** Number of days in the year having an Air Quality Index value. This is the number of days on which measurements from any monitoring site in the county or MSA were reported to the Air Quality System (AQS) database. **# Days Good** Number of days in the year having an AQI value 0 through 50. **# Days Moderate** Number of days in the year having and AQI value 51 through 100. **# Days Unhealthy for Sensitive Groups** Number of days in the year having an AQI value 101 through 150. **# Days Unhealthy** Number of days in the year having an AQI value 151 through 200. **# Days Very Unhealthy** Number of days in the year having an AQI value 201 or higher. This includes the AQI categories very unhealthy and hazardous. Very few locations (about 0.3% of counties) have any days in the very unhealthy or hazardous categories. **AQI Max** The highest daily AQI value in the year. **AQI 90th %ile** 90 percent of daily AQI values during the year were less than or equal to the 90th percentile value. **AQI Median** Half of daily AQI values during the year were less than or equal to the median value, and half equaled or exceeded it. **# Days CO** **# Days NO2** **# Days O3** **# Days SO2** **# Days PM2.5** **# Days PM10** A daily index value is calculated for each air pollutant measured. The highest of those index values is the AQI value, and the pollutant responsible for the highest index value is the "Main Pollutant." These columns give the number of days each pollutant measured was the main pollutant. A blank column indicates a pollutant not measured in the county or CBSA. **US EPA Air Quality Index Ranges and Associated Categories**

	Range **Category** 0-50 Good 51-100 Moderate 101-150 Unhealthy for Sensitive Groups 151-200 Unhealthy 201-300 Very Unhealthy 301-500 Hazardous
Selection Rationale:	The Environmental Protection Agency (EPA) Air Quality Index (AQI) is a standard, widely used measure that includes six National Ambient Air Quality Standard (NAAQS) pollutants. It has been maintained by the Federal government for decades and is reported on a daily basis by zip code.
Source:	United States Environmental Protection Agency. AirData. Available at https://www.epa.gov/outdoor-air-quality-data/about-air-data-reports#aqi
Availability:	Publicly available
Life Stage:	Any Age
Language:	English
Participant:	Not applicable: derived from publicly available data.
Personnel and Training Required:	None
Equipment Needs:	None
General References:	Rice MB, Ljungman PL, Wilker EH, Gold DR, Schwartz JD, Koutrakis P, Washko GR, O'Connor GT, Mittleman MA. (2013). Short-term exposure to air pollution and lung function in the Framingham Heart Study. *American Journal of Respiratory and Critical Care Medicine,* 188(11),1351-7. Talbot, T.O., Haley, V.B., Dimmick, W.F., Paulu, C., Talbott, E.O., Rager, J. (2009). Developing consistent data and methods to measure the public health impacts of ambient air quality for Environmental Public Health Tracking: progress to date and future directions. *Air Quality, Atmosphere, & Health, 2*(4), 199-206. Wellenius GA, Burger MR, Coull BA, Schwartz J, Suh HH, Koutrakis P, Schlaug G, Gold DR, Mittleman MA. (2012). Ambient air pollution and the risk of acute ischemic stroke. *Archives of Internal Medicine*, 172(3):229-34. Kumari S., Jain M.K. (2018) A Critical Review on Air Quality Index. In: Singh V., Yadav S., Yadava R. (eds) Environmental Pollution. Water Science and Technology Library, vol 77. Springer, Singapore Air Quality Index (AQI) Basics. Available at: https://airnow.gov/index.cfm?action=aqibasics.aqi Thach TQ, Tsang H, Cao P, Ho LM. A novel method to construct an air quality index based on air pollution profiles. Int J Hyg Environ Health. 2018 Jan;221(1):17-26.
Mode of Administration:	Secondary Data Analysis

<table>
<tr><td>Derived Variables:</td><td>None</td></tr>
<tr><td>Requirements:</td><td>
<table>
<tr><th>Requirements Category</th><th>Required (Yes/No):</th></tr>
<tr><td>Major equipment</td><td>No</td></tr>
<tr><td>Specialized training</td><td>No</td></tr>
<tr><td>Specialized requirements for biospecimen collection</td><td>No</td></tr>
<tr><td>Average time of greater than 15 minutes in an unaffected individual</td><td>No</td></tr>
</table>
</td></tr>
<tr><td>Annotations for Specific Conditions:</td><td>No annotations at this time</td></tr>
<tr><td>Process and Review:</td><td>The Expert Review Panel has not reviewed this measure yet.</td></tr>
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