STATE ENVIRONMENTAL HEALTH INDICATORS COLLABORATIVE (SEHIC)
AIR QUALITY INDICATORS

Indicator: **AQ4: Hazardous Air Pollutants**

Measure(s): **AQ4.1: Percentage of Population living in counties that exceed health benchmarks for Benzene**

MEASURE DESCRIPTIONS

AQ4.1: Percentage of Population living in counties that exceed health benchmarks for Benzene	
Last updated :	September 30, 2008
Description:	This analysis compares estimated ambient concentrations of benzene from EPA's 1999 National Air Toxics Assessment (NATA) with three health benchmark concentrations. The first benchmark concentration corresponds to the level at which exposure to the hazardous air pollutant is judged to be of minimal risk; exposures above this benchmark may be associated with adverse, chronic health effects other than cancer. The other two benchmarks reflect potential cancer risks, at levels of 1-in-100,000 risk and 1-in-10,000 risk. If a particular hazardous air pollutant is present in ambient air at a 1-in-100,000 benchmark concentration, for example, one additional case of cancer would be expected in a population of 100,000 people exposed for a lifetime.
Measurement units:	Percentage of population
Geographic scale:	State summary of County data
Time scale:	1999
Significance/background:	Hazardous air pollutants, also known as air toxics, have been associated with a number of adverse human health effects, including cancers, asthma and other respiratory ailments, and neurological problems such as learning disabilities and hyperactivity. The Clean Air Act identifies 188 substances as hazardous air pollutants. Benzene is one of the most significant HAPs for cancer health effects. For detailed background information on the health effects of benzene, see the following resource: Benzene - **http://www.epa.gov/ncea/iris/subst/0276.htm**; and for information on the setting of HAPs health benchmarks used in this measure, see - **http://www.epa.gov/ttn/atw/nata1999/99pdfs/healtheffectsinfo.pdf**.
Rationale:	This measure will provide an indication of the population living in counties with levels of benzene that exceed health benchmarks.
Measure limitations:	This measure provides a general indication of the overall population burden of exposure to benzene. It does not include all of the HAPS. It is based on comparison of estimated ambient concentrations to health benchmarks. Because the database for establishing the health benchmarks is far from complete, this may under-estimate the health significance of these pollutants. The measure does not account for any synergy in effects.
Data resources:	1999 NATA: **http://www.epa.gov/ttn/atw/nata1999/tables.html** Census**:** **http://www.census.gov/popest/archives/1990s/CO-99-01.html**
Data limitations:	The benchmarks generally reflect health risks to adults, rather than potential risks to children or risks in adulthood stemming from childhood exposure.

	Benchmarks are not available to reflect the latter concerns. Further, the benchmarks reflect risks of continuous exposure over the course of a lifetime. Potential risks from very high short-term exposures are not addressed by these benchmarks. The estimates of ambient concentrations of 33 air toxics for the year 1999 were generated as part of EPA's National Air Toxics Assessment. A computer model provided estimates for every county in the continental United States. The computer estimates generally are consistent with the limited set of actual measurements of ambient air toxics concentrations available for 1996, though at many locations the model estimates are lower than the measured concentrations. Actual exposures may differ from ambient concentrations. Indoor concentrations of hazardous air pollutants from outdoor sources may be slightly lower than ambient concentrations, though they can be significantly higher if any indoor sources are present. Levels of some hazardous pollutants may be substantially higher inside cars and school buses.
Related sets of data:	
Related SEHIC measures:	
Related indicators from other projects:	
Recommendations:	
Additional data elements:	

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HOW-TO GUIDE: AQ4.1

Obtain Data from the 1999 NATA website:

1. Go to the EPA web site: **http://www.epa.gov/ttn/atw/nata1999/tables.html**
2. In the section **County-Level Ambient Concentration Summaries (Microsoft Access 2000)** select **Benzene** from the drop-down list of pollutants and then click on the download button.
3. Save the file on your computer, and then open the saved file in Microsoft Excel. To do this, first open Excel, then go under file and choose open, then select **Acess Databases** for the Files of Type option. When the Opening Query window pops up, click Open, then select the **County Distributions file** to open.

Create a SEHIC report in Excel:

4. With the county benzene data now open in Excel, insert a new worksheet in the file by choosing Worksheet under Insert on the drop-down menu at the top of the screen. In the sheet that contains the benzene data, copy the header row and paste it in the new worksheet. Also highlight all the rows and columns of benzene data for your state, copy the data, and paste it in the new worksheet.
5. Save the file on your computer as an Excel file.
6. Insert 3 new columns for health benchmarks after the total_mean column, and label the columns in this order noncancer, cancer1, and cancer2.
    a. In the first new column (noncancer), enter the chronic, noncancer health benchmark of **30** in the first cell.
    b. In the second new column (cancer1), enter the cancer health benchmark of **1.3** in the first cell (this is the health benchmark for 1 in 100,000).
    c. In the third new column (cancer2), enter the cancer heatlh benchmark of **13.0** in the first cell (this is the health benchmark for 1 in 10,000). Copy and paste the values in these cells to the other cells in these three columns.
7. Now insert three new columns and use the IF function to compare the estimated values to the three health benchmarks, as follows:
    a. In the first new column, enter =IF([column letter and row number of total_mean value]>[column letter and row number corresponding to the noncancer benchmark value],1,0). (For example, =IF(K4>L4,1,0). K4 and L4 are for illustration; use the column letter and row number that correspond to the indicated data in the formula.) Note: 1=exceeded the benchmark; 0=did not exceed the benchmark.
    b. In the second new column, enter the formula that compares the total_mean value to the first cancer benchmark value. For example, =IF(K7>M7,1,0).

c. In the third new column, enter the formula that compares the total_mean value to the second cancer benchmark values. For example, =IF(K7>N7,1,0).

d. Label the first new column 'exceeds noncancer', label the second new column 'exceeds cancer1', and label the third new column 'exceeds cancer2'.

8. To calculate the percentage of your state's population in counties where benzene exceeds the health benchmarks:

    a. Obtain county population data from the census web site **http://www.census.gov/popest/archives/1990s/CO-99-01.html** and copy the 7/1/99 estimates to a new column inserted after the exceeds cancer2 column. Label the new column POP.

    b. Insert 3 new columns after the POP column. In the first new column, enter the formula =if([column letter and row number of exceeds noncancer]=1,[column letter and row number of population data],0). This formula copies the county population if that county's level of benzene exceeded the noncancer benchmark. Label this new column POP1.

    c. In the second new column, enter the formula =if([column letter and row number of exceeds cancer1]=1,[column letter and row number of population data],0). This formula copies the county population to the new column if that county's level of benzene exceeded the first cancer benchmark. Label this new column POP2.

    d. In the third new column, enter the formula =if([column letter and row number of exceeds cancer2]=1,[column letter and row number of population data],0). This formula copies the county population to the new column if that county's level of benzene exceeded the second cancer benchmark. Label this new column POP3.

    e. Sum the population column to get the state's total population. Sum the pop1, pop2 and pop3 columns to get the total population living in counties that exceeded the noncancer, cancer1 and cancer2 benchmarks.

9. Open the Excel file SEHIC Indicator Report Template.xls. In the SEHIC Report worksheet AQ4.1, enter these totals in the corresponding cells. Formulas are included in this worksheet for calculating percentages. (These cells will contain #VALUE! until your population counts are entered.)