PROPOSED CHANGES IN THIS CALENVIROSCREEN 3.0 UPDATE

This draft of CalEnviroScreen 3.0 updates the tool in a variety of ways. This draft incorporates:

- More recent data for all indicators.
- Improvements in the way some indicators are calculated, and additions to some indicators, to better reflect environmental conditions or population vulnerability to pollution.
- The addition of two new indicators reflecting health and socioeconomic vulnerability to pollution.
- The removal of the "children and elderly" age indicator, and replacement with an analysis of age.

The tables below describe the proposed changes to each indicator in greater detail.

As a result of these changes, CalEnviroScreen 3.0 would use 20 indicators covering pollution burden and population characteristics of California's approximately 8000 census tracts. One of the two proposed new indicators, emergency department visits for acute myocardial infarction (heart attack), is an indicator of subpopulations that may be especially vulnerable to the health effects of pollution. The other new indicator takes housing costs into consideration as a socioeconomic factor that can affect a community's vulnerability to the health effects of pollution. The Age indicator from Version 2.0 has been removed based on concerns that the measure of populations of children and the elderly in individual census tracts does not adequately represent these vulnerable populations. New data are added to several indicators, including three additional drinking water contaminants, one additional pesticide, and the addition of produced water ponds from oil and gas operations to the groundwater threats indicator.

Additional information on pollution near the California–Mexico border that was not available at the time of the Version 2.0 release is included in this update. For example, certain facilities that release toxic chemicals in Mexico near the border have been incorporated into the Toxic Releases indicator. Likewise, air monitoring data from two new air monitoring stations near the border has been factored into the ozone and PM 2.5 indicators. Additional details are provided below.

The CalEnviroScreen model and method used to calculate CalEnviroScreen scores remains the same and is described in the draft report. More detailed information on the proposed changes and further description of the new indicators is also available in the draft report.

Exposure Indicators:

Indicator	Proposed Improvements
Air Quality: Ozone	The air monitoring data used in this indicator have been updated to reflect ozone measurements for the years 2011 to 2013. The proposed measure for CalEnviroScreen 3.0 is the average daily maximum ozone concentration. In CalEnviroScreen 2.0, the measure was the sum of the ozone concentrations above the state's ozone standard at a given air monitoring station. The change to a more straightforward calculation of average concentration is easier to interpret. This change also allows the incorporation of information on ozone for all areas of the state, not only census tracts with levels estimated to be over the standard. As a result of this change, areas with no exceedances of the state ozone standard that previously had a zero score now have a score greater than zero. Data from two new air monitoring sites near the California–Mexico border at San Ysidro and Otay Mesa are also included in the CalEnviroScreen 3.0 calculations. In addition, ozone concentrations for census tracts further than 50 kilometers from an air monitor are now reported. Previously, ozone concentrations for census tracts whose center was more than 50 kilometers from the nearest air monitor were not reported.
Air Quality: PM 2.5	The air monitoring data used in this indicator have been updated to reflect PM 2.5 measurements for the years 2011 to 2013. Additional data from two new air monitoring sites near the California–Mexico border at San Ysidro and Otay Mesa are also included in the calculations. PM 2.5 concentrations for census tracts further than 50 kilometers from an air monitor are now taken into account. Previously, census tracts with centers more than 50 kilometers from the nearest PM2.5 air monitor were not included. Some satellite data was incorporated to provide full state coverage for the PM2.5 indicator.
Diesel Particulate Matter	Diesel PM emissions were updated for the year 2012. Emissions from sources of diesel PM in Mexico near the US are also included in this update. Diesel PM emissions estimates are provided to OEHHA by the California Air Resources Board (CARB) in 16-square-kilometer grid cells that cover most of the state. In the previous version of CalEnviroScreen, these grid estimates were converted to the census tract scale based on the total geographic area of the census tract. In this draft, the grid estimates were converted using only the populated areas of each census tract (populated census blocks). This change means the diesel PM emissions

estimates for each census tract better represent emissions and potential exposures where people live.

To account for additional diesel PM emissions from sources on the Mexico side of the US-Mexico border, CARB compared modeled diesel PM emissions with data from air monitoring of nitrogen oxides (NO_x), a proxy for diesel PM, at Calexico and Otay Mesa. Based on a comparisons of the modeled diesel PM emissions to measured concentrations of NO_x, CARB adjusted modeled diesel PM upward at the Calexico border area. CARB found modeled diesel PM in Otay Mesa did not need to be adjusted.

Drinking Water Contaminants

The drinking water indicator uses information on the quality of drinking water that is delivered by community water systems as well as the boundaries of the geographic areas served by the systems. Of the approximately 3,000 community water systems covered by the drinking water indicator, 2,057 water system service area boundaries were used in this version of CalEnviroScreen. These 2,057 boundaries were downloaded from the California Environmental Health Tracking Program's (CEHTP) Water Boundary Tool. The boundaries were either obtained by water providers or researched and drawn by OEHHA or CEHTP staff using maps or other information about the population served by the system. In this draft, there are about 700 more service area boundaries than were available when CalEnviroScreen 2.0 was finalized. The incorporation of the new boundaries allows for a more accurate geographic representation of water quality across the state.

The methodology used to reflect delivered water quality was also improved through better selection of sample locations to represent delivered water and the collection of updated information on how much water wholesale water suppliers provide to their customers, which might have changed in recent years (possibly due to drought action).

Water contaminant data from 2005 to 2013 was collected, representing the most recent compliance period. Three new contaminants were added to the index based on toxicity concerns and frequency of tests. These contaminants are tetrachloroethylene (PCE), 1,2,3-trichloropropane (TCP), and combined radium 226 and 228.

Pesticide Use

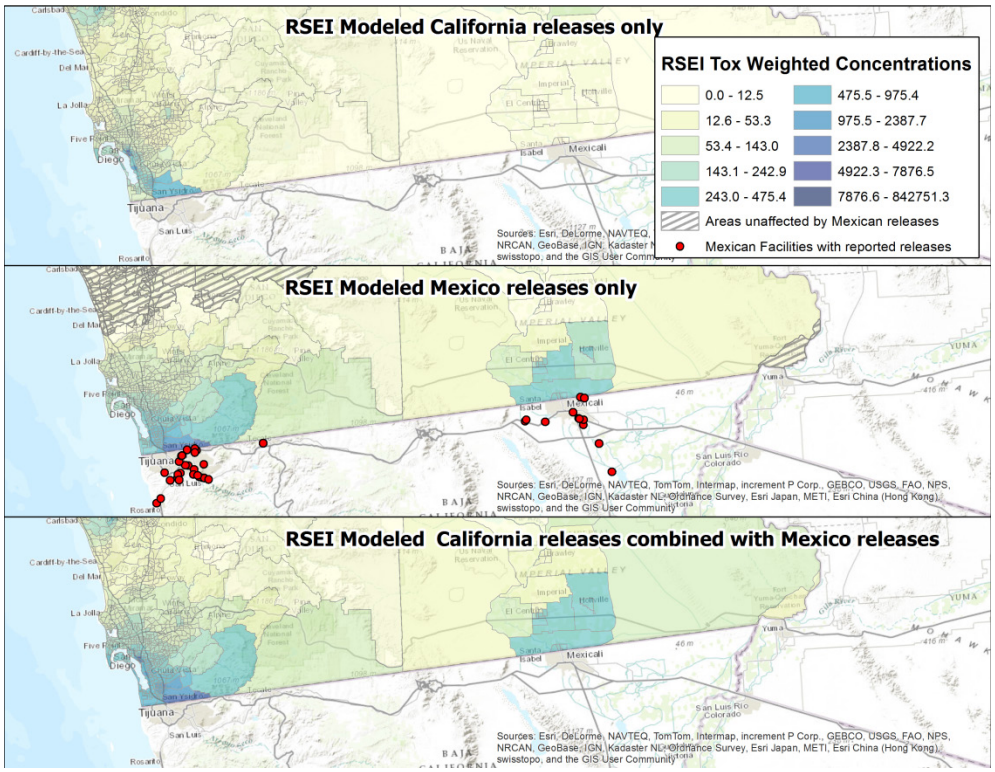
The pesticide use indicator was updated to include data for the years 2012 to 2014. One additional pesticide, ethylene glycol, met the hazard and volatility criteria and was added to the analysis. A total of 70 pesticides are now covered by this indicator.

Toxic Releases from Facilities

The toxicity-weighted concentrations of modeled chemicals released to air from the US EPA's Risk Screening Environmental Indicators (RSEI) program were updated to incorporate an average of the emission data for the years 2011 to 2013. After the release of CalEnviroScreen 2.0, California communities located near the Mexican border raised

concerns that the indicator did not incorporate potential cross-border pollution from toxic emissions originating in Mexico.

To address this gap, toxic release emissions data from Mexico up to 49 kilometers south of the California-Mexico border for the years 2011 to 2013 were incorporated into the RSEI model by Abt Associates, US EPA contractors for the RSEI program. RSEI combines reported chemical emissions with toxicity estimates and models the dispersion of chemicals into air by incorporating physicochemical properties, weather, and geography. Toxicity-weighted concentrations from the Mexican facilities were modeled and incorporated into the California RSEI results. The new toxicity-weighted emissions were then aggregated to census tract level estimates for the border region by Abt Associates and provided to OEHHA. This data set was used to better characterize binational pollutant impacts on communities near the California-Mexico border.



Traffic Density

The traffic density indicator was updated with traffic volumes for 2013 and includes a more expansive network of traffic volumes and roadways.

CalEnviroScreen 2.0 used Caltrans-based traffic volumes from the 2004 Highway Performance Monitoring System (HPMS) on segments of roadways across the state. The updated dataset was provided by the California Environmental Health Tracking Program (CEHTP) and uses additional sources of traffic volumes. The data on traffic volumes,

including data on local traffic not contained in HPMS, were acquired from TrafficMetrix, a database of current traffic volumes up to 2013 that includes 2008 roadway data from Tele Atlas, a mapping company.

Modeling of traffic data on road segments without traffic counts was used to provide statewide coverage of many more roadway segments than in the previous version of CalEnviroScreen. The use of Caltrans HPMS, local data sources, and modeling result in a more comprehensive estimate of traffic density in the state.

There is a high correlation between the traffic data used in 2.0 and the new data used in 3.0. In general, the new dataset shows decreases in traffic volume estimates. This difference, however, represents a refinement of data by including traffic counts on smaller, local roads, rather than a true decrease in traffic. Since CalEnviroScreen indicators are scored as percentiles, the traffic levels divided by lengths of measured roadways in or near each census tract, relative to those of the state's other census tracts, governs an individual tract's score for this indicator.

Traffic density information from roads in Mexico in close proximity to California was updated for inclusion in the new California traffic data. First, traffic volumes at the six border crossings within 150 meters south of the California-Mexico border were updated to include more recent traffic data. The data came from the US Department of Transportation and the US Customs and Border Protection. Border crossing counts at the six ports of entry into California for trucks, buses and personal vehicles in 2013 were incorporated.

Updated traffic volumes for parallel roads within 150 meters of the California-Mexico border was also investigated, but as of the time of this draft, new data are not available. This proposed version of CalEnviroScreen uses the same data as CalEnviroScreen 2.0 for traffic volumes for the two major parallel roads in Tijuana (Via International and Blvd Aeropuerto). OEHHA obtained the data from the San Diego Association of Governments (SANDAG).

Environmental Effect Indicators:

Cleanup Sites This indicator has been updated with information on the location and status of cleanup sites from the EnviroStor database, downloaded in May 2016.

Groundwater Threats Updated information on the location and status of groundwater cleanup sites was downloaded from the GeoTracker database in June 2016.

One additional type of groundwater threat has been included in this update. Produced-water ponds containing water that is produced and stored as a byproduct of oil and gas production from well stimulation activities were added to the GeoTracker database in 2015. There were

318 produced-water ponds incorporated into the Groundwater Threats indicator. The weighting of these sites in relation to the other types of sites in this indicator can be found in the appendix of the Groundwater Threats chapter in the report.

Hazardous Waste Generators and Facilities

The hazardous waste generators data was updated for the years 2012—2014 with information provided by the Department of Toxic Substances Control (DTSC). Updated information on the location and status of permitted hazardous waste facilities was also acquired from DTSC. Numerous adjustments to permitted facility locations were made in this version and many facility boundaries were also incorporated. Reported locations for the facilities were checked and adjusted by Dr. James Sadd and his research team at Occidental College and provided to OEHHA. The changes were confirmed by OEHHA staff based on visual inspection of satellite imagery.

A minor change to the scoring matrix for these facilities was also made. Permit status was removed as part of the criteria for scoring permitted hazardous waste facilities. The new facility scoring weights can be found in the appendix of the Hazardous Waste Generators and Facilities section in the draft report.

Impaired Waters

The State Water Resources Control Board (SWRCB) released its Final 2012 California Integrated Report (Clean Water Act Section 303(d) List / 305(b) Report) on impaired water bodies in 2015. The 2012 version updates only Region 1 (Northwest Coast), Region 6 (Eastern California) and Region 7 (Southeastern California). This proposed Impaired Waters indicator update included the new information from the SWRCB 2012 report for these regions. Data for Regions 2, 3, 4, 5, 8, and 9 remain the same as in CalEnviroScreen Version 2.0.

Solid Waste Sites and Facilities

Updated information on (1) active solid waste sites, (2) closed, illegal, abandoned waste sites, (3) waste tires and (4) violations at solid waste facilities was obtained from CalRecycle in June 2016. These were all incorporated in this proposed version of the indicator.

Sensitive Population Indicators:

Age: Children and Elderly

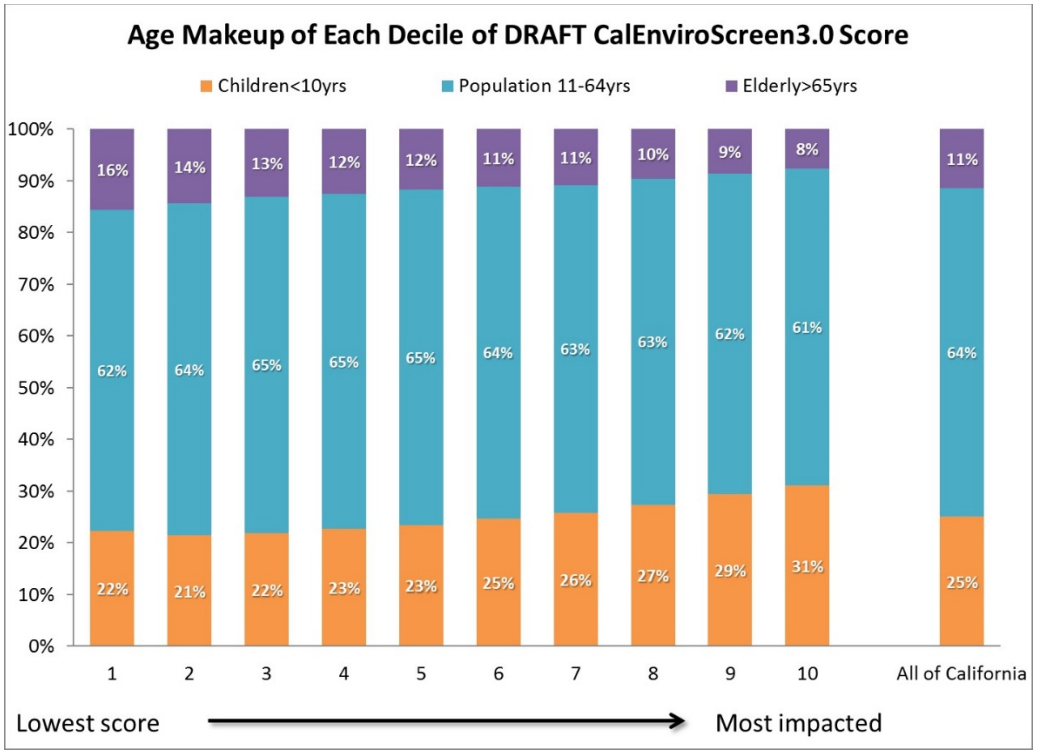
In this update to CalEnviroScreen, OEHHA proposes to remove the Age indicator, and instead address age in a different analysis and also display the age data with the scores for each census tract. This change does not reflect a change in the evidence that children and elderly are especially vulnerable to pollution's effects. The change instead reflects additional analysis showing that the indicator does not provide a good measure to represent the vulnerability of these populations across the state.

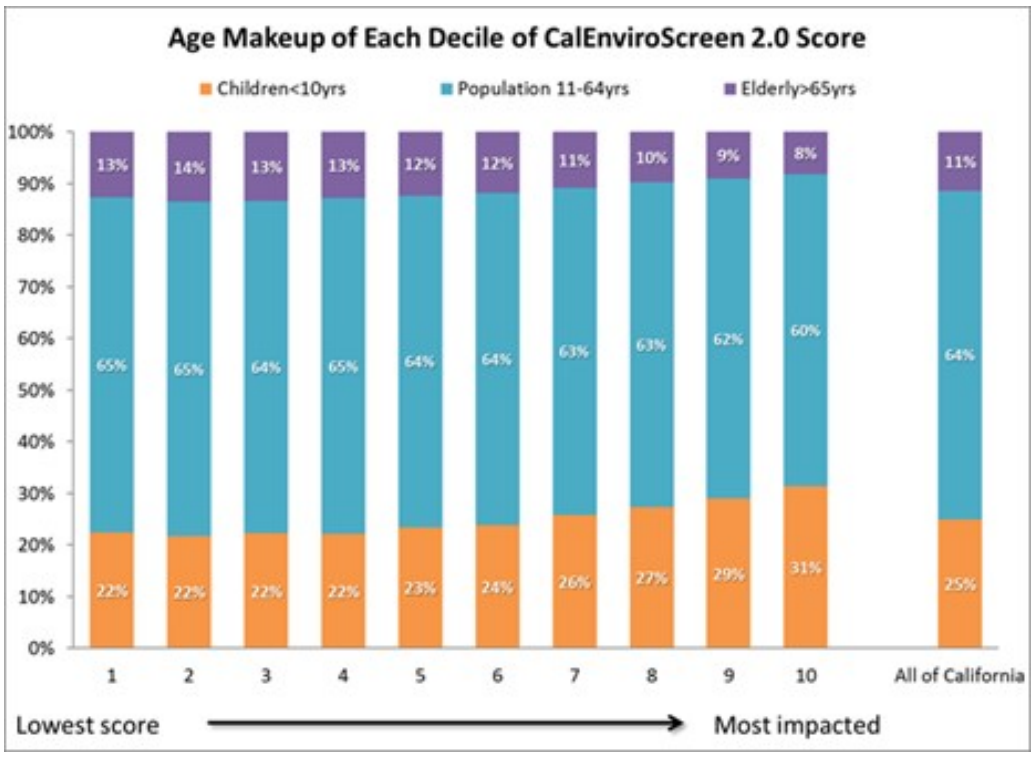
In CalEnviroScreen 2.0, the age indicator score was based on the percent of population under age 10 or over age 65 in a census tract. Here, the proposal to remove the indicator is based on the following findings:

- The measure of the elderly tended to highlight census tracts with high concentrations of retired (and in many cases, more affluent) elderly populations with longer life expectancies rather than more vulnerable elderly populations with early mortality.
- Few census tracts have a high prevalence of both children and elderly. The overall effect in the CalEnviroScreen 2.0 indicator is that one subpopulation counterbalanced the other. Removal of the indicator has little bearing, for example, on the overall number of children in the highest scoring areas.
- The Age indicator is more highly correlated with the percent elderly than percent children. This results in elderly being more highly represented by the indicator.
- The Age indicator contradicted the general pattern across indicators that decreasing the indicator score is desirable.
- Using CalEnviroScreen 2.0 data, a sensitivity analysis excluding only the Age indicator produced a minimal shift in the demographics of the most highly-scoring census tracts (see charts below).

Therefore, instead of including the Age indicator in the calculation of the final score, OEHHA will include an analysis in the final CalEnviroScreen 3.0 report that describes the percentage of the two vulnerable population segments (children and elderly) in all census tracts, as well as correlations between age and CalEnviroScreen scores across California. The online maps will also allow viewers to click on individual census tracts and view age statistics along with statistics on race/ethnicity for each tract.

The charts below show the age composition of all census tracts when placed into 10 groups from lowest to highest CalEnviroScreen score. The results are very similar between the proposed CalEnviroScreen 3.0 and 2.0 versions with respect to the fraction of children and elderly in each group.


Age Makeup of Each Decile of DRAFT CalEnviroScreen3.0 Score
Children<10yrs
Population 11-64yrs
Elderly>65yrs
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
16% 14% 13% 12% 12% 11% 11% 10% 9% 8% 11%
62% 64% 65% 65% 65% 64% 63% 63% 62% 61% 64%
22% 21% 22% 23% 23% 25% 26% 27% 29% 31% 25%
1 2 3 4 5 6 7 8 9 10 All of California
Lowest score
Most impacted


Age Makeup of Each Decile of CalEnviroScreen 2.0 Score
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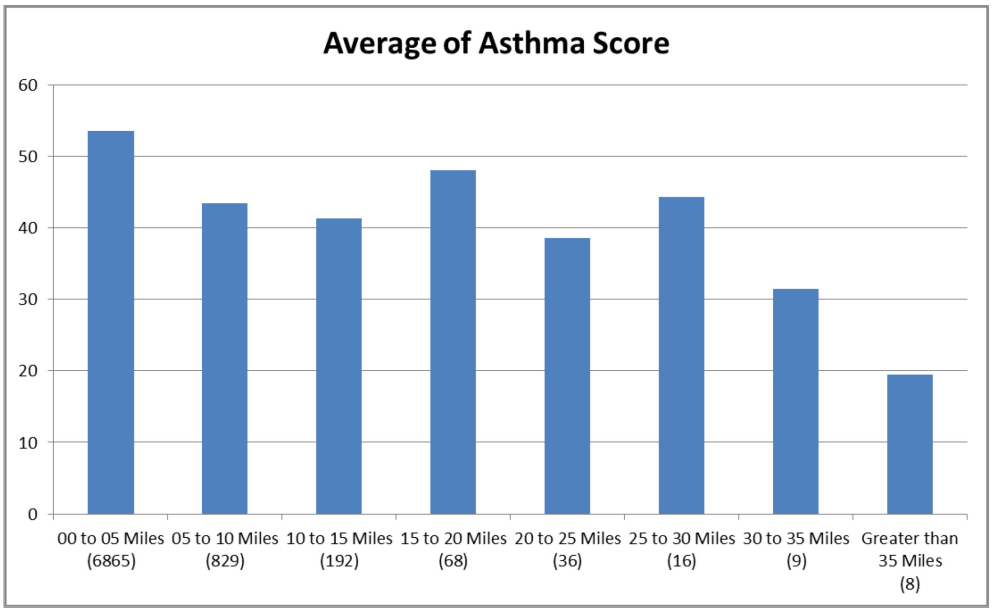
20%
10%
0%
13% 14% 13% 13% 12% 12% 11% 10% 9% 8% 11%
65% 65% 64% 65% 64% 64% 63% 63% 62% 60% 64%
22% 22% 22% 22% 23% 24% 26% 27% 29% 31% 25%
1 2 3 4 5 6 7 8 9 10 All of California
Lowest score
Most impacted

Asthma

The asthma indicator has been updated with data for the years 2011 to 2013 and represents the rates of emergency department (ED) visits for asthma that are age-adjusted and spatially modeled. The rates were calculated by the California Environmental Health Tracking Program (CEHTP).

Comments on the previous version of CalEnviroScreen expressed concern that the rate of ED visits is underestimated in rural and medically underserved communities where the nearest ED is far away or difficult to access. To understand this issue better, OEHHA evaluated the proximity of each census tract's center to the nearest ED. OEHHA found that 17 of the 8,035 census tracts are further than 30 miles from the nearest ED.

OEHHA also evaluated if census tracts further from EDs show significant differences in asthma ED visit rates. To understand how distance to an ED is related to the asthma ED visit rate, census tracts were grouped into five mile increments based on distance from the nearest ED (less than 5, 5-10, 10-15, 15-20, 20-25, 25-30, 30-35, and more than 35 miles). A chart of the average asthma ED visit rate (per 10,000 people) by these increments is shown below. A statistical analysis showed that tracts further from an ED have lower rates of ED visits than tracts closer to an ED. It is unclear if the lower rates in the more distant areas represent a need for medical service that is not met, which would be the case if people suffering asthma attacks were not going to EDs because of the distances involved. Because of this uncertainty, OEHHA is not proposing a change to the indicator at this time. However, OEHHA will continue to research the role of access to health care for this indicator.



Cardiovascular Disease: Heart Attack Rate

A measure of rates of emergency department visits for heart attacks is proposed for inclusion as new indicator of population vulnerability. This indicator is proposed in part as a response to comments raising the concern that CalEnviroScreen 2.0 did not contain a sufficient emphasis on health indicators.

Preexisting cardiovascular disease or a previous heart attack makes individuals more susceptible to the effects of air pollution. This literature is summarized in the chapter in the draft report. Acute myocardial infarction (AMI), commonly known as a heart attack, is the most common adverse cardiovascular event. The rate of AMI visits to the ED was identified as a suitable indicator of cardiovascular disease.

The data represents the rate of ED visits for the years 2011- 2013. The data comes from the Office of Statewide Planning and Research as the number of ED visits by ZIP code for having an AMI. Rates at the ZIP code scale were calculated and provided by CEHTP. The ZIP code data was converted to a rate, age-adjusted and spatially modeled to census tracts for a 3-year average. ZIP codes are the smallest geographic unit available for ED data.

Low Birth Weight Infants

The indicator for the rate of low birth weight (LBW) infants in each census tract is proposed to incorporate more years of data. Here, the indicator is represented by a seven-year low birth-weight rate (2006 to 2012). OEHHA did not spatially model the data as it had in version 2.0 with the intent of minimizing extreme values in census tracts with very few births. OEHHA evaluated the modeled LBW rates used in version 2.0 and the newer data available (2009-2012). This analysis showed that the modeled data was actually introducing unwanted variability into the distribution of census tracts, particularly those tracts with few births. Here, we propose to use the calculated rates (not modeled) with seven years of birth data to provide more stable and accurate estimates.

Estimates derived from places with few births are considered unreliable because they often produce extreme values and can vary greatly by year. To address this issue, LBW rates for census tracts with fewer than 100 births over the seven years were not estimated.

Socioeconomic Factor Indicators:

Educational Attainment

The indicator has been updated with the 2010-2014 estimates from the American Community Survey (ACS) on the percent of the population with less than a high school degree. The methods for the analysis of the data and the exclusion of unreliable estimates were the same as for CalEnviroScreen 2.0.

Linguistic Isolation The indictor has been updated with the 2010-2014 estimates from the American Community Survey (ACS) on the percent of households where no one over 14 speaks English very well. The methods for the analysis of the data and the exclusion of census tracts with unreliable estimates were the same as for Version 2.0.

Poverty The indicator has been updated with the 2010-2014 estimates from the American Community Survey (ACS) on the percent of the population living two times below the federal poverty level. The methods for the analysis of the data and the exclusion of census tracts with unreliable estimates were the same as for Version 2.0.

Unemployment The indicator has been updated with the 2010-2014 estimates from the American Community Survey (ACS) on the percent of the population over age 16 that is unemployed and eligible for the labor force. The methods for the analysis of the data and the exclusion of census tracts with unreliable estimates were the same as for Version 2.0.

Rent-Adjusted Income OEHHA received public comments during the development of CalEnviroScreen 2.0 that differences in cost-of-living across the state should be taken into account in socioeconomic measures. The most comprehensive poverty study identified that examined cost-of-living differences was conducted by the Public Policy Institute of California in its work on a California Poverty Measure. However, the smallest scale of analysis from that work was county level, which is not suited to the much smaller census tract scale used in CalEnviroScreen. At the time, OEHHA evaluated whether cost of living could be adjusted for within the poverty measure at the census tract scale and determined that a suitable adjustment could not be made.

The dominant driver of the geographic differences in cost of living seen in the California Poverty Measure was housing cost. California has very high housing costs relative to much of the country, making it difficult for many to afford adequate housing. Even more important, the cost of living varies significantly within California and is largely dependent on housing cost, availability, and demand. Here, OEHHA proposes an additional indicator to identify areas where households may be stressed by high housing cost relative to income. This indicator of rent-adjusted income uses a measure calculated by subtracting each census tract's median gross rent from its median household income. It will help account for differences in housing costs across different areas of California.

Measures of affordable housing often use a rent burden or owner cost burden measure based on the ratio of housing costs to income. Such measures of housing cost burden, however, do not consider whether the income available after the housing expenditure is adequate to meet non-housing needs. In other words, fairly wealthy people with very high

income and high rent could have the same rent burden ratio as someone with low income and low rent. The alternative measure we propose here is the residual income approach, which focuses on the income remaining after housing expenditures. Some households earn such low incomes that they cannot afford to allocate even low percentages of their income to housing.

The scoring approach for the rent-adjusted income indicator is the same as for the other population-characteristic indicators, although the order is reversed (lower income numbers are more disadvantaged). This means that the lowest raw rent-adjusted income values score in the highest percentiles. The higher scoring tracts are those with the smallest median residual income values after the subtraction of rent.

The data on household income and gross rent come from 2010-2014 estimates from the American Community Survey (ACS). The exclusion of unreliable estimates was performed by methods comparable to the other socioeconomic measures.