



Technical Notes: State Health Indicators Maps

Introduction

The Oregon Health Authority's Center for Health Statistics (CHS) is responsible for the stewardship of vital statistic information for the State of Oregon. These vital statistics are analyzed and made available to researchers and the public through quarterly web tables and an annual report. The Oregon State Health Indicators (see the [Oregon State Health Profile](#) page for more information) are selected key indicators intended to help measure progress toward improving the health of Oregonians. CHS is the steward for the data used in measuring the key indicators of low birthweight, prenatal care, and teen pregnancy.

The CHS Oregon State Health Indicator maps represent three state health indicators compiled and analyzed by CHS: low birthweight, initiation of first trimester prenatal care, and teen pregnancy. They were created in response to a growing demand for health indicator data at county and census tract levels. To protect Oregonians' confidentiality and ensure data reliability, measures for the three indicators use five years of data, 2009-2013.

Technical Notes

This section outlines the process of compiling, analyzing, and displaying the data for the Center for Health Statistics' Oregon State Health Indicator maps.

Compiling Records and Data

Low Birthweight and First Trimester Prenatal Care

A single data file was created for analysis by compiling all Oregon resident birth records between 2009 and 2013. Several records were re-geocoded to improve data quality (see "Geocoding" section below). Next, selected health indicator variables (low birthweight and first trimester prenatal care) were calculated from the birth record information. Records were then aggregated by residence county, providing county-level as well as census tract-level measurements for each health indicator and for total births.

Two output files (.dbf) were produced to use in creating shapefiles: one with county-level measures and the other with census tract-level measures. Two analogous data tables were exported to Excel where county-level and census tract-level rates, as well as statistical significance, were calculated. (See [Annual](#)

[Report 2013, Volume 1, Appendix B: Technical notes - Formulas](#) for more information on determining statistical significance.)

In 2013, following the recommendation of the National Center for Health Statistics (NCHS), CHS revised the method used to calculate first trimester care. All 2013 mapped data for first trimester care is calculated using the revised method. First trimester care for 2009-2012 is calculated using the method that was current during those years.

Teen Pregnancy

A single data file was created for analysis by compiling all births and abortions to Oregon teens (age 15-17) between 2009 and 2013. The number of teen pregnancies was calculated by adding the number of births and abortions. Records were then aggregated by residence county, providing county-level and well as ZIP code-level measurements for teen pregnancy. Data collected on abortions is more limited than data for births, and does not include census tract information. Therefore, teen pregnancy maps display data at the county- and ZIP code-level (rather than census tract level).

Two output files (.dbf) were produced to use in creating shapefiles: one with county-level measures and the other with ZIP code-level measures (including rates). Two analogous data tables were exported to Excel where statistical significance was calculated. (See [Annual Report 2013, Volume 1, Appendix B: Technical notes - Formulas](#) for more information on determining statistical significance.)

Teen pregnancy rates are based on the average yearly count of pregnancies over the five-year period. The denominators, due to the availability of relevant population data, differed between the county-level and ZIP code-level maps. The county-level map uses the five-year average of the yearly population estimates from the [Population Research Center, Portland State University](#) (the same population estimates used in CHS annual reports). The Population Research Center does not provide population estimates by ZIP code, so the ZIP-code level map relies on population estimates provided by the [U.S. Census American Community Survey](#) for the calculation of rates.

For teen pregnancy measures, all records were used at the county-level and 95.9% of records contained usable data for ZIP code-level mapping. Records (primarily abortion records) were excluded from the ZIP code-level map if county and ZIP code could not be matched.

Geocoding

All records were first geocoded using Oregon's GC_composite geo-locator. Any records geocoded above street name level were re-geocoded using ESRI's world geo-locator. After this second round of geocoding, any location match type above street name level was excluded from census tract-level maps.

The following updated geocode field data were merged with the original file, replacing old geocode information: geocode match type, state FIPS, county FIPS, census tract, census block, longitude, and latitude.

A review of preliminarily compiled data revealed many records with missing or inaccurate geocode information. With the exception of 2012 records, all birth records used in these maps were re-geocoded with updated geo-locators prior to analysis. After recoding, 99.8% of birth records were usable at the census tract level.

Shapefile Creation

Low Birthweight and First Trimester Prenatal Care

One state (by county) and 36 individual county shapefiles were created using the U.S. Census 2013 TIGER Geodatabase (tlgdb_2013_a_41_or.gdb). This file geodatabase includes the following shapefile data layers: block, block group, census designated place, census tract, county, county subdivision, and incorporated place. According to the Census Bureau, the 2013 TIGER Geodatabase "contain[s] 2010 Census geography and current geography...Current geography is defined as the latest version of the geographic extent of legally defined geographic areas as reported, generally reflecting the boundaries of governmental units in effect as of January 1, 2013 and other legal and statistical areas boundaries that have been adjusted and/or corrected since the 2010 Census. This vintage enables users to see the most current boundaries of governmental units that match the data from the surveys that use 2013 geography, such as the 2013 Population Estimates and the American Community Survey."¹ These shapefiles were used as base shapefiles to which all the data compiled with SPSS were added.

Using ESRI's ArcMap software, the base shapefile and the output .dbf file were joined to create one health indicator shapefile. This step was performed twice to produce one county-level shapefile and one census tract/ZIP code-level shapefile. The following variable fields were added to the county-level shapefile: county rate/percent, state rate/percent, statistical significance (yes, no, or n/a). The following variable fields were added to the census tract/ZIP code-level

¹ 2013 TIGER/Line Shapefiles Technical Documentation, U.S. Census Bureau, 2013.

shapefile: census tract/zip code rate/percent, county rate/percent, state rate/percent, statistical significance (yes, no, or n/a).

Teen Pregnancy

The county-level shapefile for teen pregnancy was created using the same method as described in the previous section. The following variable field was added to the county-level shapefile: statistical significance (yes, no, or n/a). The ZIP code-level shapefile initially exceeded the 10MB limit for ArcGIS Online, and the following method was used to reduce the size of the final file. The ZIP code file geodatabase used for this project (CENSUS2010_OR_ZIPCODE.GDB) included a ZIP code shapefile (referred to as a feature class). This ZIP code shapefile was employed as a base shapefile. Using ESRI's ArcMap software, the ZIP code shapefile and the output .dbf file were joined to create one health indicator shapefile. This health indicator shapefile was then exported (saved) as a feature class into the originating file geodatabase. In ArcCatalog, all originating feature class was deleted from the geodatabase leaving only the health indicator shapefile feature class. The health indicator shapefile feature class was added back in to ArcMap and the following variable field was added: statistical significance (yes, no, or n/a). Note: Unlike census tracts, ZIP codes do not cover all areas of Oregon.

Map Creation

Maps were built and are hosted on the Oregon ArcGIS Online site. Each map consists of an Oregon county boundary layer (shapefile), Oregon county health indicator map layer (shapefile), and Oregon census tract/ZIP code health indicator map layer (shapefile). The three shapefiles (layers) were loaded via individual zip files to an ArcGIS Online mapping document.

Customization

On each layer, name, extent, pop-up, and symbology were customized.

The visibility range (extent) for the county-level layer was set to show only if zoomed out farther than 1:1,500,000 (counties). The county boundary layer and the census tract/ZIP code layer were set to show only if zoomed in closer than 1:1,500,000 (counties).

Pop-ups for the county-level low birthweight and first trimester prenatal care map layers were configured to show the county name, county total birth count, county health indicator count, county rate/percent, state rate/percent, statistical significance (compared to the state rate/percent), and a chart displaying the county rate/percent by year. Pop-ups for the census tract-level layer were configured to show the county name, census tract number, census tract total

birth count, census tract health indicator count, census tract rate/percent, county rate, state rate, and statistical significance (compared to the state rate/percent). Pop-ups for the county-level teen pregnancy map layer were configured to show the county name, county teen pregnancy five-year total count, county PSU population estimate, county rate, state rate, statistical significance (compared to the state rate/percent), and a chart displaying the county rate/percent by year. Pop-ups for the ZIP code-level layer were configured to show the county(ies) name, ZIP code, ZIP code teen pregnancy five-year total count, ZIP code ACS population estimate, ZIP code rate, county rate, state rate, and statistical significance (compared to the state rate). While the teen pregnancy pop-ups include the five-year total teen pregnancy count, the teen pregnancy rates are based on the five-year average count. Blank rates appear for ZIP codes with no pregnancies, no population estimate available, or both.

The same color scheme was used for the symbology for all layers in the map (except the county boundary map, which is for reference only). The county-level low birthweight and first trimester prenatal care layer's symbology represents the county rate/percent broken into five classes by natural breaks (placing the state rate/percent approximately in the middle of the third class). The census tract/ZIP code-level layer's symbology represents the census tract/ZIP code rate/percent broken into five classes by quantiles (placing the state rate/percent approximately in the middle of the third class). The county-level teen pregnancy layer's symbology represents the county rate broken into five classes by quantile (placing the state rate in third class). The ZIP code-level layer's symbology represents the ZIP code rate broken into seven classes by quantiles (placing the state rate approximately in the middle of the third class).

County name labels were created for the County Boundary and Oregon Counties layers.

Web Mapping Application

The completed maps were shared through a web mapping application called Story Map Text and Legend (also called "tabbed viewer") which can display multiple maps in a single application. The tabbed viewer displays each health indicator map on an individual tab, allowing users to easily view and compare maps. Each tab represents an individual ArcGIS Online map, and each map retains all of its features and attributes. Description section information is taken from the individual maps description. Legend items are dictated by the visibility range for each layer.

Analysis of Unusable Records

Low Birthweight and First Trimester Prenatal Care

As mentioned previously, 99.8% of birth records contained usable geocode information. The unusable birth records (0.2%) were analyzed for bias. While no significant patterns of bias were discovered, unusable records were more likely to include mothers living outside city limits, unmarried, less educated, or on Medicaid/Oregon Health Plan. Unusable records were also less likely to receive first trimester prenatal care and had fewer prenatal care visits during the pregnancy.

Teen Pregnancy

Usable geographic information was available for 95.9% of teen pregnancy records. The unusable records (4.1%) were analyzed for bias. As before, no significant patterns of bias were found. Unusable records were somewhat more likely to include mothers living outside city limits, tobacco users, and non-Hispanics.

Questions?

For more information, call Vital Statistics staff at 971-673-0476.

References

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