



## 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 CHS has created interactive maps of selected Oregon State Health Indicators (see the [Oregon State Health Profile](#) page for more information), which utilize vital statistics information and allow for spatial visualization of health measures of Oregonians.

The CHS Oregon State Health Indicator death data maps showcase two state health indicators compiled and analyzed by CHS staff: age-adjusted death rate and age-adjusted years of potential life lost before age 75. 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 indicators aggregate seven years of data.

### 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. CHS staff used four software applications to analyze, compile, and map the data including Microsoft excel, SPSS, ArcMap, and ArcGIS online.

#### Compiling Records and Data

For each of the health indicators, two tables (.dbf) were produced for creating the mapping shapefiles: one with county-level measures and another with census tract-level measures. The two data table files were created using SPSS. Several data files were incorporated into the SPSS files: seven years of individual-level death records data, geocoded death and birth records files generated using ArcGIS, and detailed population estimates by census tract geography and age groups for age adjustment. Incorporating these datasets using SPSS allows for more comprehensive data management and efficient statistical calculation and analyses of the output files needed for mapping.

First, the older death records (pre-2011) were re-geocoded to improve data quality (see "Geocoding" section below). Geocoding/mapping of the decedent's

resident address is necessary to locate the corresponding census tract for analytical purposes.

Second, population data by county and census tract by age groups were used as denominators to calculate age-adjusted rates for both state health indicators. We extracted data from two sources to estimate the census tract population, the Census Decennial 2010 and the American Community Survey because the Census Bureau provides population estimates annually at highly detailed geographic and age group levels. These data were used to match the Portland State University Population Research Center's annual county estimates for the seven-year period. Multi-dimensional raking was applied to generate new estimates by census tract and age groups to ensure consistency with the population data we used for our published reports.

Third, selected health indicator variables were calculated from the death record information. Data for the seven years were added together, and the US 2000 standard million population was applied to age adjust the death rate and years of potential life lost before 75 ratio. Records were then aggregated by resident county and census tract, providing county-level as well as census tract-level measurements for each health indicator.

### Geocoding

A review of the originally geocoded data revealed many records with missing or inaccurate geocode information. Since improvement to the precision of the geocoded data is possible with the advancement in spatial information technology in recent years, CHS staff re-geocoded pre-2011 death records for use in this project.

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.

All death records used in these maps were re-geocoded with updated geo-locators prior to analysis. After the re-coding process, 99.9% of death records were usable at the census tract level. The resulting geocoded data with updated geocode match type, state FIPS, county FIPS, census tract, census block, longitude, and latitude information were merged with the death records for analysis useful for county and census tract level mapping.

### Shapefile Creation

A state (by county) and county shapefiles (by census tract) were created using the U.S. Census TIGER Geodatabase, which contains 2010 Census geography with current adjustments and corrections. This geodatabase file includes the following shapefile data layers: block, block group, census designated place, census tract, county, county subdivision, and incorporated place. 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-level shapefile. The following variable fields were added to the county-level shapefile: county death counts, state death counts, county seven-year population estimate, state seven-year population estimate, county rate, state rate, statistical significance (sig. higher, sig. lower, or not sig.). The following variable fields were added to the census tract-level shapefile: census tract death counts, county death counts, state death counts, census tract seven-year population estimate, county seven-year population estimate, state seven-year population estimate, census tract rate, county rate, state rate, and statistical significance (sig. higher, sig. lower, or not sig.).

### Map Creation

Maps were built and are hosted on the Oregon ArcGIS Online website. Each map consists of three shapefiles: Oregon county boundary, Oregon county health indicator map, and Oregon census tract health indicator map. The three shapefiles were loaded via individual zip files to an ArcGIS Online mapping template.

### *Customization*

On each map layer, the name, extent, label, pop-up, and symbology were customizable.

The visibility range (extent) for the county-level map layer was set to display only if zoomed out farther than 1:1,500,000. The county boundary layer and the census tract layer were set to show only if zoomed in closer than 1:1,500,000. County labels were created for the county boundary and Oregon counties map layers to improve locational reference for map viewers.

Pop-ups for the county-level age-adjusted death rate and age-adjusted years of potential life lost before age 75 map layers were configured to show the county name, county total death count (seven years), county population estimates

(seven years), county rate, state rate, statistical significance compared to the state rate (for age-adjusted death rate indicator only). Pop-ups for the census tract-level layer were configured to show the county name, census tract number, census tract total death count (seven years), census tract population estimates (seven years), census tract rate, county rate, state rate, statistical significance compared to the state rate (for age-adjusted death rate indicator only).

The same color scheme was used for the symbology for all map layers, except the reference county boundary layer. Both county-level and census tract-level layer's symbology represents the county rate classified into five groups using natural breaks (placing the state rate approximately in the middle of the third class).

### *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.

### **Questions?**

For more information, call Center for Vital Statistics staff at 971-673-1150.

### **References**

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