Technical Notes: Tobacco Use 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 cigarette smoking during pregnancy maps were created in response to a growing demand for tobacco use data at county and census tract levels. To protect Oregonians' confidentiality and ensure data reliability, the cigarette use maps use five years of data.

Technical Notes

This section outlines the process of compiling, analyzing, and displaying the data for the Center for Health Statistics' cigarette use during pregnancy maps.

Compiling Records and Data

A single data file was created for analysis by compiling all Oregon resident birth records for the five year period. Several records were re-geocoded to improve data quality (see "Geocoding" section below). Next, the cigarette use variables were calculated from the birth record information. Records were then aggregated by residence county and census tract, providing county-level as well as census tract-level data for total births, cigarette use during pregnancy, cigarette use during first trimester, and cigarette use all (first through third) trimesters.

Two analogous data tables (.dbf) were produced and exported to use in creating shapefiles: one with county-level and the other with census tract-level total births and cigarette use (any trimester) variables. Excel was used to calculated statistical significance at county level. (See Annual Report, Volume 1, Appendix B: Technical notes - Formulas for more information on determining statistical significance.) Two data tables were also produced and exported for the "cigarette use, all trimesters" (mother smoked in first, second and third trimesters) map shapefiles creation. The tables included county-level and census tract-level cigarette use first trimester and cigarette use all trimesters variables.

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
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 data table .dbf file were joined to create one "cigarette use, any trimester" shapefile. This step was performed twice to produce one county-level shapefile and one census tract-level shapefile. The following variable field was added to the "cigarette use, any trimester" county-level shapefile: statistical significance (yes, no, or n/a). The following variable field was added to the "cigarette use, any trimester" census tract code-level shapefile: statistical significance (yes, no, or n/a). This same

[1] 2013 TIGER/Line Shapefiles Techincal Documentation, U.S. Census Bureau, 2013.

process was used to create the "cigarette use, all trimesters" map shapefiles (excluding statistical significance).

<u>Map Creation</u>
Maps were built and are hosted on the Oregon ArcGIS Online site. The first map consists of an Oregon county boundary layer (shapefile), Oregon county "cigarette use, any trimester" map layer (shapefile), and Oregon census tract "cigarette use, any trimester" map layer (shapefile). The second map consists of an Oregon county boundary layer (shapefile), Oregon county "cigarette use, all trimesters" (mother smoked in first, second and third trimesters) map layer (shapefile), and Oregon census tract "cigarette use, any trimester" map layer (shapefile). The 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 code layer were set to show only if zoomed in closer than 1:1,500,000 (counties).

Pop-ups for the county-level "cigarette use, any trimester" map layers were configured to show the county name, county cigarette use count, county total birth count, county percent, state percent, statistical significance (compared to the state percent), and a chart displaying the county percent by year. Pop-ups for the census tract-level layer were configured to show the county name, census tract number, census tract cigarette use count, census tract total birth count, census tract percent, county percent, state percent, and statistical significance (compared to the state percent).

Pop-ups for the county-level "cigarette use, all trimesters" map layers were configured to show the county name, county first trimester cigarette use count, county all trimesters cigarette use count, county percent, state percent. Pop-ups for the census tract-level layer were configured to show the county name, census tract number, census tract first trimester cigarette use count, census tract all trimesters cigarette use count, census tract percent, county percent, state percent.

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 "cigarette use, any trimester" layer's symbology represents the county percent

broken into five classes by equal interval (placing the state median percent as close to the middle of the third class as possible). The census tract code-level layer's symbology represents the census tract code percent broken into five classes by quantile (placing the state average percent approximately in the middle of the third class). The county-level "cigarette use, all trimesters" map's symbology represents the county percent broken into five classes by geometrical interval (placing the state percent as close to the middle of the third class as possible). The census tract code-level layer's symbology represents the census tract code percent broken into five classes by geometrical interval (placing the state percent 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 (also called "tabbed viewer") which can display multiple maps in a single application. The tabbed viewer displays the cigarette use maps on individual tabs, allowing for the option to add future cigarette use maps, and letting 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 Vital Statistics staff at 971-673-1191.

References
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