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Esri Health and Human Services GIS Conference
September 14, 2015

Visualizing Religious Exemptions for Vaccinations Using an Interactive, Web-Based Map

Mission: To protect, promote, and improve the health of all people in Florida through integrated state, county, and community efforts.
Objectives

- Estimate the prevalence of religious exemptions to vaccinations among school-aged children 4-18 years old at the census tract level
- Develop a visualization tool for Florida Department of Health staff to inform local public health actions
Rationale

- Previous vaccine-preventable disease (VPD) outbreaks among religiously exempt populations in Florida
- Immunization coverage estimates only available at county level
- Need for identifying subpopulations at increased risk of VPDs based on decreases in herd immunity
Vaccine Exemptions

- Four types of exemptions in Florida:
  - Religious
  - Permanent medical
  - Temporary medical
  - 30-day transfer
Religious Exemptions

- Only issued by the resident’s county health department
- May or may not apply to all vaccines
- In effect until revoked by parent
- Required entry into Florida SHOTS December 17, 2011
Florida SHOTS

- Statewide online immunization registry
- Voluntary use by selected doctors to track immunizations
- Exemption data more complete than individual immunization data
  - School entry requirements
Exemption Data

- Snapshot of all registered exemptions as of a given date
- 69,361 exemptions among children age 4-18 years as of August 31, 2015
- Home addresses used for geocoding
Population Data

- 2010 U.S. Census
  - Population for individual age groups
  - Census tract level (4,212 tracts)
School Data

- Locations of public and private schools
- Kindergarten and 7th grade immunization report
  - Florida Department of Education
  - Percentage of kindergarten/7th grade students at each school fully immunized
- Public schools only
Creating the Map

- Home addresses standardized and geocoded using Esri’s StreetMap Premium
- Spatial joined geocoded points to census tract population data
- Calculated proportion of children with religious exemption in each tract
Creating the Map

- Choropleth maps for
  - State
  - Regions
  - Counties
- Added school data
- Used ArcGIS Online to create web application
Project Demonstration
Updating the Map

- Average of over 1,000 new religious exemptions each month in 2015
- Python code to automate entire process from geocoding to updating a feature service on ArcGIS Online
- Mapping application updated monthly with most recent data
Implications of Mapping Tool

- Provides detailed understanding of religious exemption patterns in local populations
- Provides comparison to other geographic regions statewide
- Identifies geographic areas at increased risk of VPD transmission
- Informs targeted education campaigns
- Informs public health actions for VPD investigations
Future Projects

• Compare reported VPD disease and religious exemption patterns across the state
• Analyze demographic factors associated with religious exemptions by census tract
Questions?

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