

# 2019 NPCR RHODE ISLAND SUCCESS STORY

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## Rhode Island Sub-County Level Cancer Data Visualization

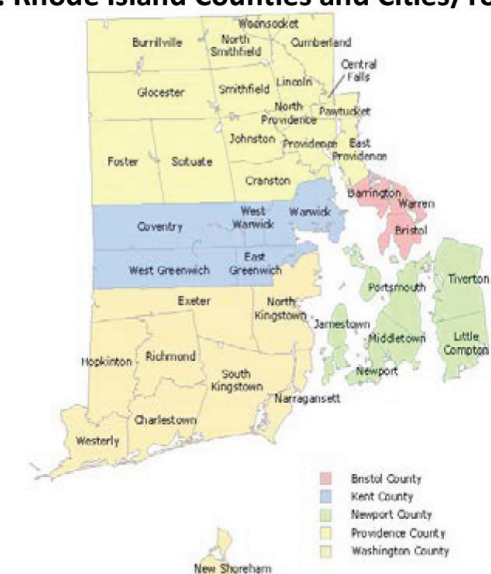
# NATIONAL PROGRAM OF CANCER REGISTRIES SUCCESS STORY

**SUMMARY:** To better meet increasing demands of local-specific cancer incidence reports, RICR needed to develop an alternative geographic unit. Through aggregation or division of the cities/towns, using constituent census tract population and boundary, 23 sub-county geographic units were constructed. Newly developed sub-county areas are currently used as the Rhode Island Cancer Registry's spatial reporting standard. Enhanced from county-level, sub-county visualizations provide more public-friendly and intuitive local-specific information. Sub-county level GIS map products are expected to help widespread and meaningful data use by Rhode Island community members, researchers, and RIDOH internal and external program partners (Comprehensive Control Program, Women's Cancer Screening Program, Colo-rectal Screening Program, Cancer Partnership, Environmental Health Program, and other chronic disease programs).

**CHALLENGE:** Rhode Island's county-level cancer reports in the United States Cancer Statistics (USCS)1 do not align well with how Rhode Islanders perceive of their local communities. Only five (5) counties are in the State of Rhode Island (Figure 1). The five-county designation is historically significant, established even before 1776 by pre-colonial settlements, but not related to Rhode Island civilians' modern-day lives. Besides, area sizes and population of five counties are widely varied: from the smallest of 24 square miles to the largest 409 square miles; from the least populated with approximately 50,000 residents to the most populated with 627,000.2 Number of cities/towns that are geographically belong to each county is also varied: three (3) towns to Bristol County and 16 cities/towns to Providence County (Figure 1). Additionally, metropolitan and non-metropolitan rural cities/towns co-exist in each county (Figure 2).

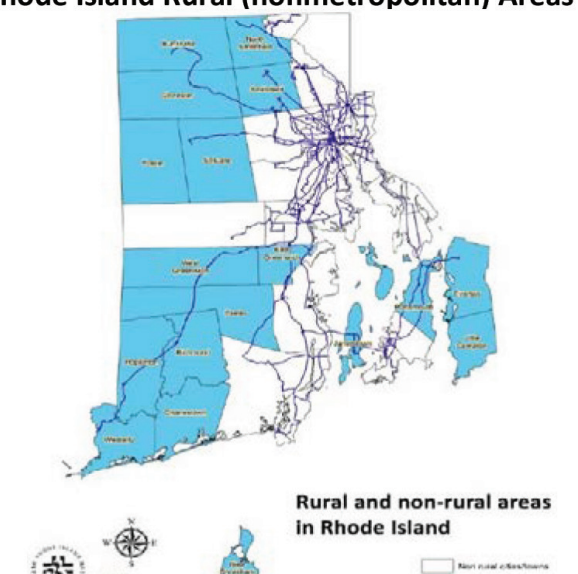
To better meet increasing demands of local-specific cancer incidence reports, RICR needed to develop an alternative geographic unit (1) that is smaller than county, (2) of which population (denominator) is large enough to generate stable and reliable statistics, (3) of which case count (numerator) is not so small that patient confidentiality is protected, and (4) with which public friendly and intuitive spatial visualization of cancer reporting is possible.

Figure 1. Rhode Island Counties and Cities/Towns



Source: Rhode Island Department of Labor and Training (<http://www.dlt.ri.gov/imi/images/county.gif>)

Figure 2 Rhode Island Rural (nonmetropolitan) Areas



Source: Rhode Island Department of Health Office of Primary Care and Rural Health (<http://www.health.ri.gov/publications/databooks/2015KeyDeterminatesofRuralHealth.pdf>)

**SOLUTION:** In consideration of annual cancer reporting at a crude rate of 600 cases per 100,000 Rhode Islanders, population denominator of less than 5,000 cannot generate stable and reliable statistics (with greater than 30% of relative standard error). If a community has less than 1,000 residents, case counts would be too small (less than 5) to protect patient confidentiality. These population thresholds were set much higher (at least 20,000) for cancer reporting by subtype and subpopulation (e.g. sex). Therefore, aggregations or divisions of existing geographic identifiers, city/town and census tract, were inevitable to identify an alternative spatial mapping standard.

**RESULTS:** Thirty-nine (39) municipalities in Rhode Island show a great extent of variability with respect to population size. According to the 2010 Census, more than 178,000 residents live in the City of Providence (the largest), and 1,050 residents in the Town of North Shoreham (the smallest).2 Of 39 cities/towns, a majority of cities/towns (31) constitute of multiple census tracts (8 in average; range=2-40).3 Meanwhile, 8 small-sized or less populated towns coincide with single census tract boundary.3

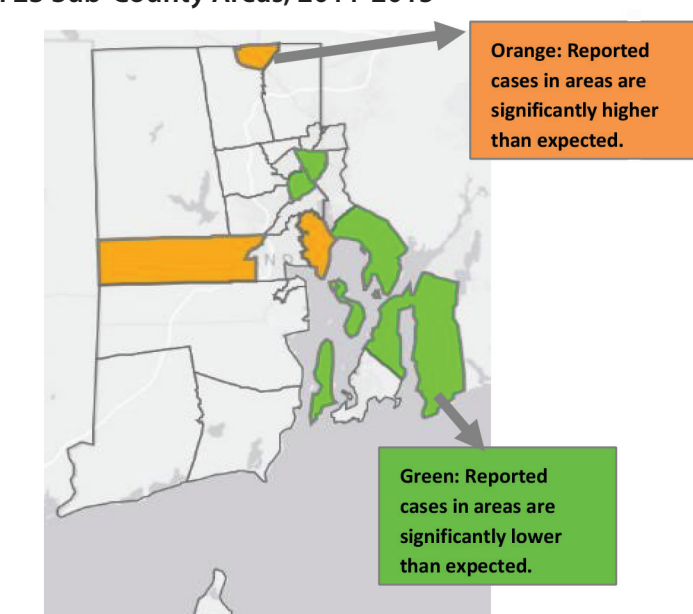
Through aggregation or division of the cities/towns, using constituent census tract population and boundary, 23 sub-county geographic units were constructed.

The followings are selective features of 23 sub-county areas, and summaries of how these are related to the existing geographic units, county, city/town and census tract.

- Denominator populations were evenly distributed across the 23 new sub-county areas: approximately 46,000 in average (minimum 32,000 to maximum 64,000). These population sizes were sufficiently large enough to report cancer incidence for most of the top 10 subtypes, males and females separately, with acceptable stability and reliability criteria.
- All counties, but one, have sub-county areas (2 at the least; 14 at the most). Bristol County, the smallest county with 3 small-sized towns, was grouped into a single sub-county area. All sub-county areas, with one exception, did not cross over the county boundaries.
- The City of Providence, the largest and the most densely populated city, was divided into 5 areas. Three other relatively large size cities with population 71,000-91,000 were divided into 2 areas of each and created 6 areas. Three medium-sized cities with 35,000-41,000 constitute a single area of each. The rest of 9 areas were constructed by grouping contiguous and adjacent 2-4 small towns together, until each area's population size reached 32,000-50,000.

• In average, 11 census tracts existed per sub-county area (range: 7-14 census tracts) For 23 sub-county areas, standardized incidence ratios (SIRs) were calculated, using reported cancer cases and expected cases estimated from the referent statewide population's cancer incidence during 2011-2015. SIRs were summarized for all cancers combined and top 10 subtypes, by sex. Figure 3 demonstrates a GIS mapping *example* of female lung cancer incidence in 23 sub-county areas. During 2011-2015, three (3) sub-county areas showed significantly higher lung cancer reporting among female residents, than the statewide referent (highlighted with orange shade). Green shaded four (4) sub-counties indicated significantly lower lung cancer incidence among female residents, compared with the statewide cancer incidence. Similar maps were created for all cancers combined and top 10 subtypes, by sex. Please see Appendix 1 for complete Rhode Island women's lung cancer statistics in 23 subcounty areas.

Figure 3. Rhode Island Women's Lung Cancer Incidence in 23 Sub-County Areas, 2011-2015



Source: Rhode Island Department of Health Cancer Registry

**SUSTAINING SUCCESS:** Newly developed sub-county areas are currently used as the Rhode Island Cancer Registry's spatial reporting standard. Enhanced from county-level, sub-county visualizations provide more public-friendly and intuitive local-specific information. Sub-county geographic units are more homogenous, than county, in respect of demographic, geographic and environmental attributes.

Collaboration with the RIDOH Public Health Communication team is crucial to integrate the GIS map products into the existing cancer data webpage and help widespread and meaningful data use by Rhode Island community members, researchers, and RIDOH internal and external program partners (Comprehensive Control Program, Women's Cancer Screening Program, Colorectal Screening Program, Cancer Partnership, Environmental Health Program, and other chronic disease programs).

### CONTACT INFORMATION:

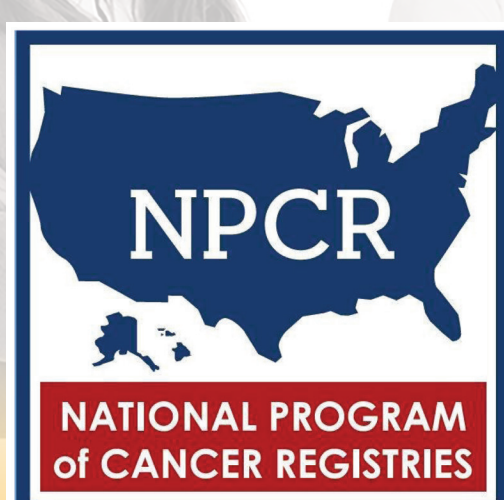
Tel.: 401-222-4577

RICR Cancer Data Page: <http://www.health.ri.gov/data/cancer/>

RICR Program Page: [http://www.health.ri.gov/programs/detail.php?pgm\\_id=124](http://www.health.ri.gov/programs/detail.php?pgm_id=124)

### REFERENCES

1. U.S. Cancer Statistics Data Visualizations Tool. U.S. Cancer Statistics Working Group. U.S. Cancer Statistics Data Visualizations Tool, based on November 2018 submission data (1999–2016): U.S. Department of Health and Human Services, Centers for Disease Control and Prevention and National Cancer Institute; [www.cdc.gov/cancer/dataviz](http://www.cdc.gov/cancer/dataviz), June 2019.
2. American FactFinder, US Census Bureau 2010 Census. [https://factfinder.census.gov/faces/nav/jsf/pages/community\\_facts.xhtml](https://factfinder.census.gov/faces/nav/jsf/pages/community_facts.xhtml)
3. State population estimates (by census tract) for rate denominators were obtained from the National Cancer Institute Surveillance, Epidemiology, and End Results Program (NCI SEER; <https://seer.cancer.gov/popdata/download.html>).



Centers for Disease Control and Prevention  
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