2023 NPCR WISCONSIN SUCCESS STORY

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Overcoming Small Geographical Area Cancer Surveillance Challenges

National Program of Cancer Registries
SUCCESS STORY

SUMMARY

Cancer surveillance in small geographical populations presents unique methodological issues and data suppression challenges to the public health community. The Wisconsin Cancer Reporting System and public health programs (partners) developed a flexible, dynamic information model with visualizations to overcome these challenges.

CHALLENGE

Small area cancer surveillance uncovers disparities masked at the county or state levels and provides more granular information for tailoring public health programming. However, many cancer registries struggle to provide meaningful small area surveillance to meet the diverse needs of public health programs. Challenges include:

- Rate stability issues and adhering to suppression standards when populations are small, or cancer events are rare in a community. This problem is especially challenging in rural communities where cancer death rates are higher and decreasing at a slower pace than urban communities.[1]

- Inflexible or pre-determined geographic boundaries that can change by public health program (for example, environmental contamination sites, hospital catchment areas, or program regions) are time-consuming to geocode and analyses need to be tailored.

- Visualizing data in a way that is useful and informative for decision-making.

When small area cancer data are provided, public health practitioners still find it difficult to decide if observed differences should be acted upon. Sometimes, data lack statistical power, or too much temporal and spatial aggregation is needed for it to be useful.[2]

SOLUTION

The Wisconsin Cancer Reporting System (WCRS) developed a flexible, dynamic information model using R software and created visualizations in Tableau to respond to small area surveillance challenges and the diverse data needs of public health cancer programs.

Our model incorporates cancer event types (death or diagnosis), cancer sites and histology for incident cases, and population predicates so public health cancer programs can specify diagnosis years, tailor geographies, and select ages, sex, and races and ethnicities of interest. Furthermore, our model uses formal, statistical tests (adjusted for multiple comparisons) to generate both effect size and significance to inform public health program decision-making.

RESULTS

We held conversations and iteratively tested our model with public health programs including CDC's Environmental Public Health Tracking Program, the Wisconsin Well Woman Program, the Division of Public Health's Bureau of Environmental and Occupational Health, and the Medical College of Wisconsin.

The image below shows an example of the model's output visualized in Tableau. This dashboard allows users to interact with selections to determine if, for example, the small area is within their catchment area of interest. Users can select results of the statistical test to inform their program decision-making.
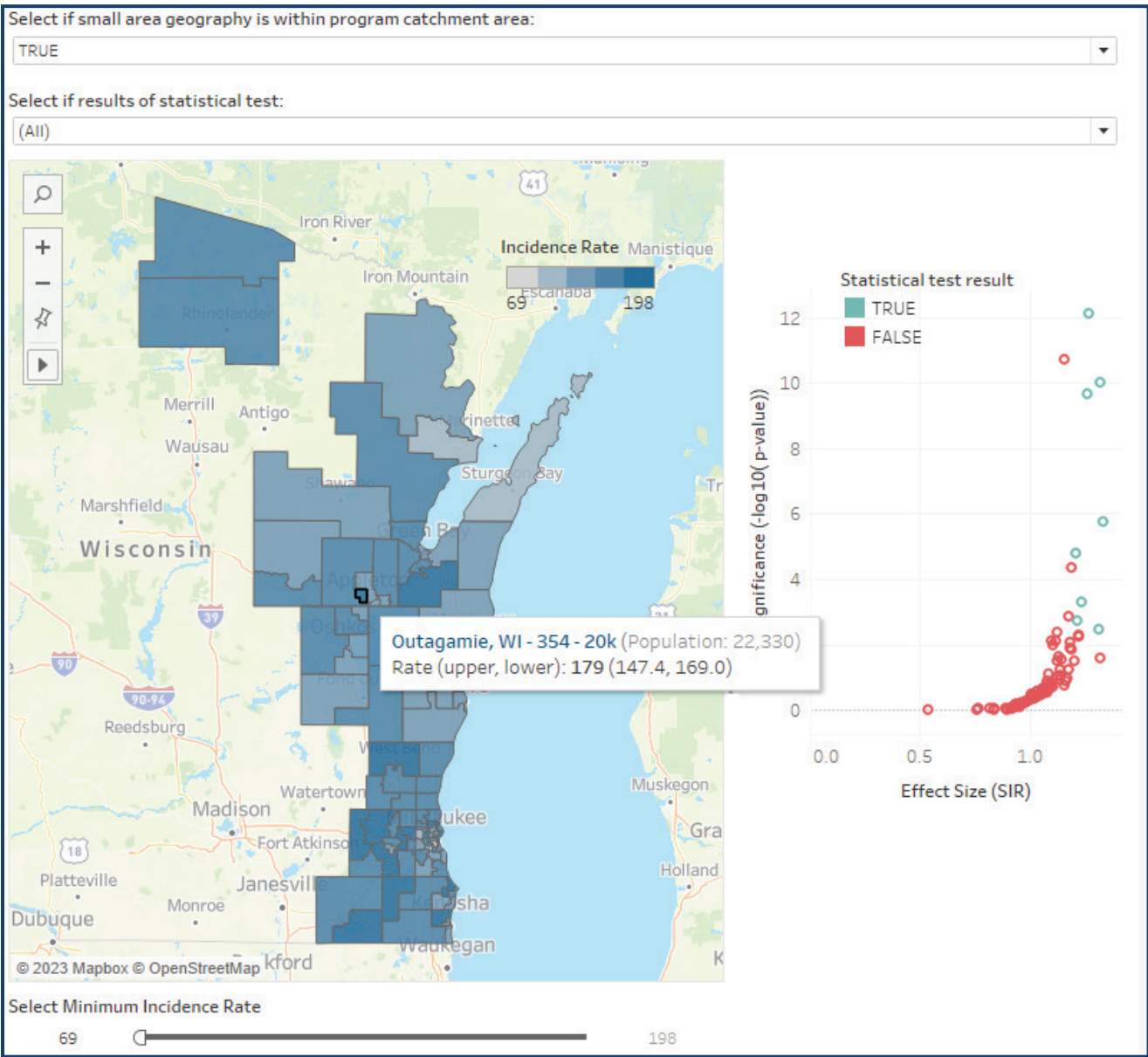
WCRS's model proved flexible and dynamic by accommodating varied public health program geographies, such as Wisconsin Well Woman Program's multi-jurisdictional areas and environmental contamination sites, and specific cancer events of interest, like breast cancer incidence and pediatric leukemia deaths.

However, translating the model's inputs needed from partners and the model's statistical test outputs remains a challenge. We've learned that hosting routine meetings between Wisconsin's public health cancer programs and developing plain language to communicate our model is critical to building a shared understanding.

SUSTAINING SUCCESS

WCRS continues to organize and participate in recurring meetings with public health programs involved in our small area surveillance efforts. These meetings provide sustained opportunities to refine our model's development, further partner buy-in for it, and build shared understanding of cancer registry data in general. WCRS continues investing in data visualization infrastructure and training and is committed to improving our model's outputs in a way that is accessible and actionable.

STORY QUOTE

"As the Wisconsin Well Woman Program Director, I need to quantify neighborhood-level breast and cervical cancer disparities so we can equitably allocate screening and educational resources. I'm very excited about the small area surveillance model and visualization collaboration between our program and WCRS. It means we can provide our program coordinators with more detailed data on women in their jurisdictions."
– Gale Johnson, Wisconsin Well Woman Program Director

"My research focuses on understanding how neighborhood environmental characteristics impact cancer outcomes. Having a surveillance model to detect small spatial variations in outcomes informs our research and what data we request from WCRS. We're thrilled about the collaborative small area surveillance efforts and look forward to continued partnership."
– Kirsten Beyer, PhD, MPH, MS, Co-Director, GEO Shared Resource, Medical College of Wisconsin

REGISTRY CONTACT

www.dhs.wisconsin.gov/wcrs

CITATIONS

1. Henley SJ, Anderson RN, Thomas CC, Massetti GM, Peaker B, Richardson LC. Invasive Cancer Incidence, 2004-2013, and Deaths, 2006-2015, in Nonmetropolitan and Metropolitan Counties – United States. MMWR Surveill Summ 2017;66(No. SS-14);1–13. DOI: **http://dx.doi.org/10.15585/mmwr.ss6614a1**.

2. Recommendation 4 of: DeSalvo KB, O'Carroll PW, Koo D, Auerbach JM, Monroe JA. Public Health 3.0: Time for an Upgrade. Am J Public Health. 2016 Apr;106(4):621-2. doi: 10.2105/AJPH.2016.303063. PMID: 26959263; PMCID: PMC4816012.

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CANCER DATA DRIVING ACTION

U.S. Department of Health and Human Services
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