

# Rural Atlas highlights differences in cancer incidence, proportion late stage, and survival using two different definitions of rurality

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## Background

Rural populations in the U.S. have different cancer rates and patterns than populations in urban areas. Rural areas often show lower incidence rates for breast and prostate cancers but also higher rates for lung and colorectal cancers.

There are multiple measures to define urban and rural areas. The Rural Atlas visualizes differences for 5 cancer sites across 2 different definitions of rurality within the UCSF Helen Diller Family Comprehensive Cancer Center (HDFCCC) catchment area.

## Methods

We explored various definitions of rurality for the Rural Atlas and narrowed our choice to those with classification at the census tract level to enable more geographically granular insights. We ultimately decided to include both RUCA codes 4-10 and >30% rural to define rurality (Table 1).

**Table 1. Rurality definitions used in the Rural Atlas**

Rurality definition	Geography	Developer	
Rural-Urban Commuting Areas	Census tract	USDA + U of Washington	10-tiered primary classification system, allowing users to distinguish areas that may be rural in population size but economically linked to urban cores through commuting
% Rural	Census tract	Census	Based on percent of residents who reside in census blocks that are designated as rural

We focused on the five most common cancer sites in the catchment area: female breast, prostate, lung, colorectal, and skin (melanoma). California Cancer Registry 2018-2022 data was used to generate incidence, late stage, and survival rates.

Rates were generated using SAS 9.4 software. We used Tableau Prep to clean and organize data before importing into Tableau Desktop to generate the user-facing interactive content.

To allow for a more regional approach to evaluating cancer rates in the 25-county catchment area, we organized these counties into four regions using California Census 2020 Regions (Table 2).

**Table 2. HDFCCC catchment area counties by four California Census Regions**

REGION	COUNTIES
Northern California (8 counties)	Butte, Colusa, Glenn, Lake, Mendocino, Sacramento, Sutter, Yolo
San Francisco Bay Area (9 counties)	Alameda, Contra Costa, Marin, Napa, San Francisco, San Mateo, Santa Clara, Solano, Sonoma
San Joaquin Valley (5 counties)	Fresno, Madera, Merced, San Joaquin, Stanislaus
Central Coast (3 counties)	Monterey, San Benito, Santa Cruz

## Results

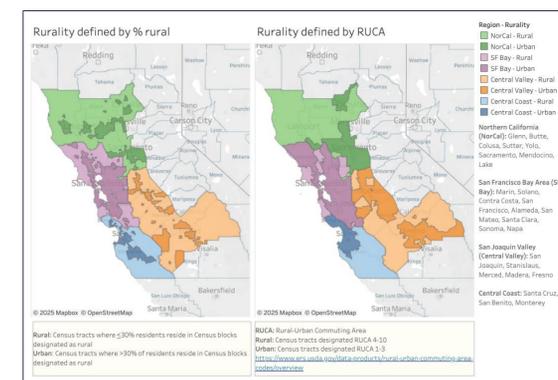
The Rural Atlas dashboard can be found here:

<https://cancerregistry.ucsf.edu/rural-atlas>



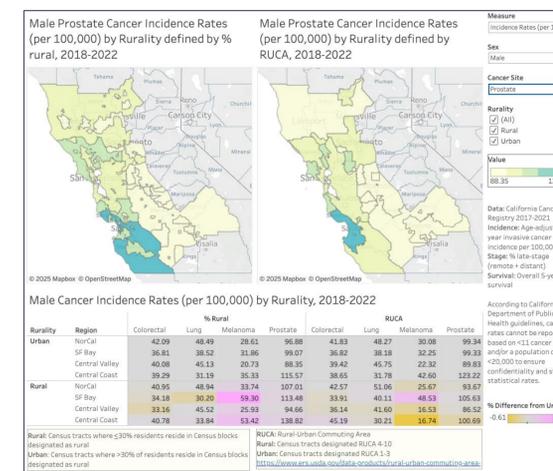
The dashboard allows users to explore cancer rates for the 25-county catchment area by rurality and regions. Within the Rural Atlas dashboard, users can select from four views.

**Figure 1. Maps of rurality by region**



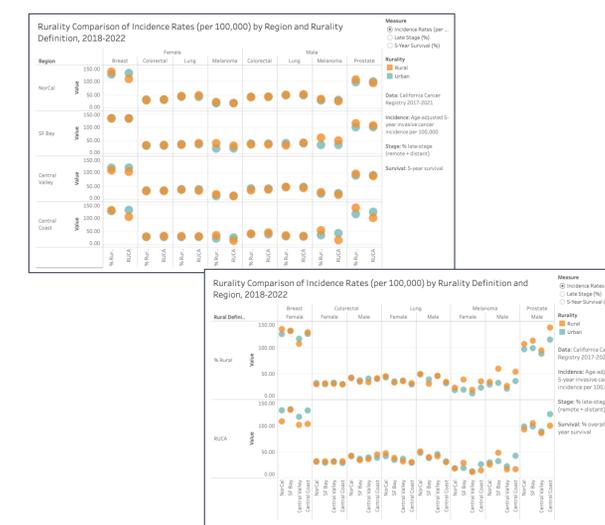
The first tab of the Rural Atlas displays a map using % rural definition on the left and a map using rurality defined by RUCA on the right. The darker colored regions represent urban areas, and the lighter colored regions represent rural regions (Figure 1).

**Figure 2. Cancer incidence, stage, and survival by rurality and region**



The second tab allows users to compare 5-year incidence rates, % late stage, and 5-year survival by rurality and region. Users can select measure, sex, and cancer site and explore the corresponding maps and tables (Figure 2).

**Figures 3 and 4. Rurality comparison by region and rurality definition**



The third and fourth tabs present cancer rates by rurality and region in dot plot form. Users can view differences between urban and rural areas across definitions of rurality (Figures 3 and 4).

Using the Rural Atlas we observed some regional differences between rural and urban areas:

- Prostate cancer**
  - Incidence was lower in rural areas compared to urban areas in the Central Coast using the RUCA definition but higher using the % rural definition.
  - Proportion late-stage was higher in rural areas of the San Francisco Bay Area, especially when using the % rural definition.
- Melanoma**
  - Male and female incidence was higher in rural areas using the % rural definition.
  - Using the RUCA definitions, there was higher incidence only in the San Francisco Bay Area and lower incidence in rural areas of the Central Coast.
- Lung cancer**
  - Male survival was higher in rural areas using the % rural definition, but lower using the RUCA definition, especially in the Central Coast.

## Conclusion

The Rural Atlas can highlight differences in rural cancer rates using different definitions of rurality. The Rural Atlas is a flexible tool for informing local efforts to reduce cancer incidence, morbidity, and mortality.

## Acknowledgements

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