

## Rural-Urban Comparison of Cancer Outcomes in California

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While the great majority of California's population resides in urban areas, over 5 million people live in rural areas throughout the state. Previous research suggests that rural residents may be more likely to have worse cancer outcomes than patients living in urban areas. For example, rurality has been associated with later stage at diagnosis, likely reflecting reduced utilization of cancer screening or limited access to preventive health care. However, the impact of rurality on receiving standard cancer treatment is not well understood, as previous studies have produced conflicting results. The objective of this analysis was to identify possible disparities in cancer treatment between patients in urban and rural areas.

Using data from the California Cancer Registry, we identified 502,544 patients who were at least 18 years old when diagnosed with cancers of the breast, cervix, colon, endometrium, lung, ovary, or stomach in California between 2010 and 2016. Rural Urban Commuting Area (RUCA) codes were used to classify patients as living in urban (n=486,494) or rural (n=16,050) areas. Select Commission on Cancer (COC) Quality of Cancer Measures were used to evaluate receipt of cancer treatment.

Patients living in rural areas were significantly more likely to be older, male, non-Hispanic white, and of low neighborhood socioeconomic status. In addition, rural patients were significantly more likely to be diagnosed at later stages than urban residents. Compared to their urban counterparts, breast cancer patients in rural areas were significantly less likely to have radiation after breast conserving surgery, and rural colon cancer patients were significantly less likely to have the recommended number of lymph nodes removed and examined. Interestingly, cervical cancer patients in rural areas appeared to have greater odds of receiving standard treatment, though the findings were not statistically significant. Other results suggest possible disparate outcomes, but the associations were not significant.

The findings from this analysis suggest that cancer patients living in rural areas are diagnosed at later stages than urban patients, and that there may be important differences in the receipt of recommended care between these patients. However, because of the small sample size of rural patients, our findings were somewhat limited. In future studies, we would like to see how

expanding our definition of rurality using Metropolitan Standard Statistical Areas definitions may impact our findings. In addition, we would like to compare outcomes for more cancer sites and to consider additional measures of care. Importantly, we should work to determine the underlying individual and structural factors affecting receipt of standard cancer care.

This analysis serves as an important example of using registry data to better understand the cancer burden in our state. Colleagues at the California Cancer Reporting and Epidemiologic Surveillance (CalCARES) are researching this issue further.