

Cancer incidence and rural surveillance challenges in West Texas

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ABSTRACT

Purpose: This study aimed to report cancer incidence across West Texas, with a focus on differences in urban and rural counties.

Methods: Aggregate population data was obtained from the Texas Cancer Registry and the United States Census to describe cancer incidence and population size for 107 counties across West Texas. Five-year cancer incidence reports were used to calculate annual mean cancer incidence to retain as much data as possible from low population rural counties.

Findings: An average of 13,500 new cancer diagnoses were reported across West Texas annually from 2018–2022. Over two-thirds of these new cases occurred among residents in the nine urban counties in the region, leaving about 4,150 new cases across the geographically large and sparsely populated 98 rural counties of West Texas.

Conclusions: West Texas cancer incidence aligns proportionally with the state of Texas when accounting for population size. However, a substantial challenge remains for rural cancer epidemiology for identifying meaningful patterns when annual absolute incidence numbers are too small for statistical analysis.

Keywords: Cancer incidence, rural health, West Texas, population health

BACKGROUND

Rural residents across the United States face meaningful barriers to cancer screening and treatment because of distance to specialty providers and treatment centers, financial barriers, and access to clinical trials.¹ Access to specialty providers has been found to drive a substantial portion of rural-urban differences in preventable hospitalization and mortality.² Bhatia and colleagues identified that rural residents suffered worse cancer outcomes due to information gaps, poor access to screening, lack of access to advanced care and clinical trials, and increased comorbidities such as smoking and obesity.³

The western half of Texas is a large geographic area characterized by majority rural counties with small-

to moderate-sized urban hubs offering varying levels of healthcare services.⁴⁻⁷ The West Texas region contains no National Cancer Institute (NCI) Designated Cancer Centers, which provide access to new treatments and clinical trials.⁸ West Texas is roughly surrounded by 4 different NCI Designated Cancer Centers – Dallas, San Antonio, Oklahoma City, and Albuquerque – yet a substantial portion of the region is not particularly close to any of them.⁸ The Cancer Prevention Institute of Texas (CPRIT) highlights geographic disparities as a central goal of expanding access to cancer screening and treatment in Texas, but it is important to understand the burden of cancer by region to establish goals for these metrics.⁹ This report uses publicly available registry data to describe overall cancer incidence across urban and rural counties of the West Texas region.

DATA AND METHODS

Aggregate public use data are obtained from two sources. Cancer incidence is estimated from two

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Table 1. Texas Population Size and Mean Yearly Cancer Incidence, 2010 and 2020

	Counties	2020 Population	2018–2022 Mean Annual Cancer Incidence	2010 Population	2008–2012 Mean Annual Cancer Incidence	Land area (mi ²)
Texas	254	29,145,505	130,185	25,145,561	102,475	261,232
% change from 2010		15.91	27.04			
West Texas	107	2,951,430	13,518	2,787,620	12,021	128,085
% change from 2010		5.88	12.45			
Urban	9	2,163,289	9,364	1,968,508	8,016	8,594
% change from 2010		9.89	16.81			
Rural	98	788,141	4,155	819,112	4,005	119,491
% change from 2010		−3.78	3.74			

Source: U.S. Census; Texas Cancer Registry.

5-year blocks derived from the Texas Cancer Registry 2008–2012 and 2018–2022, respectively.^{10–11} Mean annual cancer incidence is calculated as an average of five-year cancer incidence totals. Single-year incidence estimates are unhelpful for rural counties, as data is suppressed for less populated counties with low absolute cancer incidence. Using five-year aggregations of incidence provides data for all counties outside a small subset with extremely low population. Reporting to the Texas Cancer Registry is mandated by Texas Administrative Code, and as such, data is reasonably comprehensive compared to many other chronic diseases without mandated reporting requirements.^{12–13} Five-year aggregate cancer incidence for Sterling County for 2010 was suppressed due to small numbers, but this county was retained in the data by using a 7-year average from 2007–2013.

Population size estimates by county are obtained at the mid-point of each 5-year block using population counts from the 2010 and 2020 decennial U.S. Census.^{14–15} For this report, West Texas is defined as the 107 counties in Texas Public Health Regions 1, 2, 9, and 10, an area that spans much of the region typically defined as West Texas.¹⁶ U.S. Office of Management and Budget (OMB) definitions designate metropolitan areas as counties with a population 50,000 or more, defined here as urban.¹⁷ Nine West Texas counties fit this definition – Ector, El Paso, Lubbock, Midland, Potter, Randall, Taylor, Tom Green, and Wichita. The remaining 98 counties are categorized as rural. This

urban-rural definition provides a clear demarcation, as all nine urban counties have over 100,000 residents, whereas the largest rural county, Brown County, had 38,095 people as of the 2020 Census. Land area in square miles is provided for geographic context.¹⁸ This report uses publicly available aggregate data with no human subjects data, and as such, did not require Institutional Review Board review.

RESULTS

Table 1 shows population size and cancer incidence data for Texas and West Texas in 2010 and 2020. The four Public Health Regions of West Texas comprise approximately 49% of the state’s land area but contain only about 10% of the state’s population. Of the 2.95 million residents of West Texas, 2.16 million, or about 73% of the residents, live in the 9 urban counties across the 107-county West Texas region.

Texas Cancer Registry data indicates that about 13,500 new cases of cancer were diagnosed in West Texas annually over the 5-year span of 2018–2022, a 12.5% increase from 2008–2012. Approximately 70% of annual cancer diagnoses in West Texas were to residents of the 9 urban counties in the region, with the remaining 30%, about 4,150 annual diagnoses, spread across the 98 rural counties of the region. Six rural West Texas counties were too small to have publicly available cancer incidence data, including Borden, Kent, King, Loving, Roberts, and Terrell, and therefore,

any cancer cases in these counties are not included in the table. The combined population of these counties in 2020 was 3,300, which would account for about 15 new cancer diagnoses each year, under average state incidence rates.

Population in West Texas' rural counties declined about 4% over the 10-year study period, while mean annual cancer incidence increased nearly 4%. This finding should be taken in context, however, as the rural counties in the region have, on average, an older population than the rest of the state. In 2023, 20% of Texas' rural county population was aged 65 or over compared to a state average of 13.5%.¹⁹

DISCUSSION

This report identified about 13,500 new cancer diagnoses each year in the West Texas region. These cases represent a relatively small proportion of the state's total cancer incidence, yet the number is substantial over a geographically large area with healthcare resources concentrated in regional urban hubs. Over two-thirds of the annual diagnoses occur among residents of West Texas urban counties, but importantly, none of the cities in the region have an NCI designated cancer center. Further, about 4,150 cases are diagnosed each year across the 98 rural counties in the region, an area geographically comparable in size to the land area of the state of New Mexico.²⁰ From a capacity building perspective, 4,150 new annual cancer diagnoses represent a substantial service need for planning infrastructure across the wide geographic area. Even when rural cancer incidence rates align with statewide rates, rural residents may face different logistical realities relating to access to specialty care and transportation.

West Texas' population grew nearly 6% over the 10-year observation period compared to almost 16% for the state of Texas. Cancer incidence in West Texas grew 12.5% over the same period compared to a 27% increase for the state. Importantly, although Texas cancer incidence outpaced population growth over the 10-year period, age-adjusted cancer rates in Texas have remained stable.²¹ The growth in cancer incidence is largely attributable to the state's growing and

aging population.²¹ From 2010 to 2020, Texas' median age increased from 33.4 to 34.8 years.²²⁻²³ Even if age-adjusted cancer incidence remains stable, a growing older Texas population will result in increased case burden and need for caregivers, with added infrastructure gaps among the aging rural population.

Cancer is a complex disease classification that includes over 200 different identified types in humans and can be caused by a complex set of genetic, environmental, and behavioral factors.²⁴ In a rural epidemiological context where population is small and rates of specific cancer types are low, it may be difficult to identify meaningful trends and patterns given the small sample size. Minor changes in cancer incidence in a sparsely populated rural county may cause substantial fluctuations in cancer rates, often measured per 100,000. For example, a county of 1,000 people would be expected to have about 4 new cancer diagnoses per year, based on the state rate, yet a simple increase to 6 cases or decrease to 2 cases in a single year would place the county near the highest or lowest incidence in the state, respectively. Whether such a change is random or non-random may be difficult to discern given the small sample size and short time frame. Consistent observation over time and in larger aggregations may be needed to discern whether fluctuations in cancer incidence or mortality rates are significant.

LIMITATIONS

This report was not designed to evaluate causal relationships between rural cancer and access to treatment, treatment quality, prevention and screening, or mortality. Rather, the focus was to establish cancer incidence for West Texas toward future epidemiological and policy work on the topic. The small population size of rural Texas counties remains a barrier to understanding a complex disease such as cancer. Cancer reporting data are reliable due to legal mandates, yet public data suppresses incidence data for the smallest Texas counties. Public data on subgroups by sex, age group, or cancer type are also suppressed in most rural counties due to small numbers. Although crude cancer incidence rates can be calculated using the public data presented, they do not account for differences in age structure. As such, these findings should

not be used to calculate crude cancer incidence rates for the purpose of analyzing geographic disparities. Rather, restricted-use data that can provide age-specific incidence rates is more appropriate for such analyses, but that data is not presented here.

CONCLUSION

Surveillance of rural cancer incidence is a vital component of cancer prevention and treatment expansion efforts in Texas. Despite reliable registry data resulting from mandatory cancer reporting across the state, the small population of rural counties presents challenges for understanding risk and disease distribution. Consistent surveillance and analysis of low population rural counties are needed to provide context for infrastructure planning and needs assessment in rural cancer prevention and care. Whereas West Texas cancer incidence aligns similarly to the full state, it remains vital for rural cancer epidemiology to highlight absolute incidence numbers in addition to incidence rates to ensure that rural residents are appropriately accounted for in planning and policy efforts.

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