# Cancer disproportionately impacts adults living in rural areas

## Unmet need for cancer screening tests is greatest in rural areas

## Introduction

Cancer is the second most common cause of death in the United States (US). A total of 1.9 million new cancer cases and 610,000 deaths from cancer are expected in the US in 2022.[1] Detecting cancer early, before it spreads throughout the body, saves lives.[2] Currently, only 5 types of cancer have commonly available screenings, which leaves too many cancers with no way of being detected early.[3] In fact, more than 70% of cancer deaths are due to those cancers with no recommended screening test.[4]

Those living in rural areas often face greater public health challenges, as they have more limited access to healthcare, are less likely to be insured, and are more likely to live in poverty.[5] Those challenges can lead to increased late-stage cancer incidence and cancer deaths. While cancer mortality rates across the nation have been decreasing, this decline has not been experienced equally. For many rural populations, cancer mortality is not decreasing; it is steady and, in some cases, rising. Several studies have documented persistently elevated cancer incidence and mortality in rural communities compared to urban areas.[6-9] Research suggests an 8% higher all-cancer mortality rate for rural areas and more dramatic gaps in mortality for certain cancers, such as lung cancer (up to 18%-20% higher).[10]

As nearly 1 in 5 Americans lives in a rural area, disparities among this population can have a broad impact on the nation's health.[11] Rural communities have lower cancer screening rates compared to individuals in urban settings. Cancer screening rates are even lower for people of color in rural areas.[12] This leads to diagnoses at more advanced stages, when treatment is more difficult and has a lower chance of success.

This issue brief seeks to compare the rates of diagnosed cancers in metropolitan vs non-metropolitan areas to help quantify the disparity in cancer burden for patients living in non-metro areas.

## Methodology

To understand more fully the cancer disparities for rural patients, US cancer statistics from 3 sources were analyzed for metro and non-metro areas (see Appendix A) nationally and for 4 states of interest (Georgia, South Carolina, Tennessee, and Texas). These states were selected among the set of states that have not expanded Medicaid coverage under the Affordable Care Act's Medicaid expansion[13] and serve to highlight differences in key metrics between metro and non-metro areas. The data were sourced from the Centers for Disease Control and Prevention's (CDC) National Program of Cancer Registries and the National Cancer Institute's Surveillance, Epidemiology, and End Results (SEER) US Cancer Statistics public use databases, analyzed within the SEER*Stat database and the CDC's US Cancer Statistics Data Visualizations Tool. Overall cancer incidence[14] was analyzed for 2015-2019, mortality statistics[15] were analyzed for 2011-2020, survival statistics[16] were analyzed for 2000-2019, and cancer screening statistics[17] were analyzed for 2018.

Of note, incidence, survival, and screening statistics in this report do not incorporate the impact COVID-19 had on screening and detection of cancer. According to the National Institutes of Health (NIH), "the current impact of the COVID-19 pandemic on cancer care in the United States has resulted in decreases and delays in identifying new cancers and delivery of treatment. These problems, if unmitigated, will increase cancer morbidity and mortality for years to come."[18]

## Executive summary

The findings of this analysis show important differences in cancer incidence, mortality, and survival statistics among patients living in metro compared to non-metro areas.

From 2015 to 2019, **overall cancer incidence and death rates were higher in non-metro areas** compared to metro areas. Additionally, the rate of late-stage diagnoses was also higher in non-metro areas.[1] The rate of new cancers identified at a distant site (ie, late stage, metastatic) per 100,000 population was consistently higher nationally and for the 4 states reviewed among non-metro areas compared to metro areas between 2015 and 2019.

**From 2016 to 2020, cancer deaths per 100,000 population were 14% higher among non-metro areas compared to metro areas nationally.**

The **5-year cancer survival rate for all cancers was also 8% lower in non-metro areas**, with 62% of non-metro cancer patients surviving within 5 years.

**Screening rates for colorectal cancer were slightly lower among non-metro areas compared to metro areas for each of the 4 states reviewed;** screening rates for breast cancer and cervical cancer were similar between metro and non-metro areas.

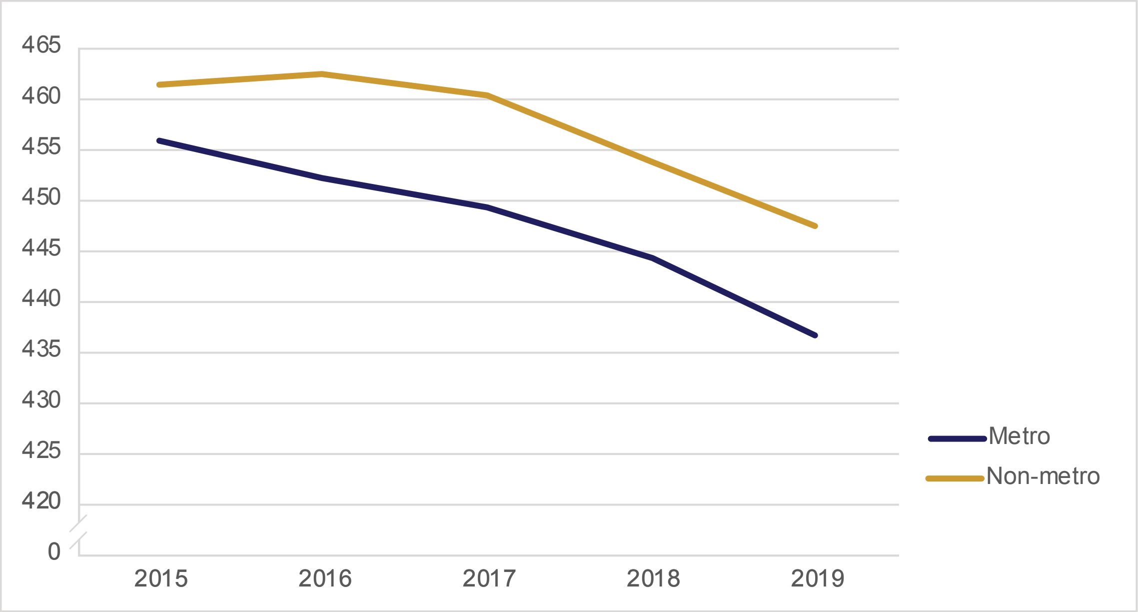
The disparity of the **rate of cancer deaths between non-metro and metro counties increased during the 2 time periods, despite the overall cancer death rate disparity decreasing.**

## Findings

### 1. Cancer incidence per 100,000 population, 2015-2019

From 2015 to 2019, cancer incidence was slightly higher among patients in non-metro areas compared to metro areas nationally (**Figure 1**). In 2019, there were 447 cases per 100,0000 population in non-metro areas, compared to 436 cases per 100,000 persons in metro areas (representing a 2.5% difference).

**Figure 1. Age-adjusted rates of cancer per 100,000 population, US**

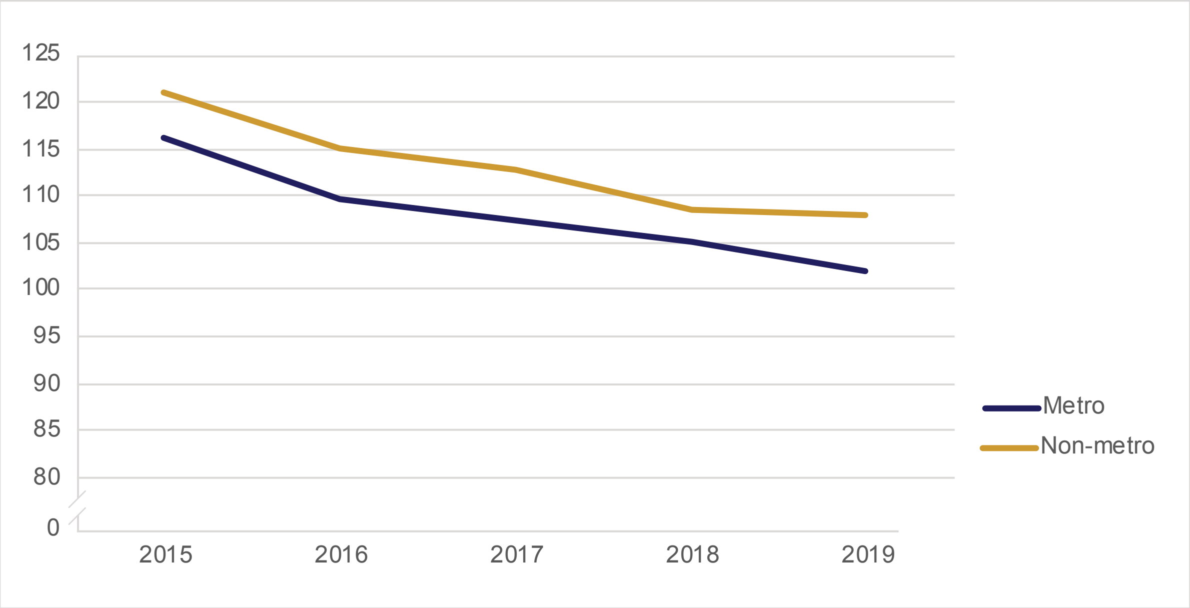


## 2. Cancer incidence at distant site per 100,000 population, 2015-2019

### All cancers

From 2015 to 2019, the rate of new cases identified at distant sites (ie, late stage, metastatic) was consistently higher among non-metro areas compared to metro areas (**Figure 2**); in 2019, approximately 108 cases per 100,000 population were identified at distant sites in non-metro areas compared to approximately 102 cases in metro areas, representing a difference of 5.9%. Tennessee and Texas had patterns similar to the national trend, with the rate of new cases identified at distant sites being 13.3% higher for Texas and 9.0% higher for Tennessee among non-metro areas compared to metro areas in 2019.

**Figure 2. Age-adjusted rates of new distant-site cancer per 100,000 population, US**




### Selected cancers

The rate of new lung and colon cancers were analyzed; those 2 cancer types were chosen because they are the 2 most common cancers in the US that affect both men and women.[19]

The rate of new lung cancer cases identified at distant sites was 21% to 25% higher in non-metro areas compared to metro areas, with a difference of 27.4 cases per 100,000 population in non-metro areas compared to 21.9 cases per 100,000 population in metro areas in 2019 (**Figure 3**). Similarly, the rate of new colon cancer cases identified at distant sites was higher in non-metro areas compared to metro areas for all years of analysis; the difference ranges from 12% to 18% higher in non-metro areas compared to metro areas (9.0 cases per 100,000 in non-metro areas compared to 7.6 cases per 100,000 in metro areas) (**Figure 4**).

**NOTE:** The scales for the age-adjusted rates differ for lung and colon cancers.

**Figure 3. Age-adjusted rates of new distant-site lung cancer per 100,000 population**

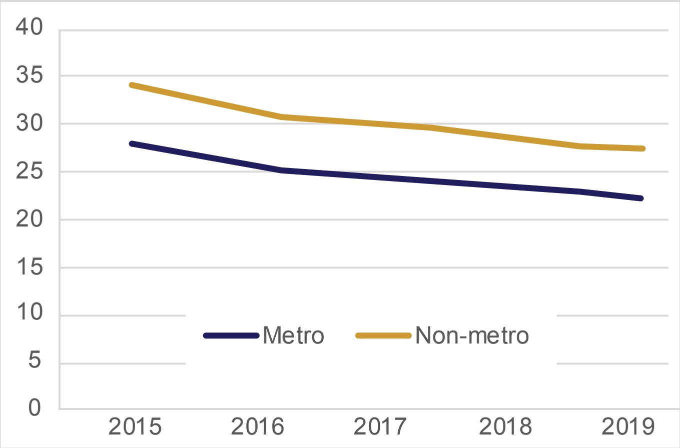
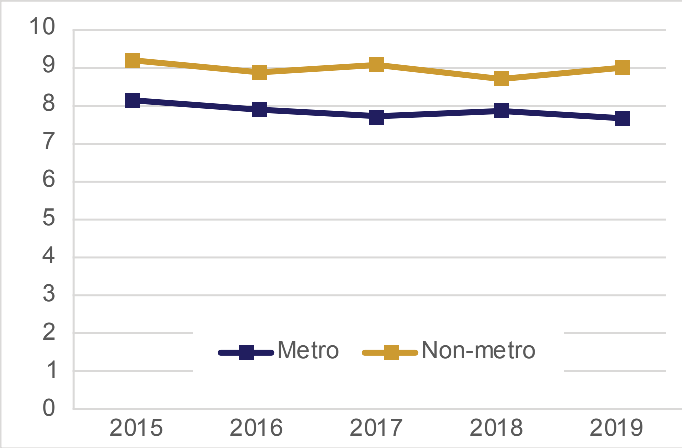


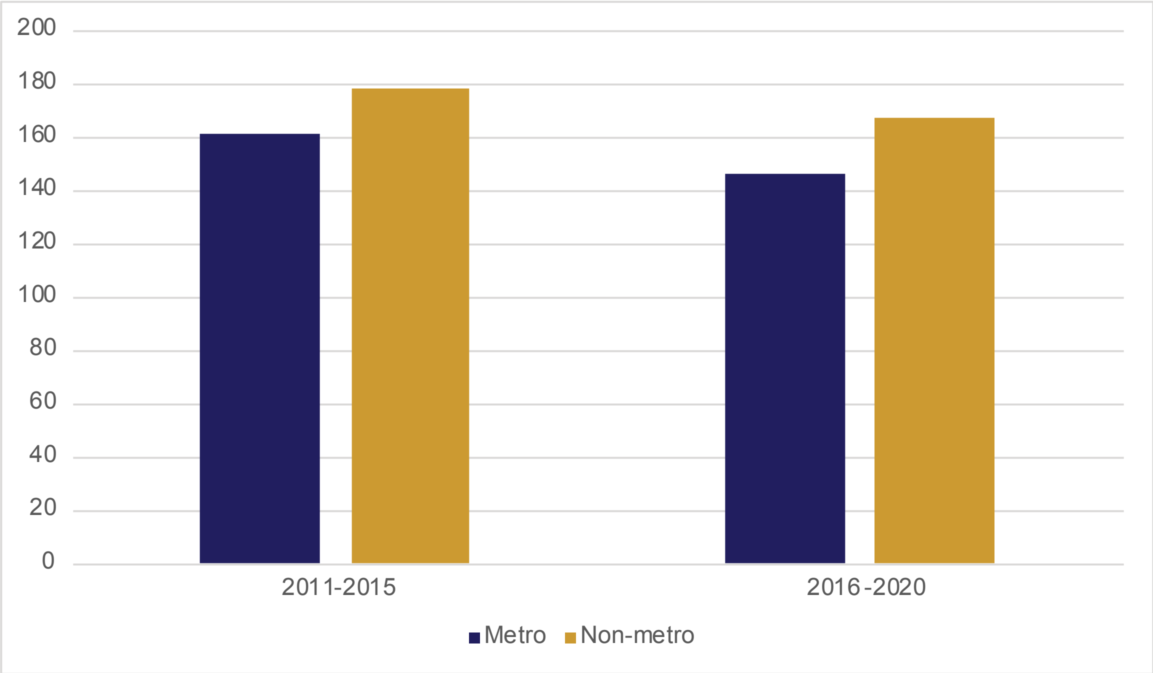

**Figure 4. Age-adjusted rates of new distant-site colon cancer per 100,000 population**



### 3. Cancer deaths per 100,000 population

The disparity of the rate of cancer deaths between non-metro and metro counties increased during the 2 time periods studied (**Figure 5**). From 2011 to 2015, non-metro counties had a higher rate of cancer deaths (178 per 100,000 population) compared to metro counties (161 per 100,000), representing an 11% difference. From 2016 to 2020, the rate of cancer deaths between non-metro counties (167 per 100,000) and metro counties (146 per 100,000) increased to 14%. These national trends are mirrored in Georgia, Tennessee, and Texas.

**Figure 5. Age-adjusted rate of cancer deaths per 100,000 population, all malignant cancers, US, 2011-2015 vs 2016-2020**

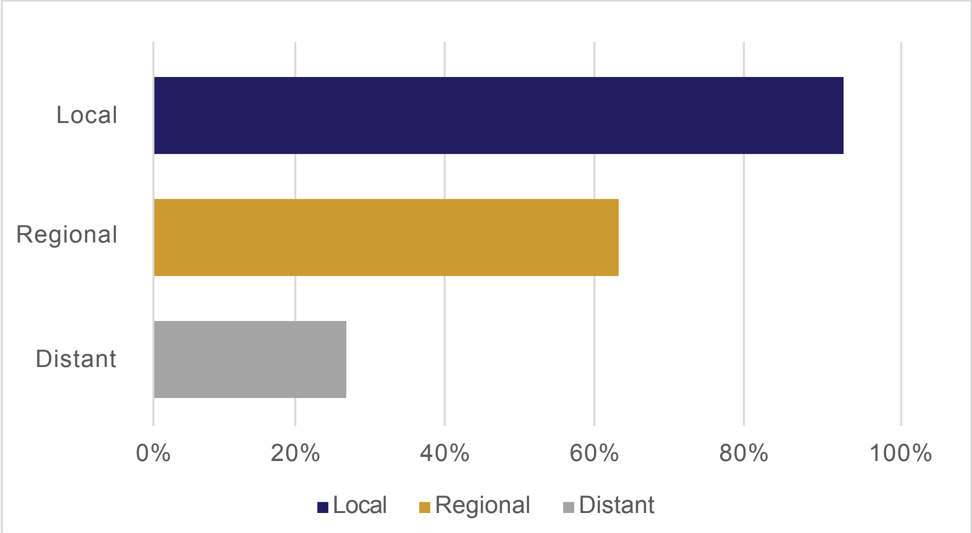



### 4. Cancer survival rates

**Survival rates by stage of diagnosis**

Analysis of cancer statistics shows that stage at diagnosis is highly predictive of cancer mortality. **Figure 6** shows the steep decrease in survival rates with later diagnoses of cancer, underscoring the need for early detection. The next section further analyzes the survival rate by stage and compares survival in non-metro and metro areas.

**Figure 6. Comparison of 5-year cancer relative survival rate by stage among non-metro areas, diagnoses from 2000 to 2019, US**



### Comparing survival rates at different stages for metro and non-metro areas

In geographic regions representing approximately one-quarter of the US population, the 5-year relative cancer survival rate for all stages among non-metro areas was lower, at 62.0%, than in metro areas, at 67.4% (**Figure 7**). Survival rates followed similar patterns at 1, 2, 3, and 4 years.

As would be expected, cancer survival rates differed based on the stage at diagnosis, with the 5-year survival rate higher in both rural and urban settings when cancer was diagnosed at an earlier rather than later stage.

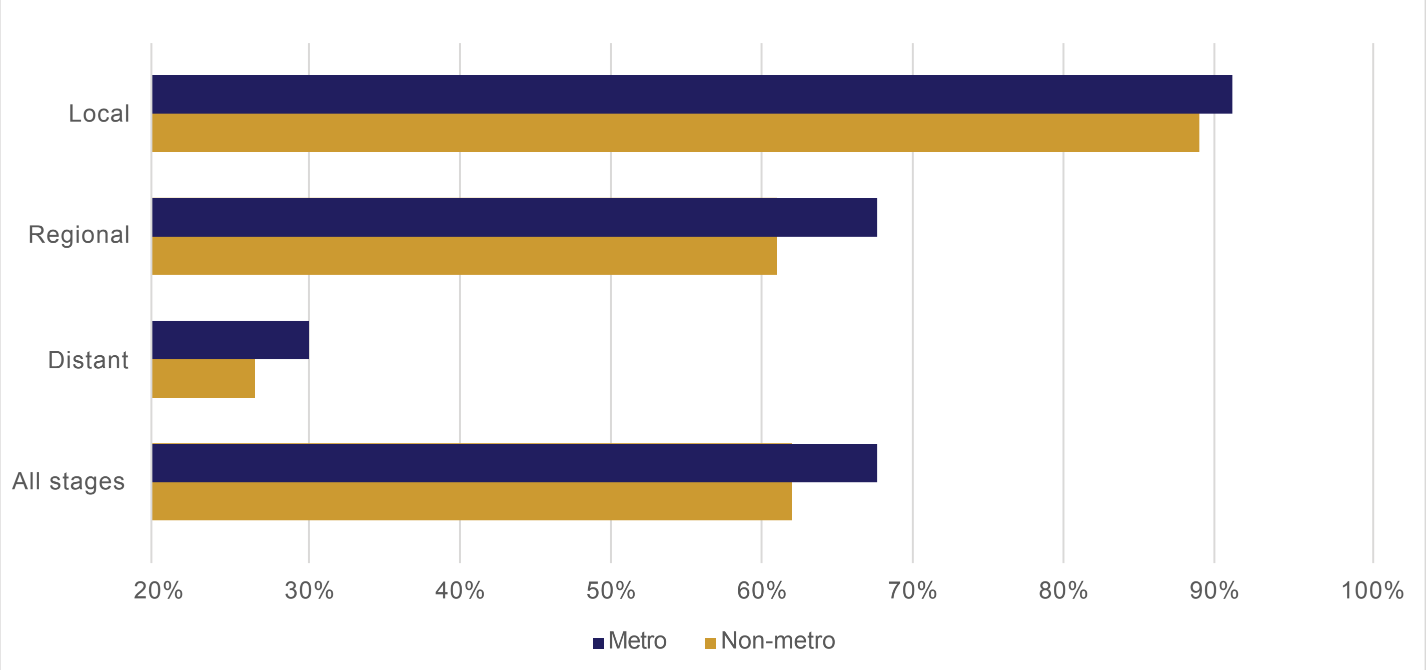
**Local stage.** The 5-year survival rate when diagnosed at the local stage was similar for metro (91.5%) and non-åmetro (89.0%) areas.

**Regional stage.** The 5-year survival rate when diagnosed at the regional stage was greater in metro (66.5%) than non-metro (61.1%) areas.

**Distant stage.** The 5-year survival rate when diagnosed at the distant stage was greater in metro (30.2%) than non-metro (26.2%) areas.

Notably, irrespective of the stage of diagnosis, non-metro populations experienced lower 5-year survival than metro populations.

**Figure 7. 5-year cancer relative survival rate, by stage, diagnoses from 2000 to 2019, US**



## Conclusion

Analysis of the US cancer statistics from 2015 to 2019 shows that overall cancer incidence and death rates were higher in non-metro areas.[1] Additionally, the rate of new cancers identified at distant sites was consistently higher among non-metro areas compared to metro areas between 2015 and 2019.

These disparities in diagnosis, incidence, and outcomes are extremely concerning—but consistent with previous research. The literature shows persistently elevated cancer incidence and mortality in rural communities compared to urban areas.[5] Research also suggests higher all-cancer mortality rates for rural areas and more dramatic gaps in mortality for certain cancers.

The causes of these disparities are multifactorial, including access to early detection, primary and specialty care, and underlying risk factors.

Increased screening and earlier detection of cancers may be important contributors to improving mortality and morbidity in non-metro communities. Policy solutions should be enacted to facilitate earlier detection of cancers, including in non-metro communities where the need has been demonstrated to be greater.

[b]Due to differences in data availability, not all of the results cover this same time period.

# Appendix A

The CDC's cancer registries and cancer statistics databases utilize 2013 rural-urban continuum codes. These codes form a classification scheme that distinguishes metropolitan counties by the population size of their metro area and non-metropolitan counties by degree of urbanization and adjacency to a metro area.

Rural-urban continuum codes:
***https://www.ers.usda.gov/webdocs/DataFiles/53251/ruralurbancodes2013.xls?v=9149.5***

**Metropolitan counties (based on the US Office of Management and Budget delineation as of February 2013)**

| Code | Description |
|---|---|
| 1 | Counties in metro areas of 1 million population or more |
| 2 | Counties in metro areas of 250,000-1 million population |
| 3 | Counties in metro areas of fewer than 250,000 population |

**Non-metropolitan counties:**

| Code | Description |
|---|---|
| 4 | Urban population of 20,000 or more, adjacent to a metro area |
| 5 | Urban population of 20,000 or more, not adjacent to a metro area |
| 6 | Urban population of 2,500-19,999, adjacent to a metro area |
| 7 | Urban population of 2,500-19,999, not adjacent to a metro area |
| 8 | Completely rural or less than 2,500 urban population, adjacent to a metro area |
| 9 | Completely rural or less than 2,500 urban population, not adjacent to a metro area |

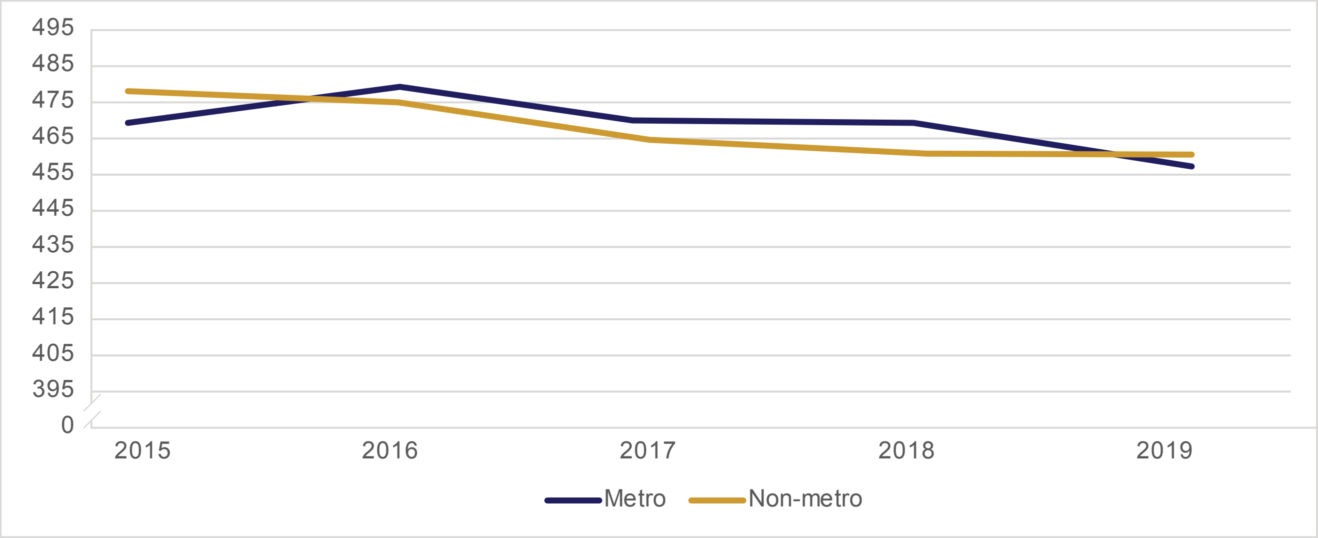
# Appendix B. Georgia

### Findings

1. Cancer incidence per 100,000 population, 2015-2019

Cancer rates in Georgia in non-metro areas were very similar to those in metro areas for all years of analysis (**Figure 8**).

**Figure 8. Age-adjusted rates of cancer per 100,000 population, Georgia**

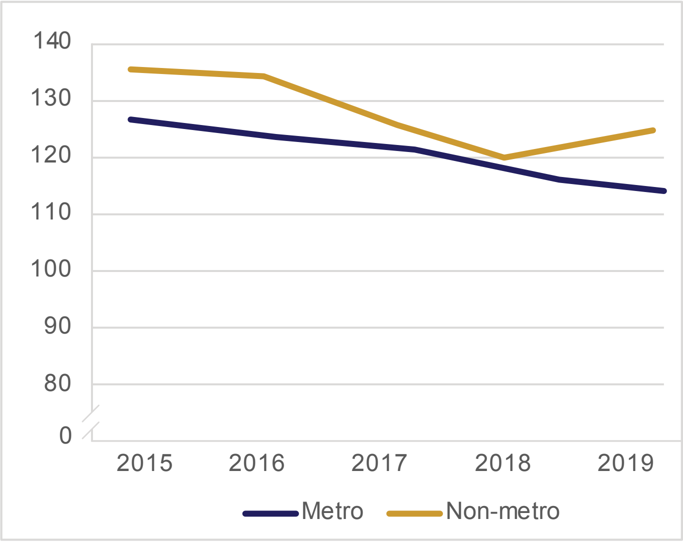


## 2. Cancer incidence at distant site per 100,000 population, 2015-2019

### All cancers

While the rate of new cases identified at distant sites in Georgia was consistently higher in non-metro areas compared to metro areas, the differential narrowed in 2017 and 2018 before increasing again in 2019 (**Figure 9**).

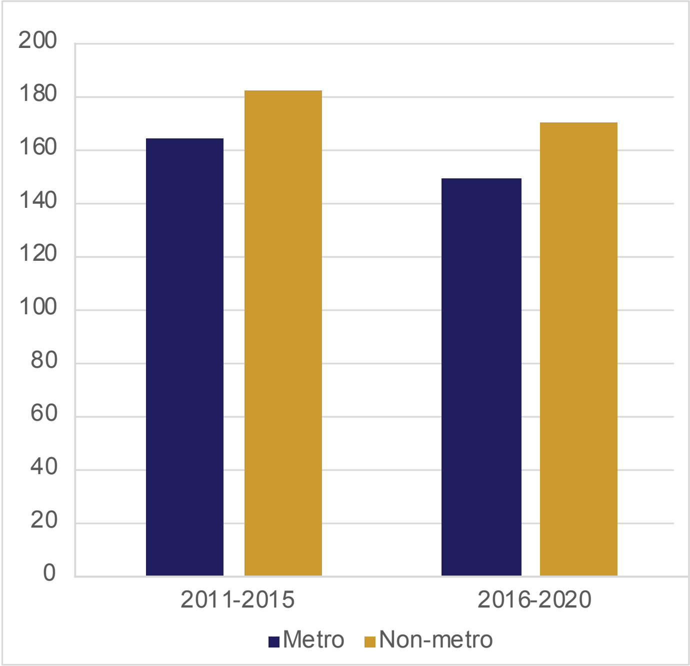
**Figure 9. Age-adjusted rates of new distant-site cancer per 100,000 population, Georgia**




## 3. Cancer deaths per 100,000 population

The results for Georgia were very similar to national trends; the differential between non-metro and metro counties increased from 11% in 2011-2015 to 14% in 2016-2020 (**Figure 10**).

**Figure 10. Age-adjusted rate of cancer deaths per 100,000 population, all malignant cancers, Georgia, 2011-2015 vs 2016-2020**



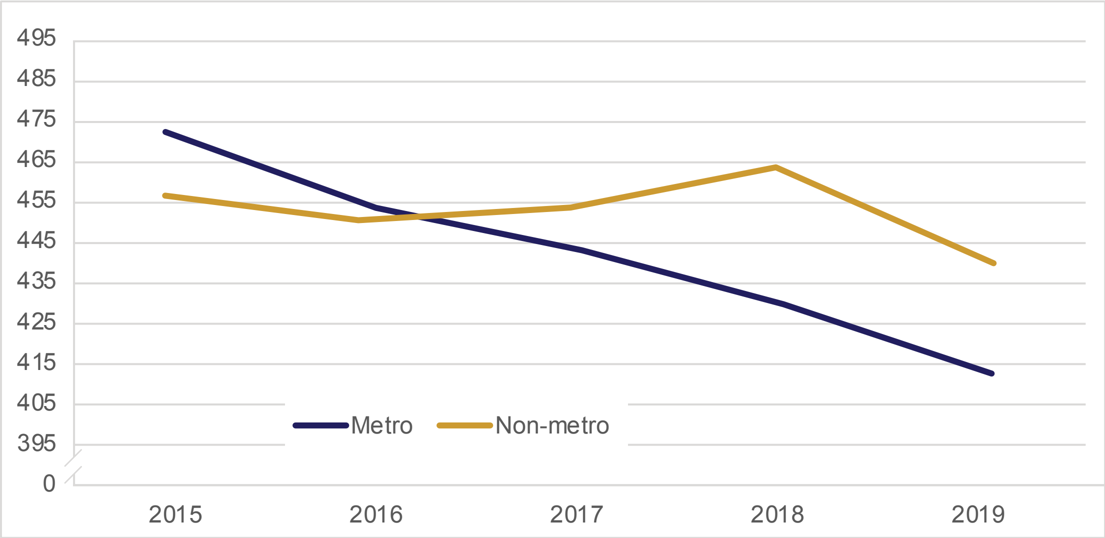
## Appendix C. South Carolina

### Findings

1. Cancer incidence per 100,000 population, 2015-2019

**Unlike other state trends, in 2015 and 2016,** cancer rates were higher in South Carolina metro areas compared to non-metro areas. However, beginning in 2017, rates in non-metro areas began to outpace cases in metro areas, with a 7% to 8% difference in 2018 and 2019 (**Figure 11**).

**Figure 11. Age-adjusted rates of cancer per 100,000 population, South Carolina**

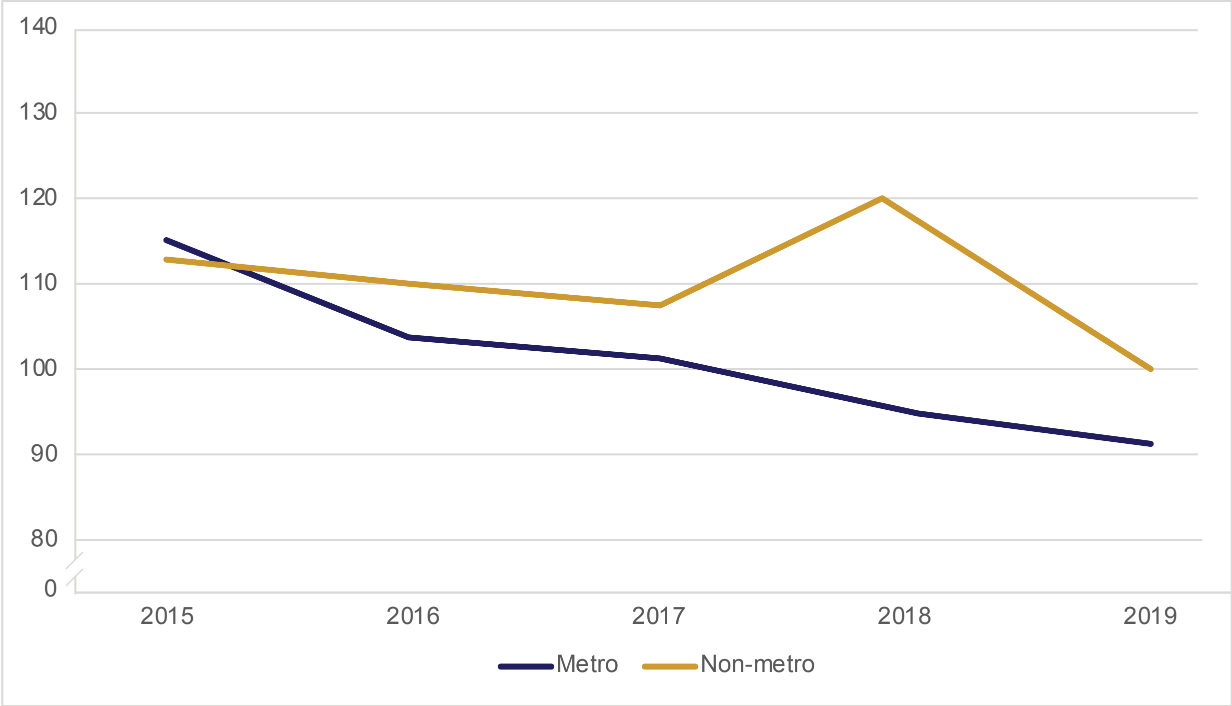



2. Cancer incidence at distant site per 100,000 population, 2015-2019

**All cancers**

The difference in the rate of new cases identified at distant sites was similar among metro and non-metro areas in 2015 (**Figure 12**). In subsequent years, the rate was higher in non-metro areas compared to metro areas, with the differential reaching 23% in 2018.

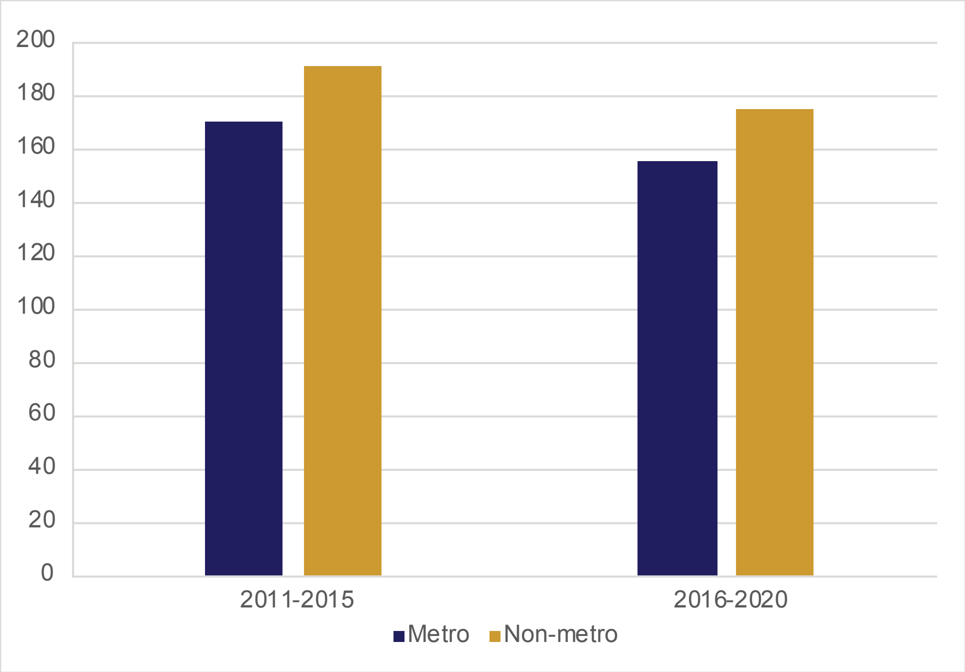
**Figure 12. Age-adjusted rates of distant-site cancer per 100,000 population, South Carolina**



### 3. Cancer deaths per 100,000 population

For South Carolina, the rate of cancer deaths among non-metro counties was approximately 11% higher than metro counties for both time periods (**Figure 13**).

**Figure 13. Age-adjusted rate of cancer deaths per 100,000 population, all malignant cancers, South Carolina, 2011-2015 vs 2016-2020**



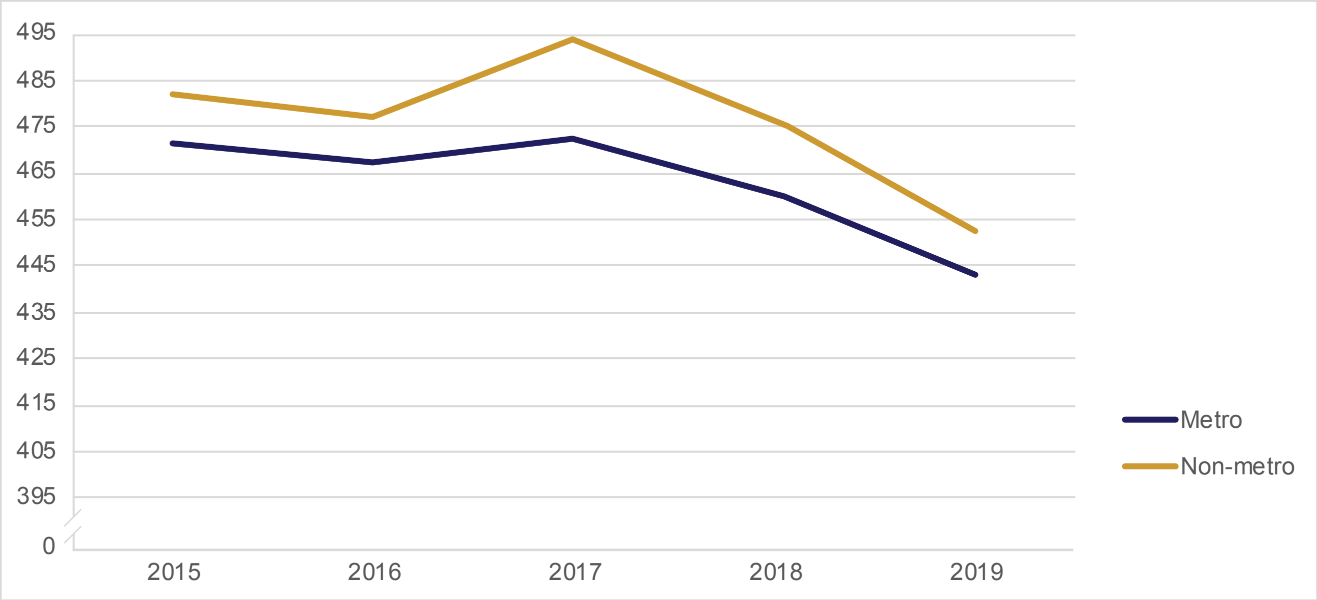

# Appendix D. Tennessee

## Findings

### 1. Cancer incidence per 100,000 population, 2015-2019

Non-metro areas consistently had higher cancer incidence rates compared to metro areas for all years, although the difference was relatively small (**Figure 14**).

**Figure 14. Age-adjusted rates of cancer per 100,000 population, Tennessee**

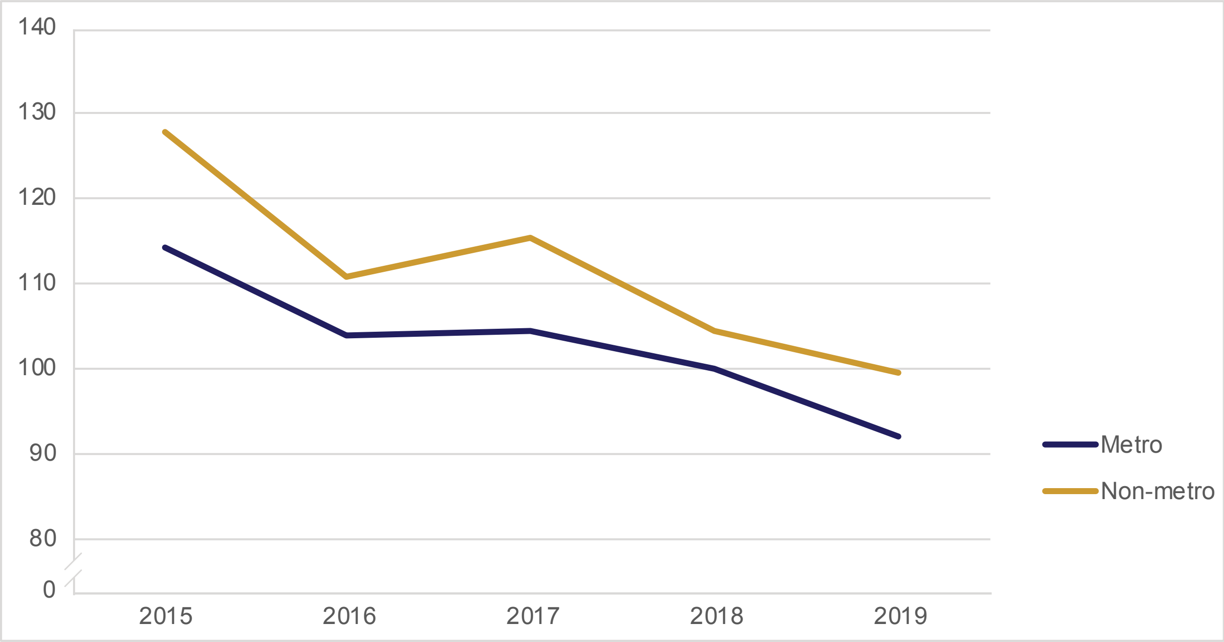


## 2. Cancer incidence at distant site per 100,000 population, 2015-2019

### All cancers

Tennessee showed a similar pattern to the national trend, with the rate of new cases identified at distant sites being 9.0% higher among non-metro areas compared to metro areas in 2019 (**Figure 15**).

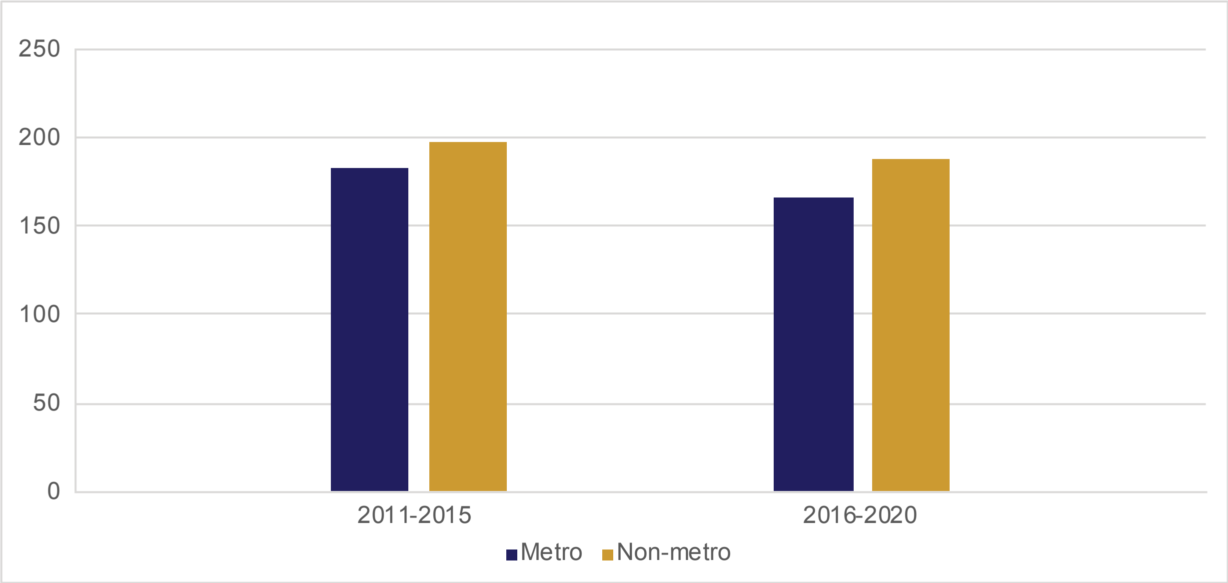
**Figure 15. Age-adjusted rates of new distant-site cancer per 100,000 population, Tennessee**




## 3. Cancer deaths per 100,000 population

The results for Tennessee were similar to national trends; the differential between non-metro and metro counties increased from 9% in 2011-2015 to 14% in 2016-2020 (**Figure 16**).

**Figure 16. Age-adjusted rate of cancer deaths per 100,000 population, all malignant cancers, Tennessee, 2011-2015 vs 2016-2020**



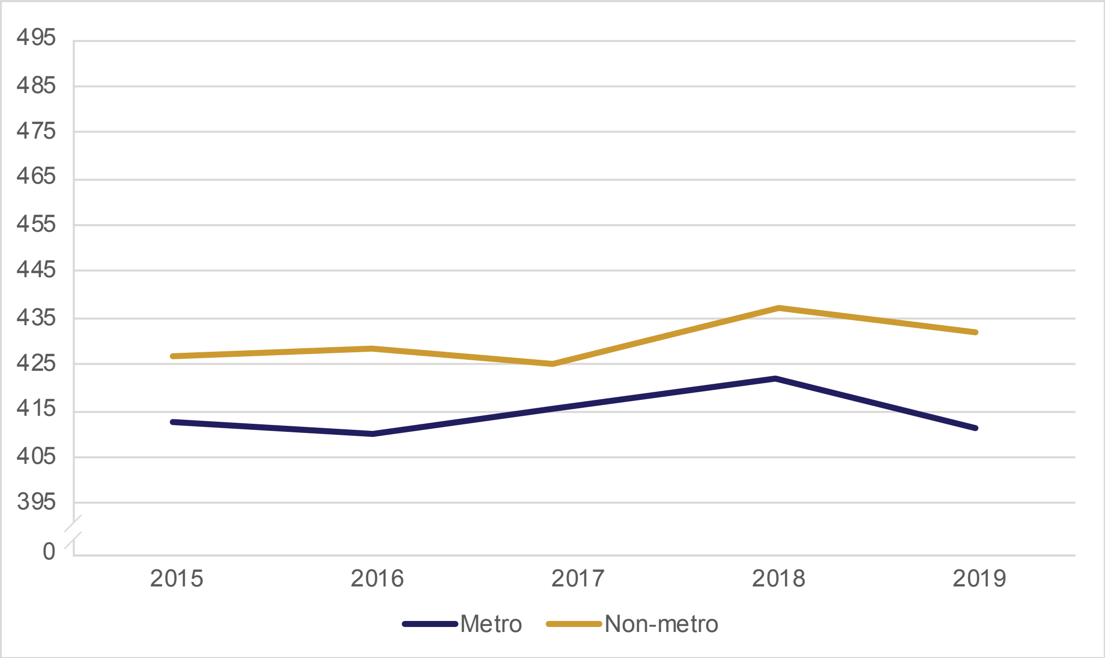
# Appendix E. Texas

## Findings

### 1. Cancer incidence per 100,000 population, 2015-2019

Non-metro areas consistently had higher cancer incidence rates compared to metro areas for all years, although the difference was relatively small (**Figure 17**).

**Figure 17. Age-adjusted rates of cancer per 100,000 population, Texas**

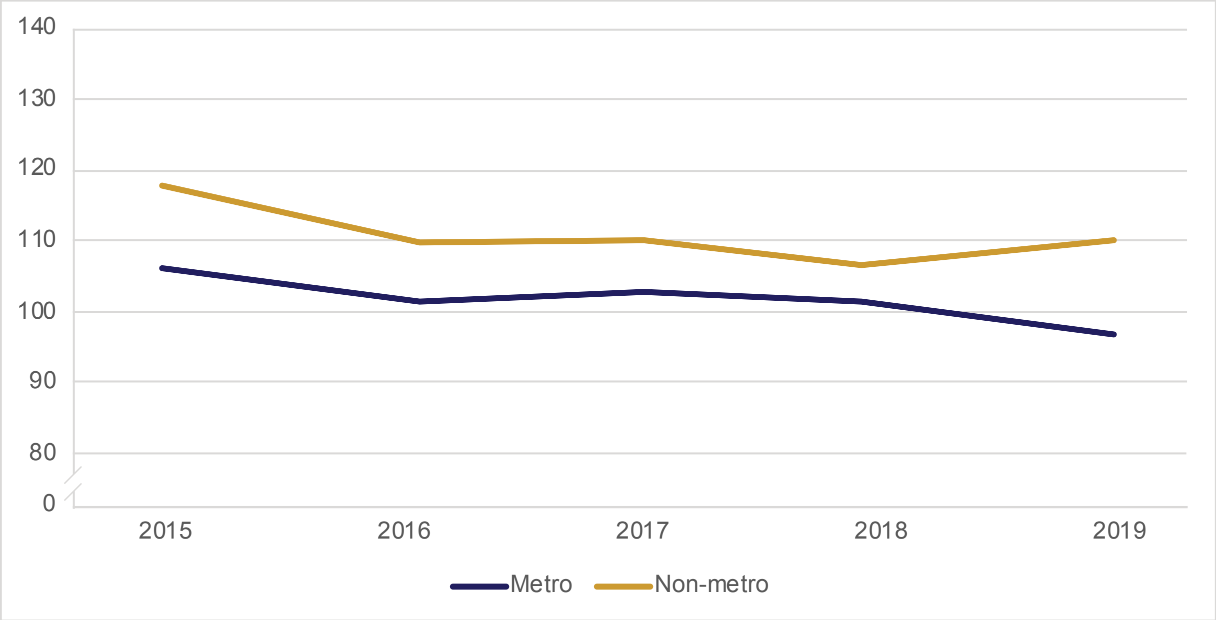



### 2. Cancer incidence at distant site per 100,000 population, 2015-2019

**All cancers**

Texas showed a similar pattern to the national trends, with the rate of new cases identified at distant sites being 13.3% higher among non-metro areas compared to metro areas in 2019 (**Figure 18**).

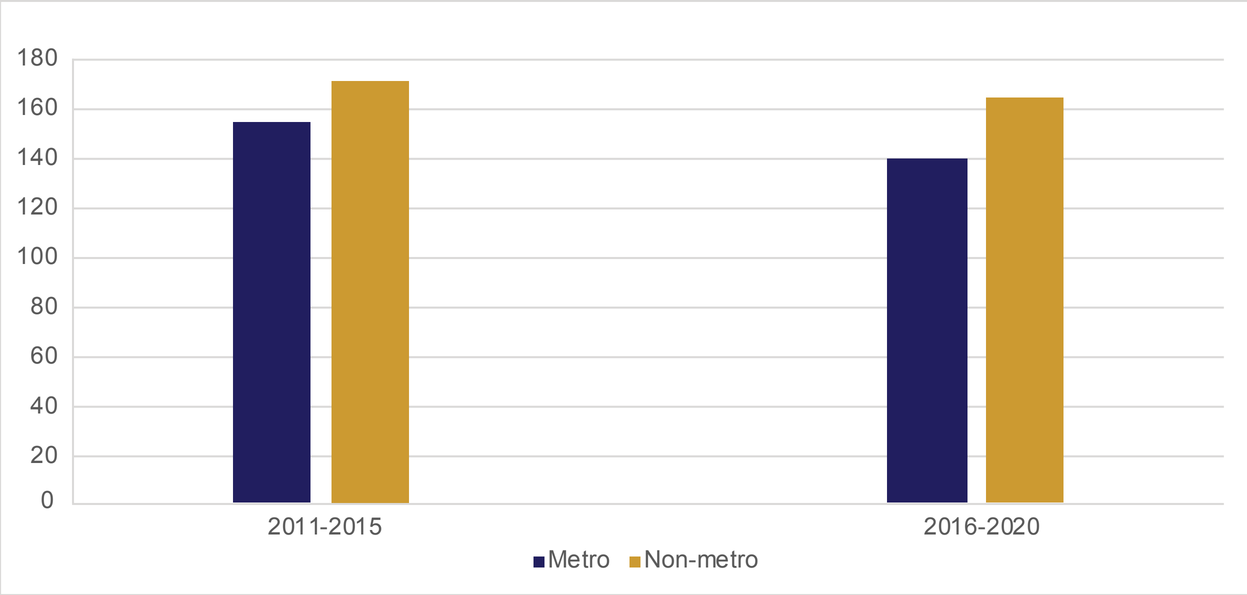
**Figure 18. Age-adjusted rates of new distant-site cancer per 100,000 population, Texas**



## 3. Cancer deaths per 100,000 population

The results for Texas were very similar to national trends; the differential between non-metro and metro counties increased from 10% in 2011-2015 to 14% in 2016-2020 (**Figure 19**).

**Figure 19. Age-adjusted rate of cancer deaths per 100,000 population, all malignant cancers, Texas, 2011-2015 vs 2016-2020**



## Appendix F. Cancer screening rates: State-specific comparisons

Self-reported colorectal cancer screening rates among non-metro areas were slightly lower than in metro areas for each of the 4 states of interest. The largest differential was in South Carolina, where 63% of patients in non-metro areas reported being up to date with their screening compared to 66% of patients in metro areas (**Figure 20**). Self-reported rates of mammogram and cervical cancer screening among metro and non-metro areas were similar for each of the 4 states (**Figure 21** and **Figure 22**).

**Figure 20. Age-adjusted percentage of adults 50-75 years who reported being up to date with colorectal screening**

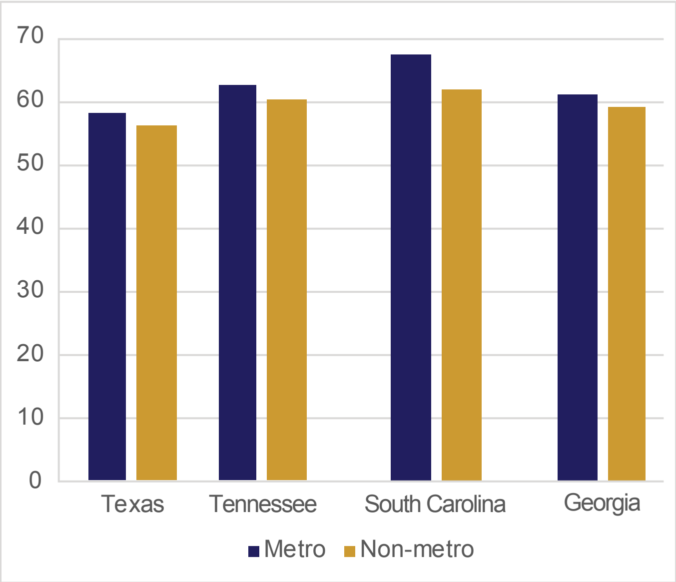



**Figure 21. Age-adjusted percentage of women aged 50-75 years who reported receiving a mammogram in previous 2 years**

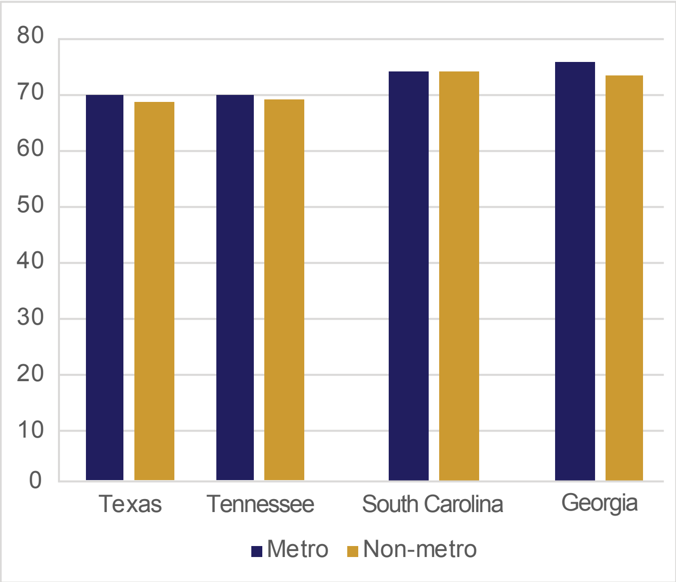
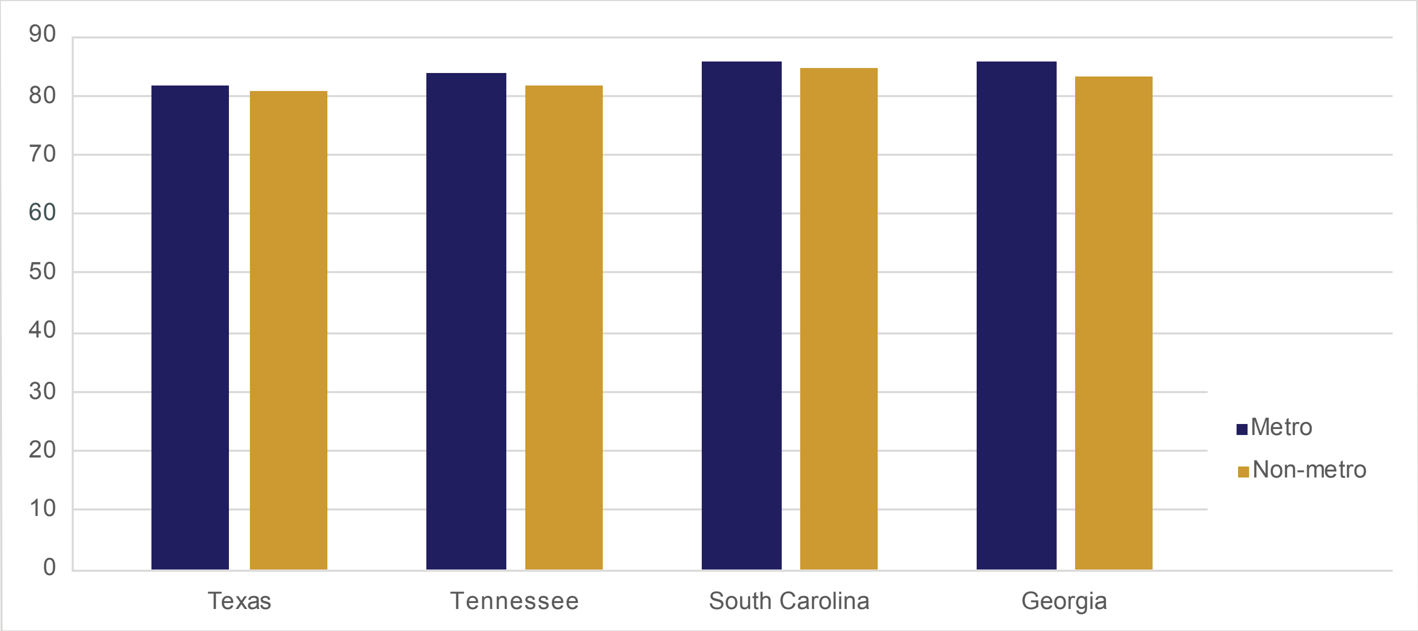



**Figure 22. Age-adjusted percentage of women aged 21-65 years who reported being up to date with cervical cancer screening**




Colon cancer screening—Numerator: Respondents aged 50 to 75 years who report having had (1) a fecal occult blood test (FOBT) within the past year, (2) a sigmoidoscopy within the past 5 years and a FOBT within the past 3 years, or (3) a colonoscopy within the past 10 years. Denominator: Respondents aged 50-75 years who report ever having or never having an FOBT, sigmoidoscopy, or colonoscopy (excluding those who refused to answer, had a missing answer, or answered "don't know/not sure").

Cervical cancer screening—Numerator: Female respondents aged 21 to 65 years who do not report having had a hysterectomy and who report having had a recommended cervical cancer screening test. For female respondents aged 21 to 29 years, the recommended screening test is Pap test alone. For female respondents aged 30 to 65 years, there are 3 recommended screening tests with varying frequencies: (1) Pap test alone, (2) human papillomavirus (HPV) test alone, or (3) Pap test in combination with HPV test (otherwise known as a co-test). Denominator: Female respondents aged 21 to 65 years who do not report having had a hysterectomy and who report ever having or never having had a Pap smear (excluding unknowns and refusals).

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