

Trends in Melanoma Incidence and Mortality Among Adults in Urban and Rural Tennessee Counties

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Abstract

Background: Over the past decade, melanoma incidence in the United States has continued to rise or stabilize while mortality has declined substantially, largely due to advances in early detection and systemic therapies such as immunotherapy. Despite these improvements, geographic disparities between rural and urban communities persist.

Methods: We conducted a population-based retrospective analysis using publicly available data from the Surveillance, Epidemiology, and End Results (SEER) program and CDC Wide-Ranging Online Data for Epidemiologic Research (WONDER). Age-adjusted incidence and mortality rates for melanoma were examined by rural versus urban county classification in Tennessee from 2004 to 2022. Trends were assessed using log-linear regression to estimate annual percent changes (APCs).

Results: Melanoma incidence rates remained stable overall, with a non-significant slight increase in rural counties (+0.6% APC, $p=0.088$) and a slight decline in urban counties (-0.2% APC, $p=0.543$); the difference in trends was not statistically significant ($p=0.103$). In contrast, mortality rates declined significantly in both rural (-1.8% APC, $p=0.00035$) and urban (-1.2% APC, $p=0.0117$) counties, with no significant difference between groups ($p=0.36$). Rural areas showed a highly significant divergence between stable incidence and declining mortality (interaction $p<0.001$).

Conclusion: Melanoma incidence in Tennessee was stable from 2004–2022, while mortality declined significantly in both rural and urban counties, consistent with national improvements in detection and treatment. The pronounced decoupling of incidence and mortality trends in rural areas suggests meaningful gains in survival. However, absolute rural-urban disparities in mortality persist, underscoring the need for continued targeted efforts to improve prevention, screening access, and care delivery in rural Tennessee.

Introduction

Melanoma is a highly lethal form of skin cancer and ranks as the fifth most common cancer in the United States¹. Risk factors include genetic predisposition, family history, and prior melanoma, with cumulative lifetime ultraviolet (UV) exposure representing the most significant modifiable risk factor¹.

Melanoma incidence in the United States has continued to rise or stabilize over the past decade, while mortality has declined substantially, largely due to advances in early detection and systemic therapies such as immunotherapy¹. Despite these improvements, geographic disparities between rural and urban communities persist².

Cancer incidence is often higher in rural populations, likely due to disparities in access to care, higher rates of smoking and obesity, and lower rates of preventive screening³. Additionally, sun exposure and inadequate photoprotection behaviors are more prevalent in rural environments, potentially related to occupational and lifestyle factors². However, trends in melanoma incidence and mortality within rural versus urban populations remain incompletely characterized, particularly at the state level. This study aims to evaluate trends in melanoma incidence and mortality in rural versus urban counties in Tennessee from 2004 to 2022.

Methods

We conducted a population-based retrospective analysis using publicly available data from the Surveillance, Epidemiology, and End Results (SEER) program and CDC Wide-Ranging Online Data for Epidemiologic Research (WONDER). Age-adjusted incidence and mortality rates for melanoma were examined by rural versus urban county classification in Tennessee from 2004 to 2022. Trends were analyzed using R, applying log-linear regression models to estimate annual percent changes (APCs).

Results

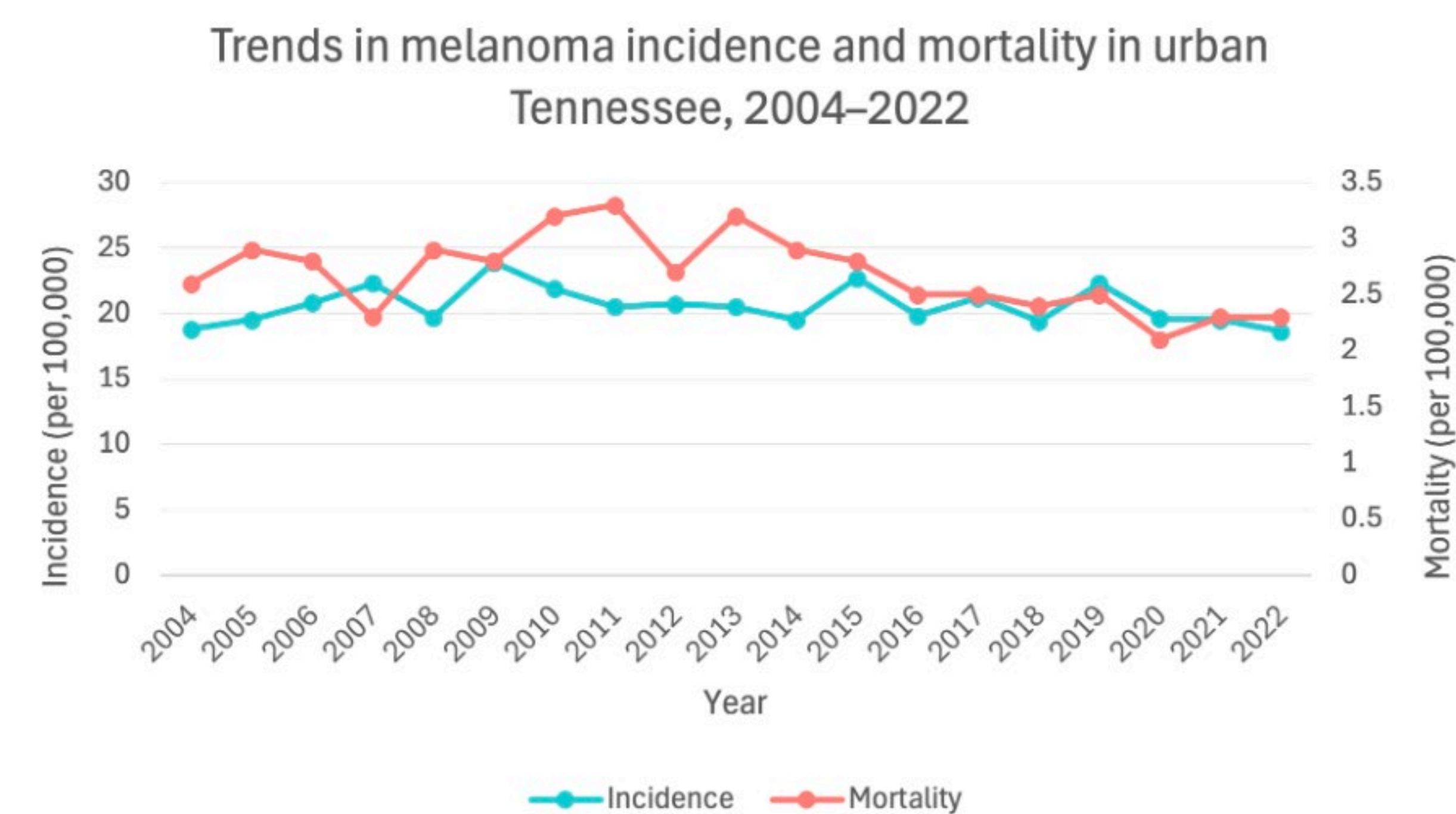


Figure 1. Melanoma incidence and mortality trends in urban counties (2004–2022). Melanoma incidence remained relatively stable, while mortality declined in urban populations; this difference was not statistically significant, $p = 0.078$

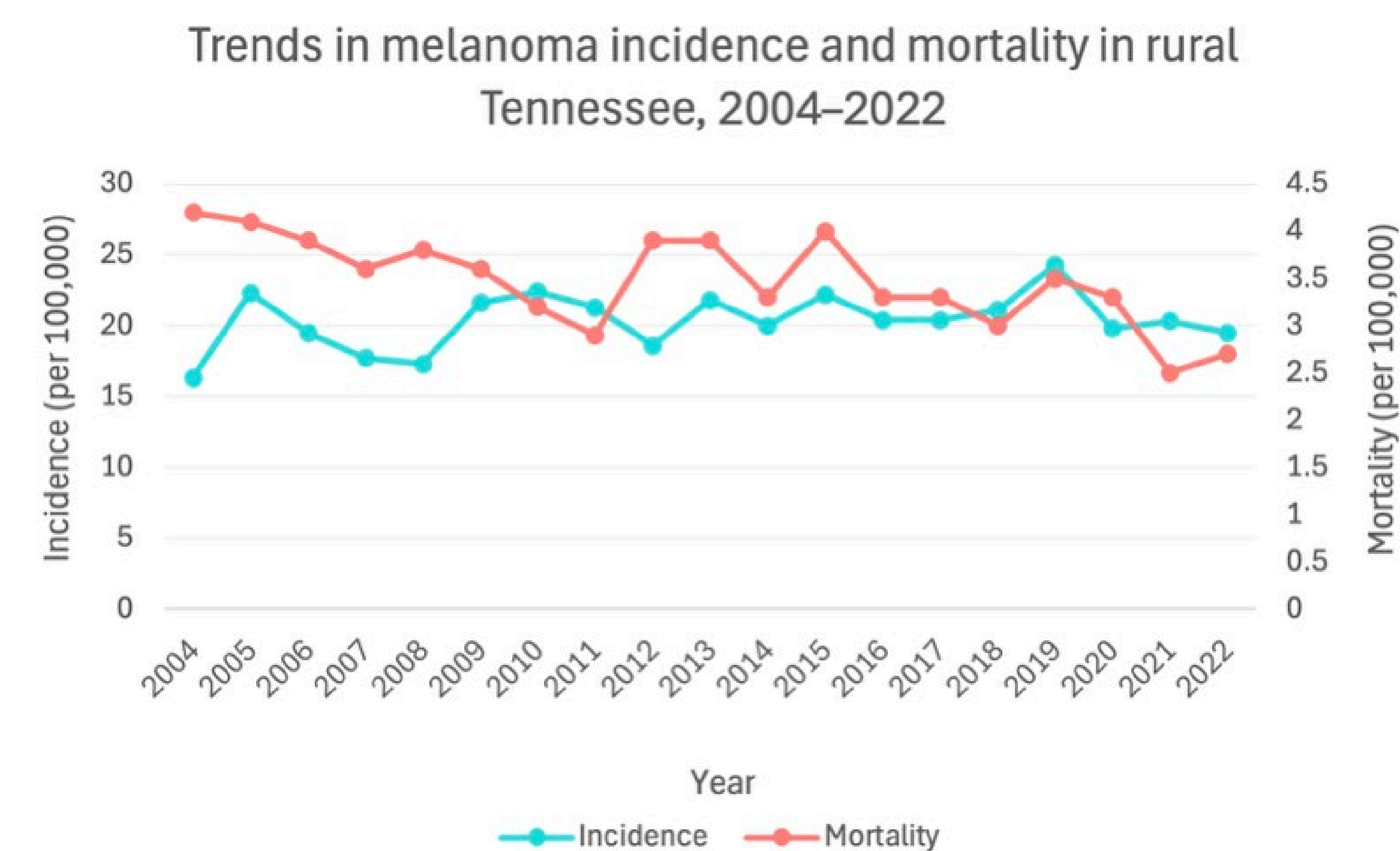


Figure 2. Melanoma incidence and mortality trends in rural counties (2004–2022). Melanoma incidence remained relatively stable, while mortality declined in rural populations; this difference was statistically significant ($p < 0.001$)

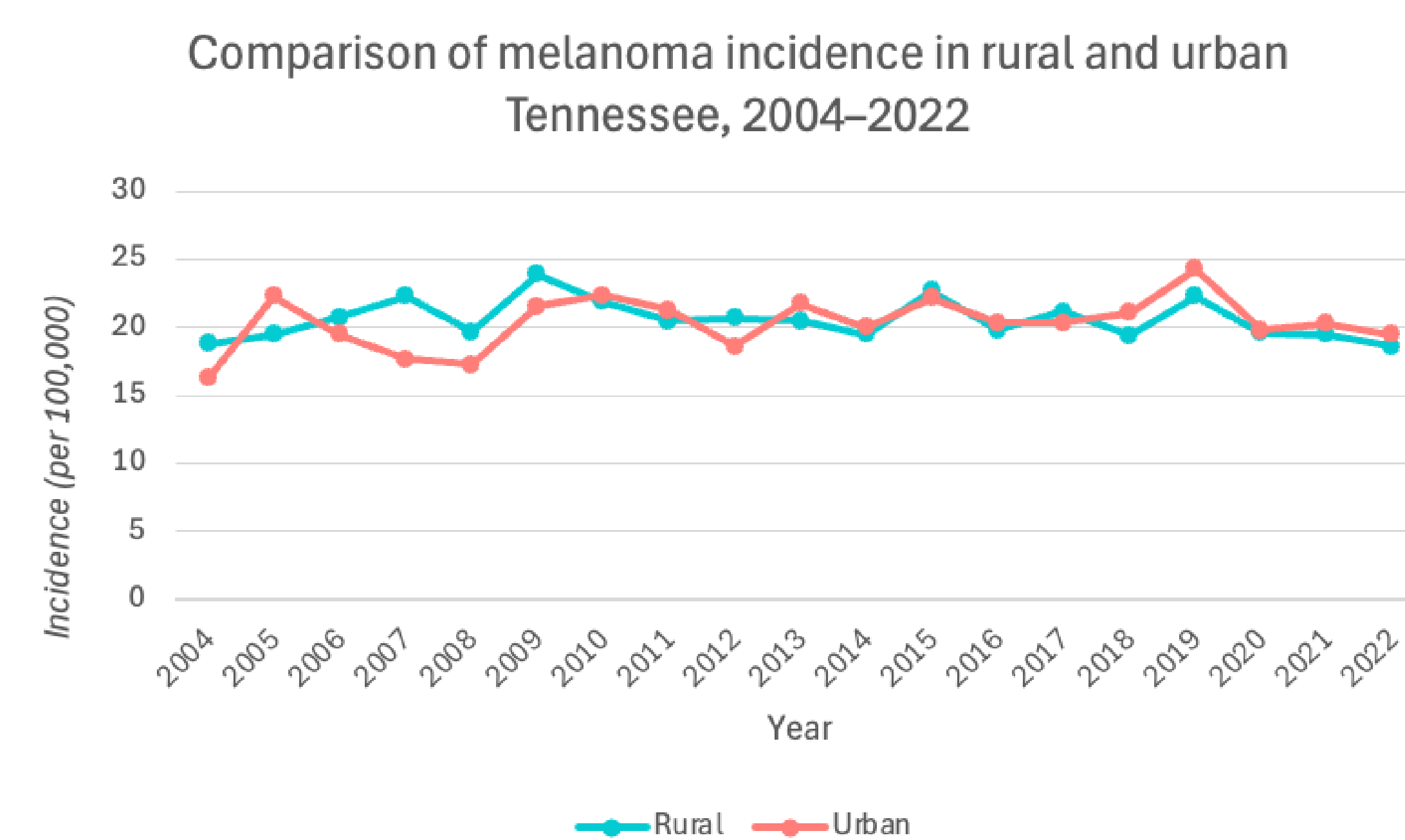


Figure 3. Comparison of melanoma incidence in rural vs urban counties. Melanoma incidence rates were comparable between rural and urban populations, with no statistically significant difference in trends.

Comparison of melanoma mortality in rural and urban Tennessee, 2004–2022

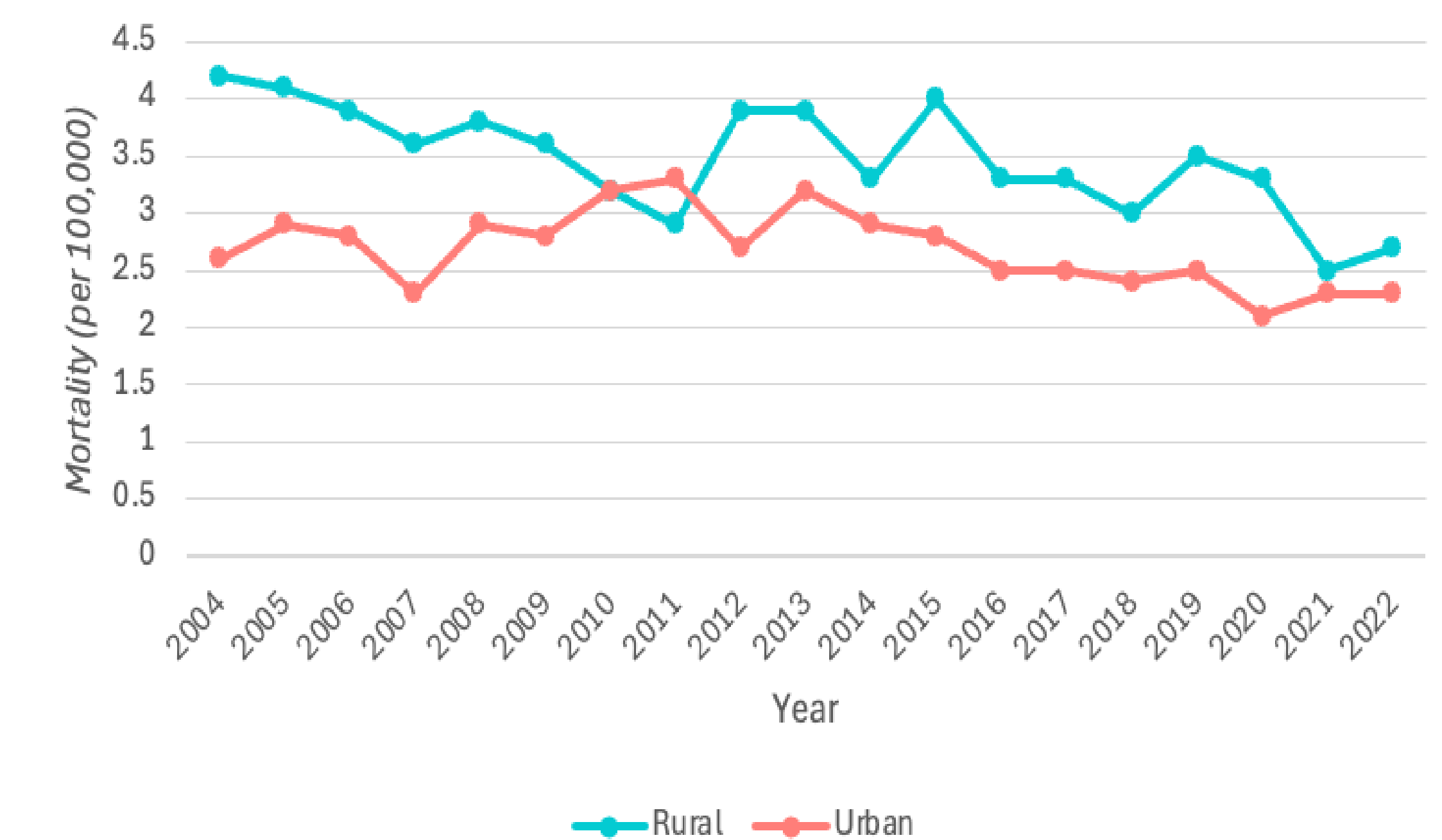


Figure 4. Comparison of melanoma mortality in rural vs urban counties. Melanoma mortality rates were generally higher in rural compared to urban populations, with a statistically significant difference in trends ($p<0.001$).

Discussion

Melanoma incidence in Tennessee was stable from 2004–2022, while mortality declined significantly in both rural and urban counties, consistent with national improvements in detection and treatment. Increased use of dermoscopy and greater awareness of skin cancer may have contributed to earlier detection and stable incidence rates¹. The observed reduction in mortality is likely multifactorial, reflecting advances in systemic therapies, including immune checkpoint inhibitors, as well as improvements in screening and timely diagnosis¹.

Despite this, rural populations continue to experience higher melanoma mortality compared with urban populations, likely due to disparities in access to dermatologic care, delays in diagnosis, and barriers to specialized treatment^{1,4}. The pronounced decoupling of incidence and mortality trends in rural areas suggests meaningful gains in survival. However, absolute rural-urban disparities in mortality persist, underscoring the need for continued targeted efforts to improve prevention, screening access, and care delivery in rural Tennessee.

References

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