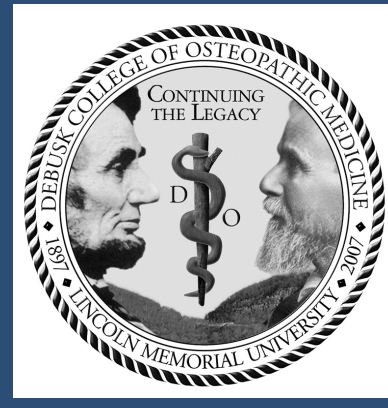


Regional Variation in Kidney Cancer Mortality Across the United States: Implications for Rural Urologic Workforce Expansion



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INTRODUCTION

Kidney cancer remains a major public health concern in the US, contributing to significant mortality. Regional differences may reflect variations in demographics, healthcare access, risk factors (e.g., diabetes, hypertension), and socioeconomic conditions. This study examines age-adjusted mortality rates (AAMR) by U.S. Census Region from 2018–2023 and tests for significant differences using ANOVA and post-hoc Tukey HSD.

STUDY OBJECTIVES & METHODS

STUDY OBJECTIVE

- Describe trends in crude and age-adjusted kidney cancer mortality rates by region (Northeast, Midwest, South, West).
- Evaluate regional differences in mean AAMR over the period.
- Assess statistical significance of inter-regional variations.

METHODS

- Data:** Aggregated kidney cancer deaths, population, crude rates, and age-adjusted rates by Census Region and year (2018–2023) from CDC WONDER database.
- Analysis:** Descriptive trends; Two-factor ANOVA without replication (years as rows, regions as columns); Tukey HSD post-hoc test ($\alpha = 0.05$) for pairwise comparisons.

DISCUSSION

- Significant regional disparities exist in kidney cancer mortality, with the Northeast exhibiting the lowest rates and a downward trend, while the Midwest shows persistently higher rates. The South and Midwest cluster together without significant difference, but both exceed the West and Northeast.
- These patterns align with broader CDC trends showing higher burdens in certain regions (e.g., Midwest/South often higher due to risk factor prevalence). The significant year effect suggests modest temporal changes, possibly influenced by healthcare improvements or external factors (e.g., COVID-19 impacts in 2020–2021).

LIMITATIONS

- Aggregate data; no adjustment for additional confounders (race, SES, urban/rural).

FUTURE WORK

- Investigate drivers (e.g., diabetes prevalence, body weight, smoking, access to care).

IMPLICATIONS

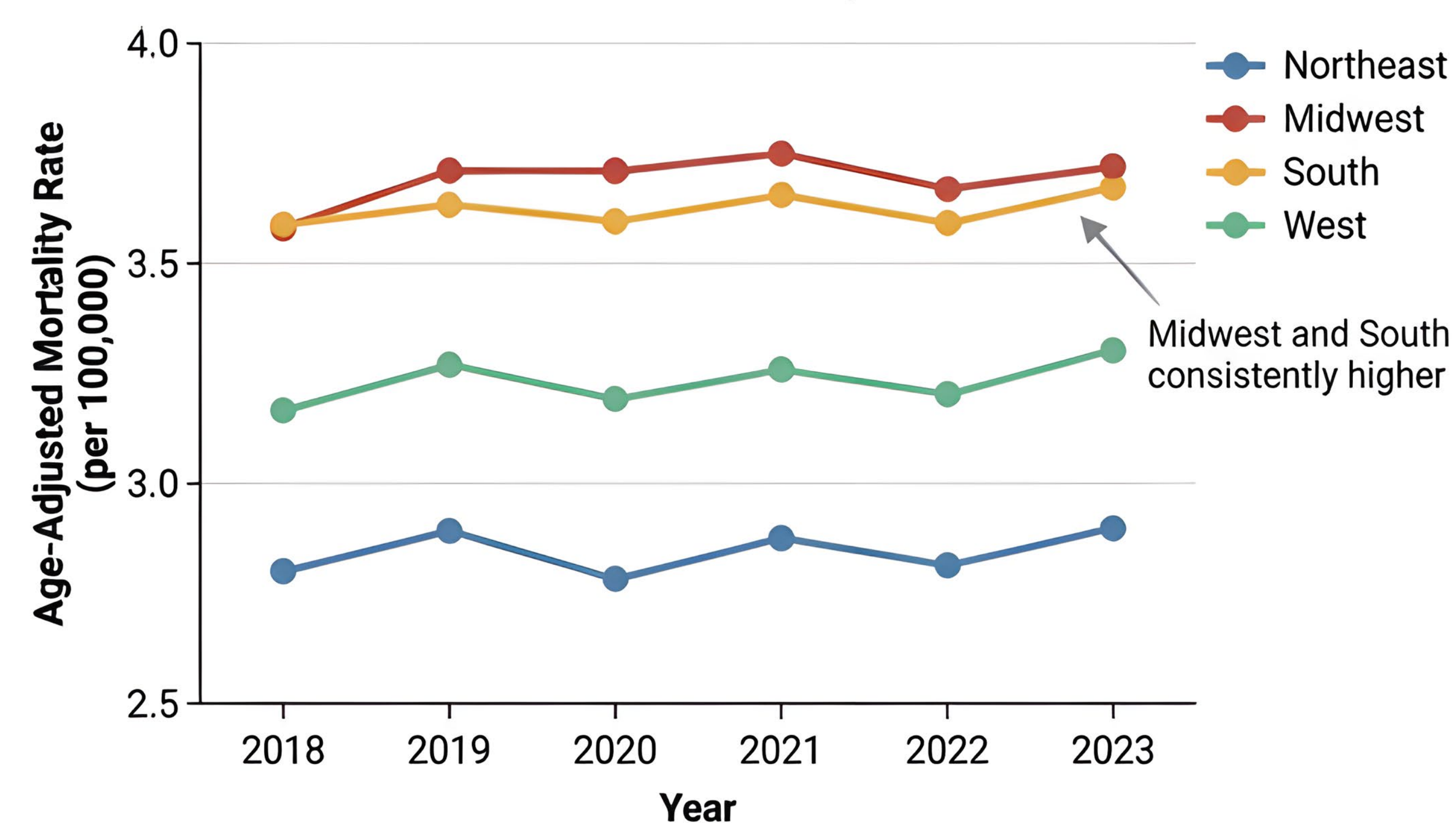
- Targeted interventions in higher-burden regions (Midwest/South) could reduce disparities.
- Expanding urologic care in rural and underserved communities.
- Continued monitoring of age-adjusted rates is essential for public health policy.

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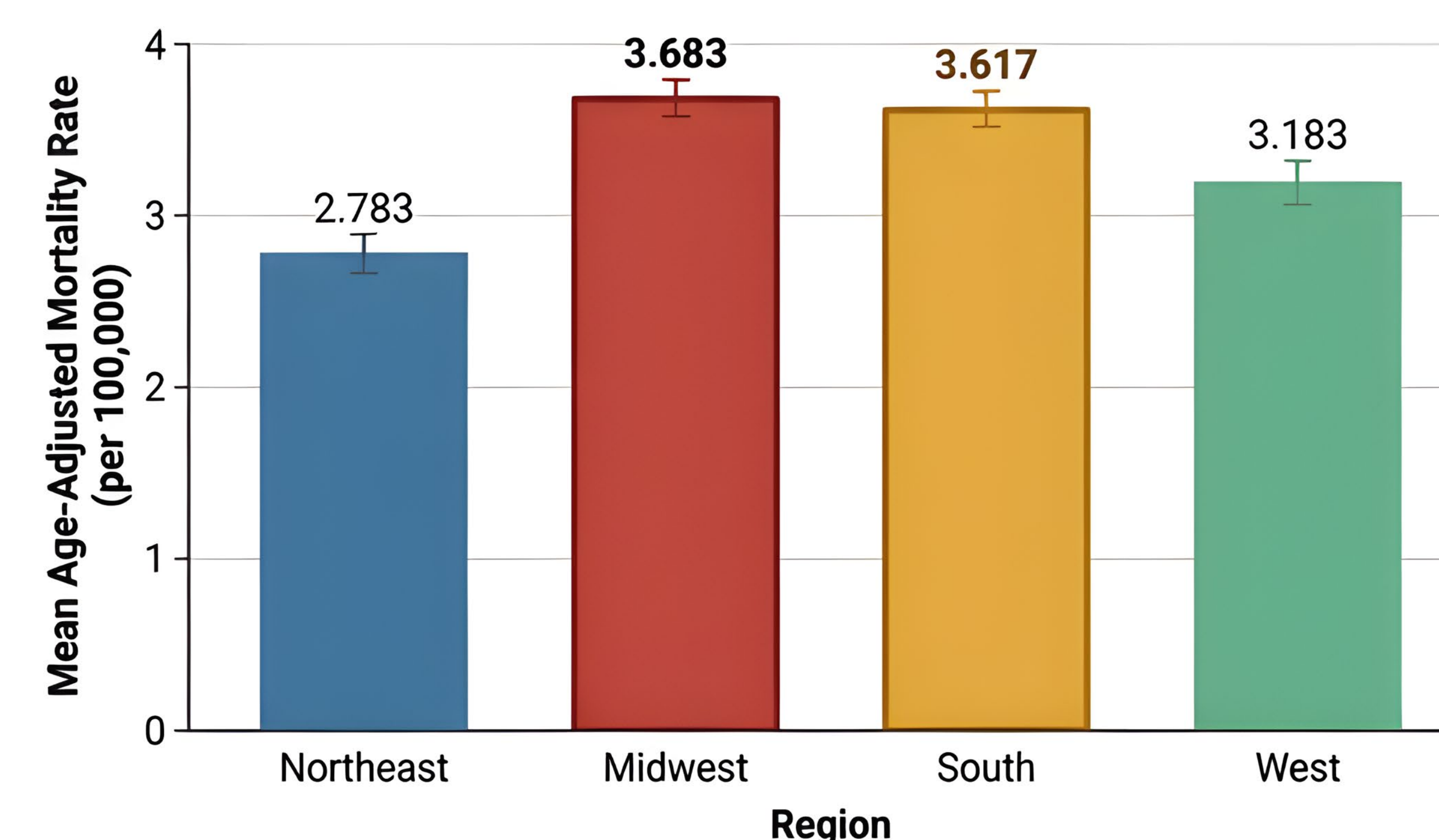
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RESULTS

A Regional Disparities in Kidney Cancer Mortality in the United States, 2018–2023



B Bar Chart – Regional Comparison of Means (2018–2023)



C Two-way ANOVA (no replication) demonstrated significant differences by region ($F = 225.71$, $p < 0.001$) and year ($F = 3.57$, $p = 0.025$).

Tukey HSD analysis showed Midwest and South had significantly higher mortality than Northeast and West ($p < 0.001$), with no significant difference between Midwest and South.

D

Comparison	Mean Diff	p-value	Cohen's d
Northeast vs Midwest	0.90	2.55E-12 ✓	13.17 ★
Northeast vs South	0.83	7.53E-12 ✓	12.20 ★
Northeast vs West	0.40	2.28E-07 ✓	5.86 ✓
Midwest vs South	0.07	0.36	0.98
Midwest vs West	0.50	1.13E-08 ✓	7.32 ★
South vs West	0.43	7.88E-08 ✓	6.34 ★