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RESEARCH LETTER

Comparison of Centers for Disease Control and Prevention and Hospital-Based Stroke Mortality Data in Kentucky: The Paul Coverdell National Acute Stroke Program

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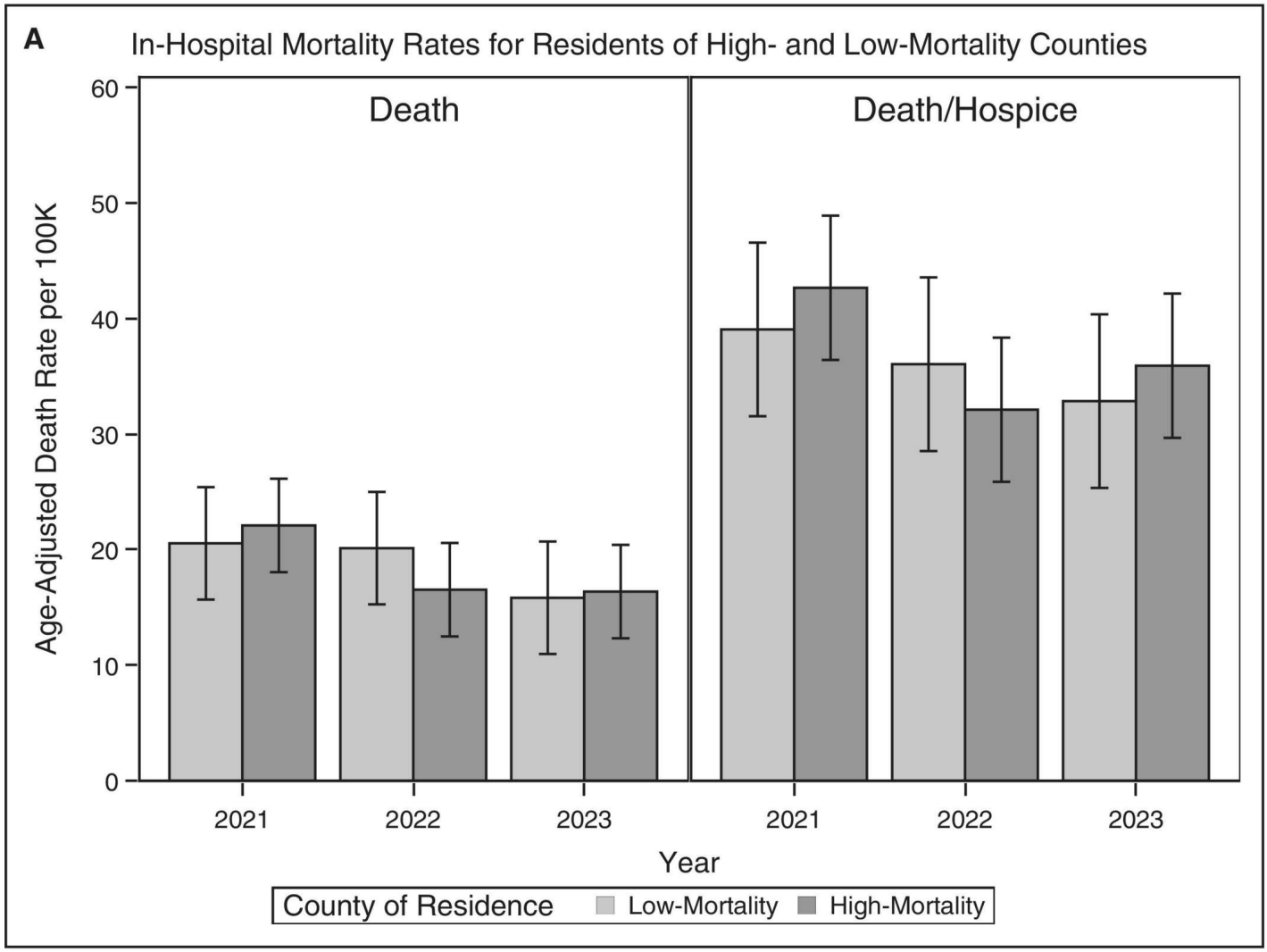
The US Centers for Disease Control and Prevention's Paul Coverdell National Acute Stroke Program (PCNASP) supports state-based efforts to improve the quality of care for patients with stroke.[1] This initiative is particularly relevant in Kentucky (ranks 38th in the nation for stroke-related deaths).[2] Mortality rates, however, vary by county across the state. We compared acute in-hospital stroke mortality rates for PCNASP-participating hospitals on the basis of patient residence in a high- versus low-mortality county and county of residence level of social deprivation.

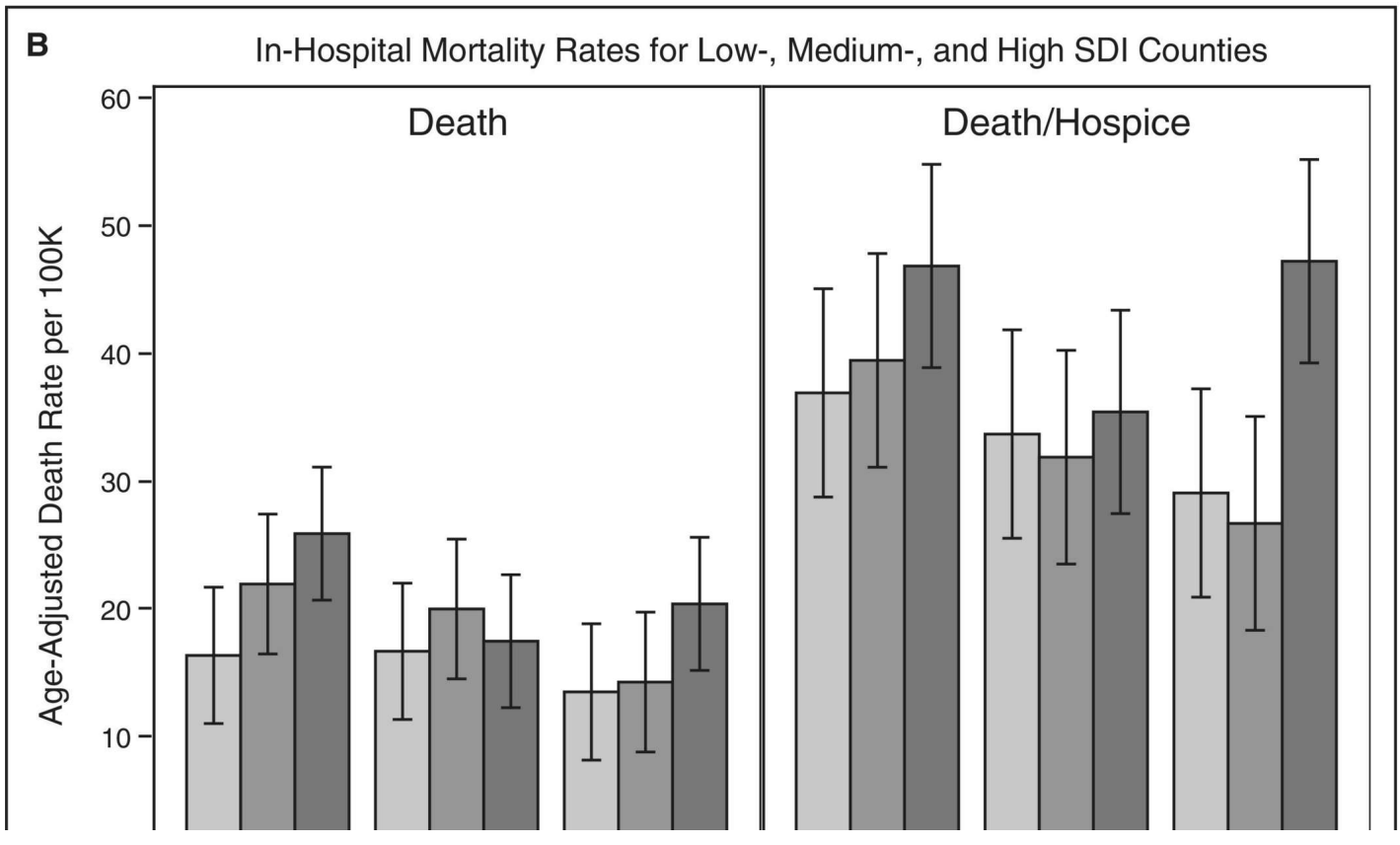
The study was approved by the University of Kentucky's Institutional Review Board, and informed consent was not required for the use of retrospective registry data. Data for the current study are not publicly available due to data-sharing agreements between participating hospitals and American Heart Association data use restrictions. For this retrospective cohort study, we obtained county-level stroke mortality estimates for 2018 to 2020 from the Centers for Disease Control and Prevention's Interactive Atlas of Heart Disease and Stroke. Per Centers for Disease Control and Prevention definitions, counties were classified as high-mortality if their age-standardized death rate exceeded 80.4 per 100 000 population (60th percentile for county-level stroke mortality rates in the United States). Data for in-hospital deaths were extracted from Get With The Guidelines–Stroke registries from 2021 to 2023, which was used by all 40 PCNASP-participating hospitals (representing 41.2% of Kentucky's acute care facilities). Age-standardized in-hospital death rates (calculated using census data) and discharge-to-hospice rates were used to provide assessments of hospitalization outcomes.

The Robert Graham Center's Social Deprivation Index (SDI), which includes 7 components (poverty, education, employment, homeownership, crowded housing rate, single-parent families, and vehicle access), was used to measure county-level socioeconomic status. Scores range from 1 to 100, with higher scores indicating greater deprivation. Counties were divided into tertiles on the basis of SDI: low (SDI ≤52), medium (53–71), and high (≥72).

A mixed-effects model assessed the relationship between county-level stroke mortality risk (high versus low) and in-hospital death/hospice discharge, accounting for repeated measures within counties. A separate analysis examined these outcomes based on SDI. Models were only age-adjusted. $P<0.05$ was considered significant. Data were analyzed using SAS version 9.4 (SAS Institute, Cary, NC).

Comparing those residing in high- versus low-mortality counties, for in-hospital deaths, neither the interaction (*P*=0.356) nor the main effect of death (high- versus low-mortality difference, −0.50 per 100 000 [95%CI, −5.14 to 4.13]; *P*=0.831) differed significantly. Results did not change when more recent Centers for Disease Control and Prevention data (2019–2021) were used to classify county mortality rates. In-hospital death decreased over time (*P*=0.023); rates in 2023 were lower than in 2021 (difference, 5.2 [95% CI, 1.5–8.9]; *P*=0.006). For in-hospital death or discharge to hospice, neither the interaction (*P*=0.351) nor the main effect of death (high versus low difference, 0.91 [95% CI, −6.30 to 8.11]; *P*=0.804) was significant. In-hospital mortality or discharge-to-hospice rates also decreased over time; compared with 2021, rates were lower in 2023 (difference, 6.5 [95% CI, 0.8–12.2]; *P*=0.026; Figure [A]).


A
In-Hospital Mortality Rates for Residents of High- and Low-Mortality Counties
Death
Death/Hospice
Age-Adjusted Death Rate per 100K
0
10
20
30
40
50
60
2021
2022
2023
Year
County of Residence
Low-Mortality
High-Mortality


B
In-Hospital Mortality Rates for Low-, Medium-, and High SDI Counties
Death
Death/Hospice
Age-Adjusted Death Rate per 100K
10
20
30
40
50
60

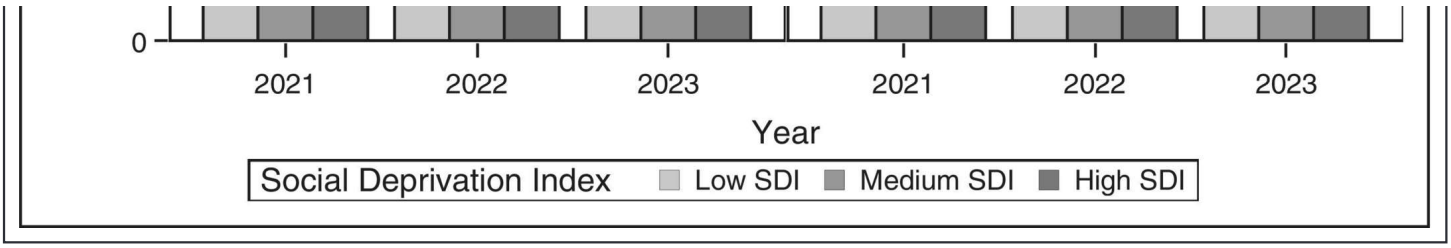


Figure 1. In-hospital mortality or discharge-to-hospice rates for high and low-mortality counties and by SDI.
A, Comparison of age-adjusted in-hospital mortality or discharge-to-hospice rates (per 100 000 population) and associated 95% CIs between low- and high-mortality counties. **B**, Comparison of age-adjusted in-hospital mortality or hospice rates by social deprivation tertile. SDI indicates Social Deprivation Index.

Comparing in-hospital death rates on the basis of county of residence SDI tertile, neither the interaction between SDI and year (P=0.198) nor the main effect of SDI tertile (P=0.117) was significant. For in-hospital death or discharge to hospice, the interaction (P=0.071) was not significant, but the SDI groups differed (P=0.022). Compared with those residing in high-SDI counties, those residing in medium- (difference, 10.5 per 100 000 [95% CI, 2.0–18.9]; P=0.015) and low-SDI counties (difference, 9.9 [95% CI, 1.6–18.3]; P=0.020) had lower rates (Figure [B]).

We found that the in-hospital stroke death rate for patients receiving care in Kentucky's PCNASP-participating hospitals was similar regardless of whether a patient resided in a high- or low-mortality county or in counties with higher levels of social deprivation (ie, patients from high-mortality or more socially deprived counties did not have worse outcomes if they received care in a PCNASP hospital). This suggests that measuring stroke death in PCNASP hospitals may not reflect county-level efforts to improve stroke outcomes.

All PCNASP-participating hospitals used the Get With The Guidelines–Stroke quality improvement tool. Access to these hospitals and possibly those using other stroke quality improvement programs such as Kentucky's Stroke Encounter Quality Improvement Program and the University of Kentucky–Norton Healthcare Stroke Care Network have likely contributed to more equitable outcomes.[3] However, we lacked data from non–PCNASP-partcipating hospitals, so it is unclear if disparities exist in other care settings. Expanding stroke quality improvement initiatives to nonparticipating hospitals or increasing access to PCNASP/Get With The Guidelines–Stroke hospitals may help address this gap.

It is important to note that county-level stroke mortality rates are influenced not only by hospital care but also out-of-hospital deaths, which account for over half of stroke-related deaths.[4] Improved primary and secondary prevention, public education related to stroke symptoms, and rapid access to appropriate care could help reduce the number of preventable stroke-related deaths within high-mortality/high-SDI counties.

Although in-hospital mortality rates did not vary by SDI, there were higher rates of discharge to hospice in counties with greater social deprivation. This suggests that socioeconomic factors may influence postdischarge decisions, reflecting possible disparities in access to in-home care or in patient and family preferences.

The decrease of in-hospital deaths from 2021 to 2023 in PCNASP hospitals is encouraging and consistent with national data.[5] It is likely due to multiple factors that may, in part, reflect advances in acute stroke management and continuous quality improvement initiatives.

Our findings highlight the need for public health strategies that focus on improving access to high-quality acute stroke care, particularly for residents of high-stroke-mortality and socially deprived counties. Further research is needed to explore disparities in posthospital outcomes and to identify additional strategies to optimize care.

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DISCLOSURES

This work represents the authors' independent analysis of local or multicenter data gathered using the American Heart Association's Get With The Guidelines IQVIA Registry Platform but is not an analysis of the national Get With The Guidelines data set and does not represent findings from the American Heart Association's Get With The Guidelines National Program.

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