



Investigating the Role of Public Assistance Programs in Responding to Cardiovascular Emergencies in Rural Areas



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Background + Gap

Individuals in rural areas often have worse health outcomes compared to those in urban settings¹.

- Rural populations are characterized as older, sicker, and poorer than their urban counterparts².
- Rural communities have an increased burden of heart attack and heart failure mortality³.

Rural emergency medical services (EMS) provide critical care for remote/isolated communities.

- However, they are faced with unique challenges like rural geography, workforce shortages, and higher fixed costs⁴.
- Ambulance deserts have been shown to prevent rural EMS from providing timely care to stabilize and transport sick patients⁵.

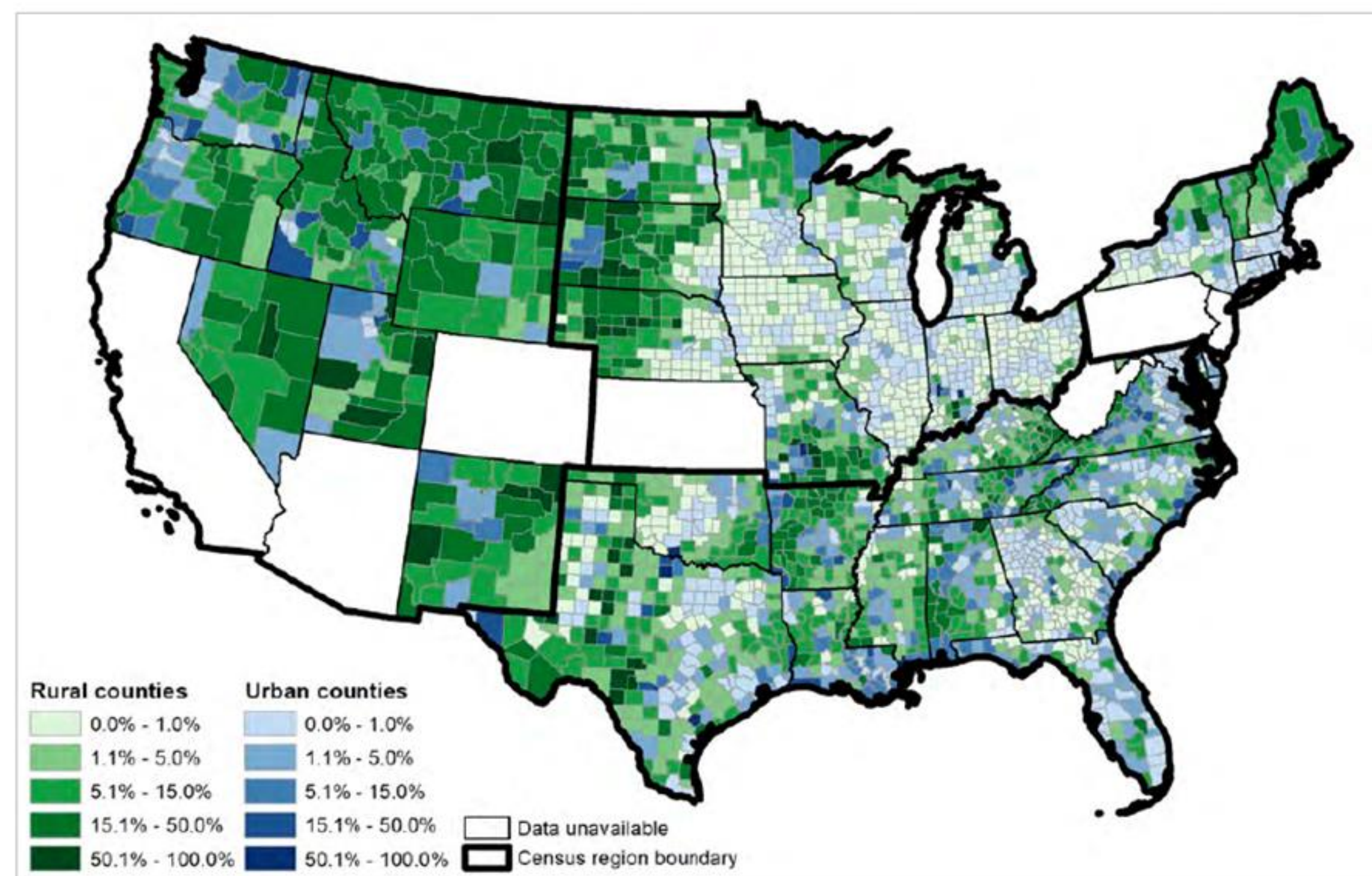


Figure 1. Percent of Rural and Urban County Populations Living in Ambulance Deserts, 2021 – 2022 (Rural Health Research Center)⁵

Public assistance (PA) has been shown to increase access to care for underserved rural populations⁶.

- However, few studies document the association between cardiac emergency outcomes and public assistance usage in rural areas across the United States.

Methods

A retrospective cross-sectional study of EMS encounters was performed utilizing a convenience sample of EMS encounters in the 2021 NEMSIS Version 3.4.0 database. After accounting for the inclusion/exclusion criteria, a total of 9,195 EMS activations remained.

- To determine whether PA-calls and 911-calls differ significantly in rural areas, the two sample Z-test of proportions was conducted.
- The relationship between public assistance and acuity level was further investigated using the chi-square test of Independence.
- Data analyses were performed on RStudio 2023 (Version 2023.09.1+494) and Microsoft Excel 2023 (Version 16.79.1).

Results

Two Sample Z-test of Proportions

	Rural				
	PA-Response	911-Response	Standard Error	Z-Score	P-Value (< 0.05)
Initial Acuity					
Critical (Red)	4.9%	19.9%	0.05	2.89	0.0038
Emergent (Yellow)	13.1%	38.7%	0.06	4.02	0.0001
Minor (Green)	78.7%	36.7%	0.06	-6.55	0.0001
Dead (Black)	1.6%	2.3%	0.02	0.32	0.7489
Final Acuity					
Critical (red)	3.3%	16.4%	0.05	2.75	0.0059
Emergent (yellow)	9.8%	35.3%	0.06	4.09	0.0001
Minor (green)	68.9%	44.1%	0.07	-3.78	0.0002
Dead (black)	1.6%	2.4%	0.02	0.38	0.7039

Table 1. With $p > 0.05$, the two-sample Z-test of proportions indicates a statistically significant difference in the proportion of acuities between the PA-response and 911-response (except for Black). The proportion of Red and Yellow acuity activations is significantly higher amongst 911-responses, while the proportion of Green acuity activations is significantly higher amongst PA-responses.

Chi-Square Test of Independence

	Rural	
	PA-Response	911-Response
Improved Acuity	3	114
No Change	36	818
Worsened Acuity	2	39
Chi-Square Test of Independence	X-squared = 0.797, df = 2, p-value = 0.6713	

Table 2. With $p > 0.05$, the chi-square test for independence suggests that there is no significant association between the presence of PA and change in acuity.

Discussion

EMS 911-response tends to respond to higher acuity activations, as they are equipped with greater experience and more medical equipment. On the other hand, public assistance personnel are most often being dispatched for less-emergent, lower acuity calls, particularly in rural locations. PA-response and 911-response do not appear to see different changes in acuity.

Conclusion and Future Studies

This study establishes a relationship between PA-response and cardiac patient acuities in rural settings. There is a significant difference in the proportion of acuity activations between those with a PA-response and those with a 911-response. Moreover, public assistance is suggested to produce an acuity outcome akin to the outcome of 911-response. Future studies could investigate other cardiac-related outcomes of public assistance and 911-response calls, such as hospital dispositions, in rural areas.

References

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