An Exploration of Rural U.S. Residents' Climate Change Beliefs

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Introduction

As severe weather and other climate-related events are expected to occur with greater frequency (WMO, 2024), it is important to understand audiences' beliefs and perceptions regarding climate risk. The vast geographic scope of U.S. agriculture and its sensitivity to weather patterns make it especially vulnerable to climate change, which could lead to substantial economic consequences (Malhi et al., 2021). Specifically, rural communities are likely to be more vulnerable to climate change impacts due to differences in demographics, occupations, poverty rates, and dependency on government funds (Lal et al., 2011). Twenty percent of the U.S. population resides in a rural area, and 404 rural counties—those not containing or economically tied to a metropolitan area—are farming-dependent (USDA ERS, 2015). Rural areas throughout the U.S. will experience climate change differently than their urban counterparts and must be prepared (Lal et al., 2011). While recent studies have found that U.S. residents' beliefs in climate change are mixed and largely neutral (Lawson, 2024), no studies have explored the climate change beliefs of rural residents. As rural communities are more vulnerable to climate-related changes, understanding regional variations in views and perceptions of climate risk is crucial for developing targeted communication strategies and policies that address the needs of rural populations.

Theoretical Framework

This study was guided by the theory of social norms (Jones, 1994) to explore rural residents' views and perceptions of climate change. Social norms encompass the leading behaviors, attitudes, and beliefs within a group that shape group members' opinions, actions, and expectations (Perkins & Wechsler, 1996) and may be viewed as both products and processes (Jones, 1994). When social norms are adopted and applied, social groups are the result. Social groups may include geographical regions and locations (Voigt, 2024), which were a focus of this study. Additionally, a region's primary economic subsistence method, such as agriculture, and environmental volatility, may influence how social norms develop in different regions (Voigt, 2024). Prior research found that regionality was related to social norms in various contexts (Haston, 2020; Kim, 2024). In addition, norms appeared to be in play in a study that showed regional cultures that valued sustainability and environmental protection were more supportive of clean energy initiatives (Farhidi & Khiabani, 2021). Though not the only factor, an individual's personal norms on climate change are likely driven by their selected social groups (Jones, 1994; Perkins & Wechsler, 1996), including geography and rurality, and the groups' subsequent beliefs on climate change, its perceived severity, and their support for policy.

Methodology

Data for this study were collected using a researcher-developed quantitative survey instrument that sought to measure U.S. individuals' climate risk perceptions. A panel of experts reviewed the instrument to ensure validity and reliability for the instrument was achieved *a priori*. Data were collected between November 7 and December 8, 2023 using Qualtrics Research Services to recruit participants. The population for this study was U.S. residents aged 18-years and older who indicated they lived in a rural area ($N = 710$).

Participants rated their levels of agreement with five statements designed to measure beliefs on climate change, perceptions of its severity, and support for climate policies using 5-point Likert-type scales (1 = *strongly disagree*, 5 = *strongly agree*), adapted from previous climate change studies (McCright et al., 2016). Belief statements included, "The scientific evidence that the

climate is changing is very solid." Statements for severity asked participants' perceptions of the threat of climate change to themselves, their local community, the U.S., the world, and nature. Policy support statements included, "Provide tax rebates for people who purchase energy-efficient vehicles or solar panels." Reliability for this measure was achieved (α = .85) *a priori*.

Results

Neutral views were observed across variables. Perceived severity (M = 3.44, SD = 1.24) was the construct with the highest scores, followed by support for climate change policy (M = 3.38, SD = .90) and climate change beliefs (M = 3.22, SD = .94). A one-way MANOVA was conducted to determine if perceived severity, support for policy, and climate change beliefs were significantly different across the four U.S. regions: Northeast (n = 173), Midwest (n = 204), South (n = 200), and West (n = 133). There were no statistically significant differences in climate change beliefs, $F(3,706) = 1.95$, $p = .12$, and support for policy, $F(3,706) = 1.89$, $p = .13$, between regions. There was a statistically significant difference between regions for perceived severity, $F(3,706) = 3.48$, $p < .05$, Largest Root = .02, $\eta_p^2 = .02$. A post hoc analysis using Bonferroni comparison revealed a significant difference ($p < .05$) between the Northeast (M = 3.60, SD = 1.21) and the Midwest (M = 3.26, SD = 1.30). There were no other significant differences between regions.

Table 1

One-way MANOVA Results for Regions on Perceived Severity, Climate Change Beliefs, and Policy Support (N = *710*)

	Northeast (n = 173)		Midwest (n = 204)		South (n = 200)		West (n = 133)			
	M	*SD*	*M*	*SD*	*M*	*SD*	*M*	*SD*	*F*	*p*
Severity	3.60	1.21	3.26	1.30	3.37	1.24	3.60	1.13	3.48	< .05
CC Beliefs	3.34	0.90	3.14	0.96	3.17	0.95	3.28	0.92	1.95	0.12
Policy Support	3.43	0.93	3.29	0.95	3.34	0.88	3.51	0.82	1.89	0.13

Conclusions / Implications / Recommendations

Rural residents in this study reported neutral beliefs on climate change and its causes and near-neutral support for climate change policies, with similarly held beliefs across regions. These findings suggest social norms related to these variables are relatively consistent for rural residents nationwide and for the U.S. overall (Lawson, 2024), implying that these norms may be driven by the social norms of the U.S. at large rather than any particular regional norms (Voigt, 2024). Though scores for climate severity were the highest score overall, the response was neutral, much like the other variables. There were, however, significant differences between the Northeast and Midwest for perceived severity. The higher scores in the Northeast for perceived severity could be influenced by regional social norms that prioritize recognizing the impacts of climate change, potentially an increased focus on sustainability and environmental protection (Farhidi & Khiabani, 2021) or the recognition of severe weather impacts on agriculturally dependent regions (Lal et al., 2011). These results are aligned with prior literature that social norms can be influenced by regionality (Haston, 2020; Kim, 2024; Voigt, 2024), though it is unlikely to be the only variable at work.

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