HERBERT WERTHEIM SCHOOL OF PUBLIC HEALTH AND HUMAN LONGEVITY SCIENCE

Introduction/Background

- Rural areas have much higher mortality rates than that of urban areas in the U.S. since the pandemic as of July 2021. (Sun, Y. et al., 2022)
- Healthcare access disparities amongst rural communities has contributed dramatically to the already pre-existing threat to healthcare access in these areas. With surveys reporting 76% of urban populations being fully vaccinated in comparison to 63% of rural residents. (Sun, Y. *et al., 2022)*
- Data revealed vaccine hesitancy is correlated with age, education and income levels, occupation, political affiliations, etc. (Soorpanth, S., et al, 2023)
- The dataset identifies differences in vaccination rates amongst different counties throughout the United States. Our analysis of this study will identify the effects of differences in healthcare access, income, and education levels between rural and urban areas on vaccination coverage.

Objectives

- Assess if there is significant difference in 2 dose vaccination rates between urban and rural communities.
- Analyze the factors associated with urban-rural classifications that contribute to differences in COVID-19 vaccination rates, such as political affiliation and healthcare access.

Methods

Data Population:

- Dataset created by the Center for Disease Control of COVID information among all counties in the United States.
- Represents national vaccine partners: partner clinics, retail pharmacies, etc.
- Latest update to the data was on May 11, 2023, originally created on May 24, 2021

Variables:

- County of Residence
- State of Residence
- Metropolitan status of the Recipient County
- Series Complete Population Percentage:
- Includes those that have completed a primary series or have had a second dose of a 2-dose vaccine or one dose of single-dose vaccine, based on jurisdiction and county of recipient.



California has higher, on average, vaccination coverage rates across all counties in comparison to Texas and Michigan (Table 1).

An odds ratio (OR) test showed 5.26 with a 95% confidence interval (CI) of (2.61, 10.61). With a median of 56.85% vaccination coverage and a 95% CI of (2.61, 10,61).

UC San Diego HERBERT WERTHEIM A Conscious County: Comparing COVID-19 Vaccination Rates Between Urban and Rural Counties in California, Texas and Michigan

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Methods Cont.

Tests:

All analysis was conducted in R and R-Studio

• Odds ratio tests are used to determine the association between geographical location and vaccination coverage within counties.

 ANOVA tests were used to compare the differences in mean vaccination rates of rural and urban counties within each state.

Results

 Table 1. Mean Population Vaccination Percentage of
All Randomly Selected Counties.

accination Rate	California	Texas	Michigan
lean	60.12%	52.06%	57.24%
laximum %	95%	86.20%	74.4%
linimum %	0%	22.20%	39.8% %

Table 2. Results from Calculated Median, Risk/Odds Ratio, Uncorrected Chi-2 Test, & Fishers Exact Test.

tatistical Analysis	Statistical Values
edian Overall Vaccination Rate	56.85%
creased risk ratio	2.36 (1.60, 3.50)
creased odds ratio	5.26 (2.61, 10.61)
ncorrected Chi2 test, OR = 1	PrChi2 = <0.001
sher Exact Test	P <0.001

• This data (Table 2) would be indicative of a statistically significant difference. With p <0.001 we would reject the null hypothesis of no association between urban-rural status and vaccination coverage (Table 2).





ANOVA test showed overall Rural counites were 48.9% of the population was vaccinated, and 64.5% of overall Urban counties were vaccinated (Table 3).

Michigan has the highest mean vaccination rate for rural counties (56.2%) while California (46.2%) and Texas have the lower rural vaccination rates (44.3%) (**Figure 1**).

Results Cont.

 Table 3. Average Vaccination Rates in Urban and Rural
Communities in California, Texas, and Michigan.

	Mean Vaccination Rate in Urban Counties	Mean Vaccination Rate in Rural Counties
California	74.6%	46.2%
exas	60.2%	44.3%
1ichigan	58.6%	56.2%
Overall	64.5%	48.9%

SECONDARY RESULTS Figure 1. Vaccination Rates in Rural Counties by State











Secondary Results Cont.

California has the highest mean vaccination rate for urban counties (74.6%), with Texas (60.2%) and Michigan (58.6%) following (Figure 2).

Conclusion

Urban counties are 5.26x more likely to having above-average rates of COVID-19 vaccination coverage in comparison to rural counties. Thus, showing that urban county residents were more likely to get vaccinated and had increased healthcare accessibility. General political affiliations of a state could not determine the level of vaccination coverage that state would have. Relying strictly on geographical urban and rural factors to contribute to vaccine coverage.

Policy Implications

Differences in vaccination rates between urban/rural communities can be attributed to healthcare access and disparities. Increasing home health agencies, telemedicine, and making health insurance more accessible could improve rates of vaccination coverage and access to healthcare services for rural populations.

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References

