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Uninsurance Rates and Associated Impacts Within Urban and Rural Counties in Ohio in 2022

Anneliese M. Fisher

Megan Sharifi

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COUNTIES IN OHIO IN 2022

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Abstract

Background: Rural populations comprise of 20% of the American population and 19% of those individuals are over the age of 65 (compared to 15% in urban areas).[1,2] There has been an increase in discussion surrounding the social determinants of health (SDOH), and the literature shows that the SDOH often disproportionately impact individuals based on where they live, including rural areas. The rural-urban mortality rate disparity within the United States has been growing and has been attributed to levels of poverty.[3] The SDOH also include access to healthcare and insurance, and insurance coverage is associated with higher healthcare access and quality.[4]

Objective: This study aims to explore the relationship between uninsurance rates and health outcomes between rural and urban counties in Ohio in 2022. This study also aims to explore how uninsurance rates are correlated with the rates of various types of health care providers.

Methods: County-level data from Ohio in 2022 were used from the County Health Rankings (CHR) website. Statistical analysis utilized Spearman correlations, ANOVA tests, independent t-tests, multiple regression analyses, and comparisons via cocor.

Results: Rural Ohio has a slightly lower but not statistically significant difference in life expectancy. Rural Ohio has a higher prevalence of obesity and diabetes compared to urban Ohio but not statistically significantly so. There is a negative correlation between PCP rate and rate of

uninsurance within Ohio generally and rural Ohio (r = -0.379, p = < 0.001). There is a positive correlation between dentist rate and rate of uninsurance within Ohio generally and rural Ohio (r = -0.394, p = < 0.001). There was no correlation between rate of uninsurance and MH provider rate in Ohio. The rate of PCP's and dentists were higher in urban Ohio (p = < 0.001), and no statistically significant difference between rates of MH providers in urban and rural Ohio was found. The rate of PCP's and rate of uninsurance was not found to be predictive of preventable hospital stays.

Key Words: *access to healthcare, uninsurance, rural, urban, Ohio, life expectancy*

Introduction

        The conversation around the social determinants of health is currently a hot topic within the healthcare realm. The social determinants of health (SDOH) as defined by the US Department of Health and Human Services are the "conditions in the environments where people are born, live, learn, work, play, worship, and age that affect a wide range of health, functioning, and quality-of-life outcomes and risks."[5] Essentially, the SDOH are the factors that impact a person's health that are not measured quantitatively and that may impact health indirectly; an example of this would be an environmental factor that influences an individual's health that is out of their control, like the safety of their neighborhood or if they have insurance.

        This study aims to explore the relationship between uninsurance rates and various health outcomes between rural and urban Ohio in 2022. Rural and urban counties were defined in this study by the Ohio Department of Health. Urban counties were classified as urban, and partially rural and rural counties were classified as rural.[6] This study also aims to explore how uninsurance rates are correlated with the rates of various types of health care providers. The

outcomes of life expectancy, preventable hospital stays, and diabetes prevalence will be explored. Within the United States, there is a large gap between the mortality of those living in rural versus urban areas. This is correlated with the social determinants of health, and people who are impacted by social determinants often have poorer health outcomes. The lack of access to healthcare is also associated with lower insurance rates.

Unfortunately, there is a lack of research within Ohio that aims to explore the SDOH and the impacts that each factor might have on each other. The SDOH are very complex and intertwined and extend far beyond the scope of even this paper. However, it will be beneficial to explore life expectancy between rural and urban Ohio, uninsurance rates, how those factors correlate with rate of various providers, and what impact that has on health. Obesity and type II diabetes mellitus disproportionately impact low-income populations and living in rural areas. For this paper, rate of providers is the number of providers per 100 people in any given county in Ohio. Obesity and type II diabetes mellitus are diseases that drastically impact one's quality of life and life expectancy.[7] People who live in a rural area are 6.2 times more likely to be obese.[8] It is very important to gain a greater understanding of the SDOH in rural areas and to understand how each factor might impact each other.

Research Questions

RQ1. What is the difference between life expectancy in rural vs. urban counties?

RQ2. Does the rate of uninsured adults correlate with the amount of primary health, mental health, and dental providers in a given county in Ohio? What is the difference between that data in rural vs urban areas?

RQ3. What is the relationship between the ratio of primary health, mental health, and dental providers and the years potential life lost (YPLL)?

RQ4. How well do the rate of PCPs, mental health providers, and dental providers, taken together (and controlling for the effects of each other) predict preventable hospital stays?

RQ5. Is there a correlation between the uninsurance rates and preventable hospital stays?

RQ6. What is the relationship between the rate of primary care providers and diabetes prevalence?

RQ7. How is the rate of primary care providers correlated with the amount of flu vaccinations?

RQ8. How does the rate of primary care providers correlate to access to exercise and healthy foods?

RQ9. How does the rate of access to exercise and access to healthy foods correlate with diabetes prevalence?

Methods

To fully evaluate the correlation between PCP rate and overall health in rural versus urban Ohio, research questions have been developed and paired with statistical tests which resulted in quantitative data. The data for each statistical test was provided by the county health rankings website (countyhealthrankings.org). This website uses national and trend data from a variety of different sources. This analysis will be focused on Ohio, with an emphasis on the potential differences that might be found between rural and urban counties. Each of the variables will be defined by the name. All data from Ohio that is related to the research questions and within the scope is included. A variety of tests were used for data analysis including, paired and unpaired T-tests, Spearman correlations, multiple regression analyses, and multivariable tests

pending. Paired t-tests were used to specifically look at comparing two different variables at two different points of time. The unpaired T-test was used to look at premature deaths in urban Ohio counties versus premature deaths in rural Ohio counties. This will made possible to explore premature deaths and how the ratio of healthcare providers within a given county correlates with premature death. Spearman correlations were used to determine the correlation between multiple different variables. The Spearman correlations were used to correlate the uninsurance rates and ratio of population to various healthcare providers, ratio of primary care providers correlated with diabetes prevalence, uninsurance rates correlated preventable hospital stays, PCP rate and access to exercise, and PCP rate and access to healthy foods. This allowed for the comparison of multiple variables. The final type of statistical test that will be used for this paper is multiple regression analyses. Our analyses used this test to look at the relationship between a single dependent variable and many independent variables. For example, multiple regression analyses were used to find correlations between how uninsurance rates, ratio of primary care health providers, etc. are related to premature death rates.

The inclusion criteria for this study included all adults who lived or who have lived in Ohio during the point of data collection. The exclusion criteria for this study included non-adults and those not living in Ohio at the point of data collection. Rural and urban Ohio was defined by the Ohio Department of Health and their classifications of each county as rural or urban.[9] For purposes of this study, counties that were classified as partially rural were included within the rural group.

Data Analysis:

IBM SPSS Statistics software was used to run Spearman correlations, multiple regression analyses, independent t-tests, multiple regression analyses, and ANOVA tests. A cocor analysis

was also run. The cocor analysis (comparingcorrelations.org) was used to determine whether two correlations were statistically different from each other.

Results

The mean life expectancy of urban counties is 76.9063 years and in rural counties is 76.2514 years, which is not statistically different (p=0.240). The PCP rate is negatively correlated with percent of uninsured adults (r= -0.379, p=<0.001). This means that as the rate of PCP increases, the percentage of uninsured adults decreases. Additionally, the rate of dentists is positively correlated with percent of uninsured adults (r=-0.231, p=0.030). This means that as the rate of dentists increases, the percentage of uninsured adults increases. There is also a positive correlation between PCP and mental health provider rate (r=0.583, p=<0.001), PCP and dentist rate (r=0.598, p=<0.001), mental health provider rate and dentist rate (r=0.553, p=<0.001). The rural counties within Ohio had similar findings to Ohio generally, as the PCP rate was negatively correlated with percent of uninsured adults (r=-0.394, p=<0.001) and the rate of dentists was positively correlated with percent of uninsured adults (r=0.531, p=<0.001). However, there was not a statistical significance between the rate of mental health providers and percent of uninsured adults in Ohio and in urban counties, but in rural counties, it was found that there was a negative correlation between these variables (r=-0.570, p=<0.001).

Table 1 below shows the rate of primary care physicians (PCP), dentists, and mental health care providers. Using an independent t-test, it was found that the difference between these means was statistically significant (p = < 0.001) for the rate of primary care physicians and dentists, but not statistically significant difference was found between the rate of mental health providers.

Table 1: Mean Rate of Various Health Care Professionals within Ohio

	Rate of Primary Care Physicians*	Rate of Dentists*	Rate of Mental Health Care Providers
Urban Counties	77	61.88	272.88
Rural Counties	43.31*	39.97*	208.49
All counties	49.43	43.95	220.19

*significantly different from urban counties at p=<0.001

Within Ohio, the rate of PCPs, mental health providers, and dental providers do not predict preventable hospital stays within Ohio generally (F=0.067). However, there is a relationship between the rate of these providers and years of potential life lost (YPLL) (F=<0.001). There is a positive correlation between YPLL and preventable hospital stays within Ohio (r=0.305, p=0.004).

Table 2: Selected Health Care Outcomes in Rural and Urban Counties

	Obesity Prevalence (%)	Rate of Uninsurance (%)	Diabetes Prevalence (%)	Flu Vaccines Received (%)	Preventable Hospitalization Rate
Urban Counties	36.69	7.49	10.31	54.81	3253.19
Rural Counties	38.5	8.8	10.5	49.75	3115.44
All Counties	35.8	8.1	10.9	53	3278

There is not a statistically significant correlation between the rate of PCP's and percent of adults with diabetes in Ohio. The mean percent of adults with diabetes in urban and rural counties is similar; the mean percent in urban counties is 10.61% and in rural counties is 10.51%. Within Ohio, there is not a statistically significant correlation between percent of adults without insurance and the rate of preventable hospitalization.

There was a statistically significant correlation between the rate of PCPs and percent of people vaccinated in rural counties ($r_s=0.388$, n=72, p=<0.001) but not in urban counties. In all of Ohio there is a statistically significant correlation between these two variables. There is not a statistically significant relationship between diabetes prevalence and limited access to healthy foods in Ohio.

Discussion

It is not surprising to find that the data shows a significant difference in rate of PCP's and dentists in urban versus rural counties within Ohio. However, it was surprising to find that there was a higher rate of mental health providers compared to PCPs and dentists, and that it did not change between rural and urban counties within Ohio. County Health Rankings defined mental health providers as any individuals in Ohio with a National Provider Identification (NPI) number who are psychiatrists, psychologists, licensed clinical social workers, counselors, marriage and family therapists, mental health providers that treat alcohol and other drug abuse, and advanced practice nurses specializing in mental health care. PCPs are defined as County Health Rankings as MD's and DO's under age 75 specializing in general practice medicine, family medicine, internal medicine, and pediatrics. Dentists are defined as registered dentists with an NPI. Likely the rate of mental health providers is higher because it encompasses a larger group of professions. To explore this finding further, it would be helpful to look at the rate of psychiatrists and psychologists between urban and rural areas to have this be more comparative to the other rankings.

Overall, it was found that there was no difference in life expectancy in rural vs urban counties in Ohio in 2022. This was surprising because the literature has found that there is a growing disparity between rural and urban areas in Ohio, and with that, there is a reported increasing loss in life expectancy.[10] Additionally, it is unclear how there are less primary care physicians and greater rates of uninsurance in rural Ohio but that this does not impact life expectancy, but it is not surprising that there were less PCPs and dentists in rural areas.[11] There is a statistically significant positive correlation between PCP rate and access to exercise. There is also a statistically significant positive correlation between PCP rate and access to healthy food.

In rural counties within Ohio, there is a negative statistically significant correlation between percent of uninsured adults with the ratio of PCPs, rate of mental health providers, and rate of dental providers.

However, statistical data cannot explain causations, only correlations. That can be said of any statistical analysis paper, and it is true of this paper as well. The data presented in this paper was able to showcase some correlations between different factors specifically in rural vs urban counties in Ohio in the year 2022. That cannot be applied to other states and other years necessarily so that is a limitation. Another limitation is the group sizes. Using the Ohio County Rankings, there were 16 urban counties and 72 rural counties. That means there were over 4 times as many county data points for the rural counties than the urban counties. That could pose some limitations for statistical analysis.

Some future directions we would like to focus on is analyzing specific areas in each county. There are some counties in Ohio that are very diverse within themselves, so it is hard to classify each as either "rural" or "urban." That poses some limitations for statistics. If there were a way to further break down each county into separate areas that are rural or urban that might give us more accurate data. Another future direction that should be explored for this topic is focusing on nationwide data. This data only focused on Ohio specifically in 2022 so it would be extremely beneficial to expand that range and explore the data from other rural and urban countries in the US over various years. That would be able to further validate some of the points that our data uncovered. Additionally, this study did not look at the impact that underinsurance can have on an individual. Unfortunately, there is not much literature published about the concept of underinsurance, and as such, cannot be discussed in depth here.

Conclusion

The findings of this analysis were somewhat interesting, as some findings contradicted what was expected and previously published. It will be important to delve into this further in the literature to explore why these contradictory findings were found. Going forward, some of the alterations to the study that should be made include expanding the data set range in terms of years and the number of states being compared. These two alterations would help to provide more accurate and concrete data that can be used to draw conclusions. Overall, the key takeaways from the analysis were that although there were differences between rural and urban counties in Ohio in 2022 such as diabetes prevalence and access to healthcare providers it has not reached a point where life expectancy is affected. This may change when the data set range is expanded but for the analyses run in this paper, that is what was concluded.

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