

USING DATA SCIENCE TOOLS TO ANALYZE MEDICAID CLAIMS DATA AND BETTER UNDERSTAND CARDIOVASCULAR DISEASE

Summary Prepared by the Office of Data Analytics Division of Analytics

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What is Known on This Topic?

Cardiovascular disease is the leading cause of death for men, women, and most racial groups in the US.

What Did this Project Do?

This project sought to analyze cardiovascular disease trends of Kentucky's Medicaid population.

What Could Medicaid Do with These Conclusions?

This project identifies areas and demographics in need of additional healthcare resources with disparate trends in cardiovascular disease compared to the rest of the state.

Introduction

Cardiovascular diseases (CDs) are the leading cause of death in the US, accounting for nearly one-fifth of all deaths in 2020.¹ CDs cost the nation hundreds of billions of dollars every year through healthcare costs and lost productivity.¹ Kentucky has historically had a rate of CD above the national average, and even had the seventh highest rate of CD in the United States in 2016.² Kentucky's population has several risk factors that predispose it to hypertension and heart failure. These include high rates of smoking, lower rates of exercise, and high rates of obesity.² These risk factors are even more pronounced in the Medicaid sphere.

While CD refers to many problems affecting the cardiovascular system, this study focused on hypertension and heart failure. Hypertension, or high blood pressure, is a reliable predictor of cardiovascular disease. Heart failure, or congestive heart failure, occurs when the heart can no longer adequately support the body's organs. Because hypertension is a predictor of heart failure, a goal of this study was to utilize the data to inform a predictive model of cardiovascular disease.

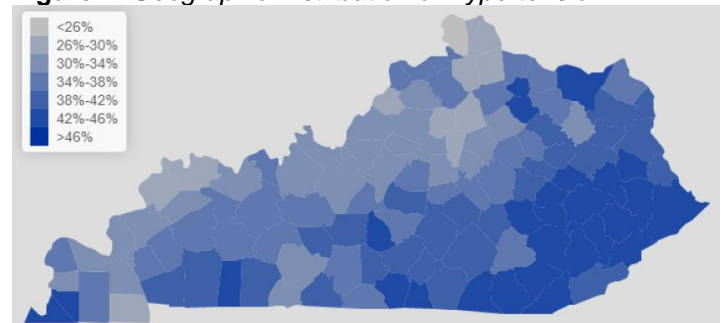
Project Methods & Results

This study sought to better understand CD among Kentucky Medicaid beneficiaries. The study utilized Kentucky Medicaid claims data between 2010 and 2019. In 2014, Kentucky elected to expand Medicaid. Expansion changed the overall size and basic demographic makeup of Kentucky's Medicaid beneficiary population. The results of this study are therefore reported with the context of being pre- or post-expansion.

The Medicaid claims and encounters data were limited to only include individuals diagnosed with hypertension and heart failure in the study window. Demographic information such as age, gender, race, and county of residence are included for each beneficiary as well as information about the providers of the healthcare services.

A beneficiary was identified as having hypertension if they have at least one hypertension diagnosis in that year. Prior to expansion, the rate of hypertension in Medicaid hovered around 42%; following expansion, the rate drops to around 35%. This is largely due to a younger, healthier Medicaid population due to the new, expanded requirements for eligibility. Hypertension rates have been rising at around 0.4% per year since 2015. Figure 1 displays these results.

Figure 1. Geographic Distribution of Hypertension in KY



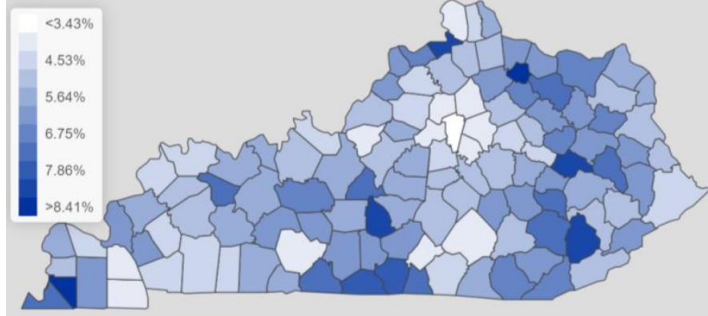
Note: Figure 1 appears as Figure 4 in the SUP report. Darker shades of blue indicate counties with a higher prevalence of hypertension among its Medicaid population.

Heart failure rates were much lower than rates of hypertension in the Medicaid beneficiary population, and rates of heart failure dropped following the 2014 Medicaid expansion. Pre-expansion, males were more 1% more

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likely to experience heart failure than females. Post-expansion, from 2014 to 2017, females experienced higher rates of heart failure, but only by half a percent. In 2018 and 2019, however, rates for males and females were roughly equivalent. Figure 2 displays rates of heart failure across Kentucky's counties.

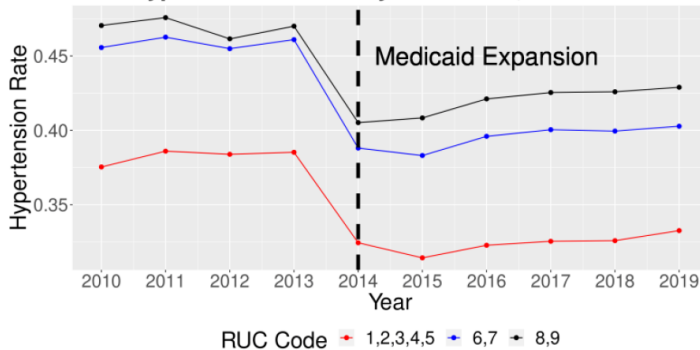
Figure 2. Geographic Distribution of Heart Failure in KY



Note: Figure 2 appears as Figure 4 in the SUP report. Darker shades of blue indicate counties with a higher prevalence of heart failure among its Medicaid population.

Males were determined to be 14.5% more likely to experience a hypertension diagnosis than females after considering their age and where in the state they lived. Beneficiaries living in rural areas had a 13.0% higher risk of hypertension after accounting for their age and identified sex. Figure 3 displays the results of analysis of the association between hypertension diagnoses and rurality. Similarly, rates of heart failure were 18% higher for males and around 5% higher for those living in rural areas with all other variables accounted for. The model found that, when accounting for gender and rurality of residence, a beneficiary's risk of a heart failure diagnosis increases by 6.5% for each additional year of age.

Figure 3. Hypertension Diagnoses by Rurality in KY
Hypertension Rates by RUC Code, 2010–2019



Note: Figure 3 appears as Figure 3 in the SUP report. RUC = Rural Urban Continuum; a metric developed by the US Department of Agriculture. A RUC of 1 signifies a metro county with 1 million or more residents in the area, and a RUC of 9 signifies a rural county with less than 2,500 residents.

Figure 3 offers reinforcing evidence in favor of efforts to provide quality cardiovascular care in Kentucky's rural areas, as these patients are experiencing a disparate level of both hypertension and heart failure.

Conclusion

The results of this study indicate that Kentucky Medicaid beneficiaries have increased risk of hypertension and heart failure if they are older, male, or reside in a rural county. These results were produced using comprehensive data science and statistical tools that account for other relevant variables.

This study also examined the impact of the Medicaid expansion Kentucky underwent in 2014 on the rates of CD. The expanded eligibility criteria for Medicaid allowed for a younger, healthier population to enroll in the Medicaid system, which lowered rates of CDs across the population.

In 2019, a significant percentage of the beneficiaries had an 'unspecified' race, making the group contain a larger proportion of the population than identified as Black or Other combined. Preliminary statistical analysis indicates that hypertension diagnoses are significantly more prevalent among those with unspecified race.

Future studies should focus on developing more sophisticated models to investigate the correlations between CD and a beneficiary's location, race, and age. For example, the finding mentioned above that the risk of heart failure increases by 6.5% each year is a linear model, but a non-linear model might be more appropriate when considering the variability in each individual's health status. The inclusion of other variables, such as history of smoking, could also improve the quality of the results.

CD impacts the lives of many Kentuckians. These diseases are costly in terms of healthcare costs and impacts on individuals' happiness and productivity. Despite improvements in treatment, a CD diagnosis is associated with up to a 10% reduction in one's lifespan.⁴ Medicaid should continue investing in targeted preventative measures for the populations identified in this analysis.

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