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Different Hollers, Different Outcomes: Differences in Health Outcomes among Appalachian and Non-Appalachian Counties in Kentucky

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Abstract: *This study examines difference in health outcomes, health insurance, and doctor access between Kentucky's Appalachian and non-Appalachian counties. Using 2018 data curated by the Robert Wood Johnson Foundation, this study analyzes differences in means in overall health outcomes, health insurance, and the number of primary care physicians at the county level for Appalachian and non-Appalachian counties in Kentucky. This study finds that persons living in Appalachian Kentucky counties have statistically-different and worse overall health outcomes, health insurance access, and physician access compared to those living in non-Appalachian Kentucky counties.*

Keywords: *Appalachia, Kentucky, health outcomes, health insurance, health inequality*

The Appalachian region has experienced a longstanding crisis with health inequality (Greenberg, 2016). Residents in the region often face negative socioeconomic statuses, which can contribute to the struggle of affordable healthcare or the decision to delay important health check-ups (Barcus & Hare, 2007). Geographical inequalities are also associated with poor healthcare patterns and deprivation of medical attention, such as issues with access to doctors (McGarvey, Leon-Verdin, Kilos, Guterbock, & Cohn, 2010). In addition, Appalachia also has high rates of heart disease and cancer (Griffith, Lovett, Pyle, & Miller, 2011).

Kentucky offers an interesting opportunity to examine how Appalachia's health issues might vary in comparison to non-Appalachian counties within a single state already experiencing health issues. Researchers have noted longstanding poverty issues in Kentucky, particularly its Appalachian counties (Monroe, Kruse, & Chadwick, 2014). Of Kentucky's 120 counties, 54 are located in Appalachia per the Appalachian Regional Commission (ARC, 2012). Previous studies on health have largely focus on the entire Appalachian region, while few studies focus on specific states and how these differences may exist within Appalachian/non-Appalachian areas in the state (Greenberg, 2016; Mudd-Martin, Biddle, Chung, Lennie, Bailey, Casey, Novak, & Moser, 2014). As such, this study provides value to a topic that is not often discussed. It also provides a useful opportunity to apply theories of development and

inequality and understand how these may unexpectedly impact measures of health inequality over time.

The purpose of the present study is to examine differences in health insurance access, quality of life, and nearby access to doctors among Appalachian and non-Appalachian counties. The authors utilize difference of means testing of secondary data curated by the Robert P. Johnson Foundation to examine if standardized measures differ based on being located in Appalachia. Hypotheses specifically examine if health outcomes, insurance, income inequality, and physician access vary by being in Appalachian portions of Kentucky. Results indicate that Appalachian counties had reduced access to health insurance as well as lower quality of life outcomes. The paper concludes with a deeper exploration of how this relationship impacts residents of Kentucky's Appalachian counties.

Residents of Appalachia experience issues in accessing adequate healthcare and are often at a disadvantage due to the limited health providers in their area (Greenberg, 2016; Griffith et al., 2011; McGarvey et al., 2010; Barcus & Hare, 2007). Geography is consistently linked to the state of healthcare in this region, such as the access to healthcare facilities, travel time, and the financial burden to pay for office visits (Barcus & Hare, 2007). Rural areas in Appalachia often do not have a hospital within an hour from their home and only have limited transportation ability to a primary care facility (Griffith et al., 2011). The eastern end of Kentucky is largely mountainous, with most areas having limited access to interstates. Limited access

places an increased importance on being able to access medical care close to home.

Appalachia's socioeconomic status further influences the framework of the inequities of healthcare (Monroe, Kruse, & Chadwick, 2014; McGarvey et al., 2010; Mudd-Martin et al., 2014; Huttlinger, Ayers, & Lawson, 2004). Individuals living in poverty are at increased odds of exhibiting poor health associated with the disparities in Appalachia (Monroe, Kruse, & Chadwick, 2014). Appalachian communities often have lower incomes as well as lower disposable income which can be budgeted for unexpected health crises or health insurance (McGarvey et al., 2010). Persistent poverty in Appalachia also correlates with the region's higher than national average mortality rates and morbidity rates (Huttlinger, Ayers, & Lawson, 2004). The Appalachian region experiences higher rates than the national average for multiple chronic illnesses as well, which can be better treated through resources like insurance and income (Hege, Ball, Christiana, Wallace, Hubbard, Truesdale, Hedge, & Fleming, 2018; Bombak, 2013; Griffith et al., 2011; Danaei, Rimm, Oza, Kulkarni, Murray, & Ezzati, 2010). The Appalachian region similarly has the highest rates of health issues, such as cardiovascular disease, cancer, hyperlipidemia, hypertension, and diabetes (Griffith et al., 2011). Yet, parts of Appalachian (including some of Kentucky's Appalachian counties) indicate frequent issues in obtaining health insurance to treat these illnesses (ARC, 2012).

Numerous healthcare disparities arise from unhealthy behaviors of Appalachian residents (Hege et al., 2018). It is reported to have the highest number of smokers across the United States, which correlates with health issues like cancer and heart disease (Griffith et al., 2011). Appalachian residents also have increased rates for other unhealthy behaviors, such as not engaging in healthy physical activity or making healthy lifestyle choices (Bombak, 2013). A lack of access to nutritious food leads to obesity, poor physical behavior leads to cardiovascular issues, and mental health is also becoming an issue (Hege et al., 2018). High mortality rates in the United States are linked to risk factors such as high blood pressure, high glucose levels, and smoking, this region is known to exhibit the highest mortality rates for these risk factors across the country (Danaei et al., 2010). Appalachian parts of Kentucky are known to be among the highest areas for heart disease due to deprivation of poor health patterns among individuals and geographic inequality in healthcare facilities (Barcus & Hare, 2007).

Much of Appalachia's health issues are arguably shaped in part by long-term economic trends in the region which have persisted across generations. The spatial stratification hypothesis states that the geography of rural regions limit healthcare opportunities and is marginalized by persistent poverty (Greenberg, 2016). This hypothesis posits there is a relationship between spatial inequality and the inadequacy of healthcare among Appalachia and, due to the longer the distance from a healthcare facility, the more likely individuals are to have healthcare issues (Greenberg, 2016). Residents of Appalachia do not have access to transportation or cannot afford travel expenses (Greenberg, 2016). The inadequacy of available resources and

qualities in a location can shape individual life and quality of life. Spatial inequality is a major geographical issue that impacts individuals due to their location and cultural background. Rural areas are at a disadvantage due to the lack of opportunities available and their socioeconomic background (Greenberg, 2016). Residents struggle to obtain affordable health insurance. Patients are sometimes turned away and do not receive the same health care when they do not have health insurance. Physicians will alter the care and provide an easier fix to the problem when individuals do not have health insurance. Low-income rates and excessive poverty in the region make it hard for residents to afford health expenses.

Kentucky presents an interesting case for examining health in its eastern Appalachian end, as it is a state already experiencing health issues as a whole. In recent decades, Kentucky has been subject to intense issues with addiction, leading to a comparison of its opioid addiction to the 1980s HIV crisis (Sullivan, 2017). In 2019, America's Health Rankings rated Kentucky lowly on drug deaths, obesity, physical inactivity, smoking, and overall health-related behaviors. Moreover, the state was poorly ranked for preventable hospitalizations and overall clinical care issues. In terms of outcomes, the state received low marks for deaths from cancer, cardiovascular, diabetes, mental distress, and premature death. What remains fascinating is that, despite these unhealthy rankings, Appalachian Kentucky counties are still, on average, scoring lower on select health measures than the rest of the state.

A consistent issue in Kentucky is that its social and health issues often remained most concentrated in its eastern end, which is where all the Appalachian counties are located. For example, addiction has often been centered in Eastern Kentucky, particularly Perry, Leslie, Knott, and Breathitt (Estep, 2015), which are all four Appalachian counties. Clay County (also an Appalachian county) was noted for having 2.2 million doses of hydrocodone filed in one year with a population of only 21,000 residents (Galewitz, 2017). Furthermore, Kentucky's poverty is also based largely in its eastern end. In 2018, 12 of 120 Kentucky counties ranked among the fifty counties with the lowest household income in the nation, which included Owsley, Clay, Martin, Lee, Bell, Harlan, McCreary, Wolfe, Knox, Magoffin, Clinton, and Breathitt. All but one (Martin) was in Appalachia. Owsley, an Appalachian county, ranked third, while Clay ranked 13th. The Appalachian Regional Commission labels much of Eastern Kentucky's Appalachian counties as distressed (the lowest possible rating). This ranking means that the counties have experienced generational poverty for thirty or more years.

Ronald Eller's work on uneven development in the Central Appalachian region (which includes Eastern Kentucky) argues that its inequalities are partly rooted in its political economy (Eller, 2008). Appalachia was long understood as an area set aside for resource harvesting, such as coal and timber, which required minimal infrastructure development or investment in crafting a strong, permanent community. Instead, as resources were exhausted, workers and companies would simply travel to other areas and begin anew. Today, this translates into fewer

options for economic and individual growth and the continuation of lack of opportunities.

Method

In this study, four key questions were examined about adequate healthcare in the Appalachian region. First, do health outcomes vary among Appalachian and non-Appalachian counties in Kentucky? Second, does health insurance access vary among Appalachian and non-Appalachian counties in Kentucky? Third, does income inequality vary among Appalachian and non-Appalachian counties in Kentucky? Fourth, does access to physicians vary among Appalachian and non-Appalachian counties in Kentucky? Finally, what is the effect of living in an Appalachian county and the number of primary care physicians? To answer these questions, this study utilizes secondary data from the Robert P. Wood Foundation. This 2018 dataset included measures for health and well-being for all counties in Kentucky and utilized data curated by the Foundation from other existing data sources described in the coming paragraphs.

This study included variables on the following measures: overall health outcomes, access to health insurance, income inequality, and access to physicians in the county. The health outcome variable in the present study is a scale created by the Robert P. Johnson Foundation. It is comprised of five measures (weights and original data source in parentheses): premature death (50%, National Center for Health Statistics or NCHS henceforth), poor or fair health (10%, Behavior Risk Factor Surveillance System or BRFSS henceforth), poor physical health days (10%, BRFSS), poor mental health days (10%, BRFSS), and low birthweight (20%, NCHS). This measure was standardized and expressed as a z score ($M = 0$, $SD = 1$). As a result, it can be interpreted by its distance from the mean of zero. As the intent of this dataset was to identify negative health outcomes, the scores were intentionally multiplied by -1 by the dataset's organizers so that scores above zero indicate worse outcomes. For example, Breathitt, Wolfe, and Owsley counties all have negative health outcomes, so their scores ranged from 2.34 to 2.13, whereas comparatively healthy counties like Oldham, Boone, and Shelby counties ranged from -2.07 to -.151.

The remaining three independent variables come from single data sources curated by the Foundation. Income inequality is based on the income ratio of household incomes at the 80th percentile to incomes at the 20th percentile. This data is sourced from the American Community Survey and results are standardized. Insurance access is based on the number of persons under age 65 who do not have health insurance from the Small Area Health Insurance Estimates. Finally, access to primary care physicians is based on the ratio of physicians available in the county to county residents from the Area Health Resource File, American Medical Association. All three variables are standardized ($M = 0$, $SD = 1$). Again, these scores were multiplied by -1 by the dataset organizers so that positive scores represent worse outcomes.

The study utilized a variable delineating between Appalachian and non-Appalachian counties. Kentucky includes

the following Appalachian counties per the Appalachian Regional Commission: Adair, Bath, Bell, Boyd, Breathitt, Carter, Casey, Clark, Clay, Clinton, Cumberland, Edmonson, Elliott, Estill, Fleming, Floyd, Garrard, Green, Greenup, Harlan, Hart, Jackson, Johnson, Knott, Knox, Laurel, Lawrence, Lee, Leslie, Letcher, Lewis, Lincoln, McCreary, Madison, Magoffin, Martin, Menifee, Metcalfe, Monroe, Montgomery, Morgan, Nicholas, Owsley, Perry, Pike, Powell, Pulaski, Robertson, Rockcastle, Rowan, Russell, Wayne, Whitley, and Wolfe. In all, there are 54 Appalachian counties and 66 non-Appalachian counties in Kentucky. This variable was modeled as a dichotomous dummy, where zero equaled being a non-Appalachian county in Kentucky, and one equaled being an Appalachian county in Kentucky.

Based on the four major questions and the variables available, this study examined four hypotheses designed to add new information about differences in healthcare among Appalachian and non-Appalachian counties in Kentucky.

H1. First, the authors examined health disparities. Based on extensive literature on health in Appalachia, the authors hypothesized that residing in an Appalachian Kentucky county will statistically correlate with negative health outcomes when compared to non-Appalachian Kentucky counties.

H2. Next, the authors examined health insurance access. McGarvey and associates' (2011) work on health care disparities in Appalachia argues that residents of Appalachia frequently lack health insurance or sufficient funds for insurance payments. As a result, the authors hypothesized that residing in an Appalachian Kentucky county will statistically correlate with lower health insurance access when compared to non-Appalachian Kentucky counties.

H3. Third, the authors examined income inequality. Mudd-Martin and associates (2014) recently published on the idea of health behaviors and socioeconomic status. Here, they argue that inequities in socioeconomic status are linked to unhealthy lifestyle behaviors. Therefore, the authors here hypothesized that residing in an Appalachian Kentucky county will statistically correlate with higher income inequality when compared to non-Appalachian Kentucky counties.

H4. Finally, the authors examined access to physicians within one's county of residence. Huttlinger and associates (2004) provide background on the limited access to healthcare Appalachia and dramatic rates of morbidity through Appalachia. Residents living in Appalachian counties generally suffer from spatial inequality and cannot afford travel expenses. Here, again McGarvey and associates' (2011) work applies to the spatial inequality theory, which argues that numerous Appalachian counties physically lack health care providers, and this exacerbates health outcomes overall. Based on these findings, the authors hypothesize that residing in an Appalachian Kentucky county will statistically correlate with lower access to physicians when compared to non-Appalachian Kentucky counties.

Results

Based on the continuous standardized variables available in the dataset and using a county’s status of being inside/outside Appalachia, the authors elected to use difference of means testing to examine the above hypotheses. In each case, an independent samples t-test will provide statistical evidence of differences of means in each hypothesis based on being inside an Appalachian Kentucky county

Table 1 examines descriptive statistics for variables in this study. Again, note that four of the five variables are standardized z scores ($M = 0, SD = 1$). When looking at the ranges (min and max), the data show how scores are distributed inside the z score. Here, negative scores are somewhat counter-intuitive, as a negative score is coded as being a more desirable outcome (e.g., more physician access). Note also that increasing distance from the mean of zero indicates cases either getting worse (a counterintuitive positive mean) or better (negative mean). The study includes 45 counties which are designated as being in Appalachia per the Appalachian Regional Commission, and this variable will be used to determine how the other variables in the table might differ based on being an Appalachian or non-Appalachian county in Kentucky.

Table 2 lists the results of difference of means testing based on the hypotheses in this study. In hypothesis 1, the analysis indicates there is a statistical difference in health outcomes between Kentucky’s Appalachian and non-Appalachian

counties. Here, Appalachian counties scored a mean of .649 vs non-Appalachian counties -.536, indicating that overall Appalachian counties had negative health outcomes. This supports rejecting the null hypothesis.

In the second hypothesis, the analysis indicates a statistical difference between Appalachian and non-Appalachian counties regarding health insurance access. As with the first hypothesis, Appalachian counties on average scored poorly in terms of insurance access when compared to non-Appalachian counties in the same state. This finding again supports rejecting the null hypothesis.

The third hypothesis considers how Appalachian counties may fare differently in terms of income inequality. The analysis supports this to be the case. Appalachian counties scored on average .556 (which indicates higher income inequality) while non-Appalachian counties (at -.472) showed lower income inequality levels. This supports rejecting the null hypothesis.

The final hypothesis examines if Appalachian counties may experience less access to physicians in their counties. Again, the analysis supports this to be true in Kentucky, albeit with slightly less distance from the mean for both Appalachian and non-Appalachian counties. Here, Appalachian counties scored .072 which, while indicating lower access to physicians, is not as extreme as the previous three findings. This supports rejecting the null in the fourth hypothesis.

Variable	Mean	Standard Deviation	Min	Max	Obs
Health outcomes z score	-.002	.873	-2.07	2.34	120
Income inequality z score	-.009	.966	-1.83	3.00	120
Health Insurance z score	-.001	1.000	-3.14	1.97	120
Physician access z score	.001	.978	-3.09	1.50	120
Appalachian county status (0=not Appalachian county, 1=Appalachian County)	.45	.499	0	1	120

Table 1. Descriptive Statistics

Variable	Group	n	Mean	SD	t	df	p
H1: Health Outcomes	Non-Appalachian County in KY	66	-.536	.516	10.03	118	.001
	Appalachian County in KY	54	.649	.772	10.03	118	.001
H2: Health Insurance Access	Non-Appalachian County in KY	66	-.415	1.00	-5.655	118	.001
	Appalachian County in KY	54	.508	.732	-5.655	118	.001
H3: Income Inequality	Non-Appalachian County in KY	66	-.472	.808	-6.822	118	.001
	Appalachian County in KY	54	.556	.838	-6.822	118	.001
H4: Number of Primary Physicians	Non-Appalachian County in KY	66	-.059	.987	-.0731	118	.023
	Appalachian County in KY	54	.072	.972	-.0731	118	.023

Table 2. *T-test Results Comparing Health Care Outcomes in Kentucky.*

Discussion

Appalachia has a serious health issue at hand on multiple fronts. This study confirms that Appalachian counties in Kentucky scored undesirably in terms of health care access, insurance access, physician access, and overall health outcomes. Moreover, findings about income inequality in Kentucky's Appalachian counties matches regional research longstanding findings. These findings are no surprise and simply confirm what is already known. However, the noted difference between Appalachian and non-Appalachian counties in a single state (namely Kentucky) is intriguing and raises many questions about what it really means. This study indicates that, in at least one state's case, the negative impact of living in Appalachia is so strong that, when analyzed as part of a state (which is struggling with its own health issues), the impact remains present and worse than the remainder of the state.

This study reiterates that a change needs to be made in the healthcare of Appalachia, but the great difficulty then is figuring out where to begin. Kentucky offers a valuable place to start, yet the options at first glance feel despairingly limited. In Eastern Kentucky, the state's many budgetary woes (worsened by the appearance of COVID in 2020) limit new approaches. Existing hospitals in the region are probably not suited to create changes that will alter the region. In fact, the hospitals (and to some degree, physicians in the area) are largely focused on solving issues on the back end of health problems, such as treating diabetes or lung problems, rather than addressing the front end by helping residents adjust diets and longstanding habits like smoking. Thinking again of spatial inequality theory, the eastern end of the state presents very different geographic features from the rest of the state, making access to healthcare a serious issue. Whereas much of Central and Western Kentucky are rolling hills or flatland areas, Eastern Kentucky presents a rugged mountain terrain

unfavorable for most multi-lane highways. Likewise, there are no major projects that will rapidly undo generations of uneven development in the region.

Instead, innovative, low-cost or free community-level options may provide the best starting point. For example, establishing community-level programs where residents can take an active role in well-being may work. The local farmer's market may be one place to begin (Knoempel, Brewer, Mudd-Martin, & Stephenson, 2020). Farmer's markets provide an opportunity to bring communities together in discussing healthy food options, the importance of unprocessed foods, and rethinking unhealthy diets for longer, healthier lives. Farmer's markets really require no more than public space and tables, and in rural areas often organically appear in parking lots. This may also support local economic growth in the region by offering local business opportunities even while it creates a sense of togetherness and identity (Peine, Azano, & Schafft, 2020; Chesky, 2009). Other options could be finding ways to incentivize physical activity through local clubs and organizations (Ball, Abbot, Wilson, Chisholm, & Sahlqvist, 2017). For example, having a morning walking club could help create a useful approach to activity while also encouraging social support and community growth. This also incentivizes towns and cities providing a space for activities, whether a developed city park, a planned pathway around the existing downtown area, or a mowed pathway in a publicly available field.

At the state level, efforts to continue decreasing rural isolation in Eastern Kentucky improves healthcare access while also providing economic possibilities to new employers. Although the area is often rugged, the Bert Combs Mountain Parkway is one such successful effort to connect eastern towns and cities with the remainder of the state, and it continues to expand today. This creates a linkage to Lexington for major

medical care (such as heart attack care), whereas other eastern counties have less access. By opening these areas to larger transport trucks, it also creates the opportunity for new businesses to relocate to the area amid a large unskilled labor pool. New employers create further options for economic development by supporting tax bases, attracting new residents, and stabilizing land values. Over time, this can create communities with improved economic futures.

Kentucky's State Loan Repayment Program also offers a valuable angle for attracting and potentially retaining medical caregivers in the region. This program allows student loan repayment in exchange for a two-year commitment to serving in Kentucky. The program includes physicians, nurse practitioners, and substance abuse counselors, and pharmacists, to name a few. The program has been in place since 2003. Reflecting on America's Health Rankings data from 2003 to present, it's not clear if this program has been directly successful in improving health rankings. However, promoting this and similar programs (or perhaps extending the period of service for more than two years) would be a valuable approach to bringing more medical care to the region.

Another consideration is how variables not examined in this study impact health outcomes. For example, education remains a central variable in predicting one's health outcomes (Center on Society and Health, 2015). Education comes into play through degrees (Bachelors, Masters, etc.) which create access to better jobs, and therefore better pay and potentially better insurance care. Employers may also offer free health care options, such as free annual check-ups. Education is critical in regards to following complicated medicine regimens, avoiding poor health behaviors, and being versed in healthy eating options. As such, supporting increased education in Kentucky, while a costly, lofty proposal, may prove to pay far greater savings generations down the line.

Finding ways to encourage Kentuckians to proactively impact their health outcomes would also be a valuable way to approach this. One option could be to transition the focus on chronic illness care to preemptive care in the state in general. For example, finding national or state support for offering free or reduced cost annual check-ups to all Kentuckians regardless of employment or insurance status could help identify chronic issues such as high blood pressure and address them early, creating better health over time and improving health outcomes (Elton & Ural, 2014). Treating chronic illnesses later in life prove far more costly and deadly, while mitigating these illnesses earlier in life can limit their long-term impacts. This would be a major shift in care approaches but is something that county health programs may be able to rally around as a cost-reduction approach over time.

Appalachia has faced unique inequalities unseen in other regions in the United States. Rural Appalachia continues to face poverty issues and lack of quality of life. Appalachians are at a disadvantage of improving their quality of life due to simply a lack of resources in this area. Indeed, residents suffer from inadequate healthcare and geographical inequalities; This region has the highest rates of diabetes and heart disease in the country. Unhealthy habits such as smoking and poor food options (e.g.

living in a food desert) remain an issue. Spatial issues, such as the mountains, also create access issues for medical care. Overall, unless this region finds ways to make regional changes, it will continue on this path.

There are options available, however, and these largely require rethinking how healthcare works in places like Eastern Kentucky. Given its location as part of Appalachia, Eastern Kentucky provides an ideal testing ground for improving health throughout Appalachia (particularly central Appalachia). It also provides an extraordinary opportunity to study how spatial inequalities can be challenged in many other areas through innovative approaches. Furthermore, the area provides an opportunity for the people of Appalachia to take on a new, central role in embracing their own health through community-driven projects.

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