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The Investigation of Appalachian Public Health

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EASTERN KENTUCKY UNIVERSITY

The Investigation of Appalachian Public Health

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Abstract

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Public health in Appalachia is a complex area of study. While urban-rural disparities have been a focus of researchers and policy-makers for decades, inequalities continue to grow. During the past two semesters of Honors Thesis Research, the prevalence of disparities between Appalachian college students and non-Appalachian college students at Eastern Kentucky University was brought into question. Through the use of outside sources and surveys amongst current EKU students, this research was conducted to discover not only the challenges that Appalachian college students face, but also what this campus can do to help acknowledge and mitigate the students' challenges; therefore, increasing their academic achievements, quality of life, and decrease the gap in health disparities between Appalachian and non-Appalachian college students. Certain factors including hometown, total household income, health insurance coverage, health care access, and others were studied in order to examine the differences between Appalachian and non-Appalachian college students. It is now proven by this research study that there is a striking difference between the disparities that Appalachian college students face, as compared to non-Appalachian college students. This research project can help bridge the gap between Appalachian and non-Appalachian college students on Eastern Kentucky University's campus and beyond.

Keywords and phrases: Public health; health disparities; Appalachia; college students; health care; social determinants of health

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Acknowledgements

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Introduction

When diving into the world of healthcare, one of the major hotspots of research being conducted is centered around health disparities in the Appalachian region. This research includes anything from social determinants of health, disparities of physical and mental health in rural areas, lack of access to health care, likelihood of chronic illness, a higher rate of substance abuse, and so much more. The Institute of Medicine (IOM) defines health care disparities as differences in treatment or access between population groups that cannot be justified by different preferences for services or differences in health (McGuire et al., 2006). Before discussing all of the disparities in healthcare the Appalachian region faces, I will introduce Appalachia as a whole.

Appalachia is made up of 420 counties across 13 states and spans 205,000 square miles, from southern New York to Northern Mississippi. The region's 25 million residents live in parts of Alabama, Georgia, Kentucky, Maryland, Mississippi, New York, North Carolina, Ohio, Pennsylvania, South Carolina, Tennessee, Virginia, and West Virginia (Figure 1). The Appalachian region is known for its beautiful landscapes of the Appalachian Mountains and its rich culture and history. Despite this, Appalachia is plagued with poverty, healthcare disparities, and an overall lower quality of life and health when compared to the rest of the country. Appalachia has been characterized as a place with extensive health disparities and limited health care infrastructure and services. It is a region with environmental, economic, and social conditions that contribute to poor health and substandard health care. The region has experienced a shortage of health care professionals including physicians, dentists, nurses, health educators, clinics, and

hospitals. Rural Appalachian residents tend to be sicker, poorer, and have worse health behaviors than their non-rural peers (Leider et al., 2020).

A multitude of factors contribute to the large gap between health outcomes in Appalachian areas and non-Appalachian areas. One factor contributing to health disparities in Appalachia is limited access to health care. According to the latest numbers available from the U.S. Centers for Disease Control and Prevention, more than 28.6 million Americans were uninsured in 2018, or 8.5% (Taylor, 2018). In the 13 Appalachian states, the rates of the uninsured are mostly above the national average (Figure 2). Limited access to health care services has a dramatic effect of mortality and morbidity in many Appalachian populations. This problem often results from Appalachian areas that are remote and exist outside urban boundaries where transportation is limited. A study titled "Health Care in Appalachia: A Population-Based Approach" studied the health status of people who live in rural, coal-producing counties of Southwest Virginia. These residents have a greater incidence of heart disease, malignant neoplasms, chronic obstructive pulmonary disease, and diabetes which contributes to a morbidity rate that is higher than that in the rest of the state (Beverly et al., 2020). The geography of this area represents the geography of a large portion of Appalachia and has a great contribution to the limited access of health care services that Appalachia faces. This area is characterized by excessive hilltops and mountains with secluded valleys between them which give a sense of isolation, peacefulness, and separateness from the surrounding urban areas. These isolated valleys and rugged mountains present a countless number of transportation problems for those who do not have a car and have limited to no public transportation options. The isolated location of

several Appalachian areas results in a population that is often secluded from health care service options. While Appalachia struggles from isolation from the rest of the country, Appalachia's cultural heritage is reflected in its art, music, and literature. While family roots are strong, many of Appalachia's younger generations are forced to leave Appalachia to pursue education and employment in urban areas. The remaining population in southwest Virginia reflects a group that has less than a high school education, is jobless while on welfare and disability, is uninsured, and not regularly being seen by a primary care provider. According to the Appalachian Regional Commission Health Disparities Report, there are 12% fewer primary care providers per 100,000 residents in Appalachia than in the country overall. Of the small population remaining, the few who do have means to travel to seek health care, many respondents noted that they had to wait up to three months for a general doctor's appointment. It was also common to spend several hours in the doctor's office after the appointment was granted (Huttlinger et al., 2004). There is also a severe lack of specialty care providers in Appalachia, which often leads to the need to travel across state lines or several hours across the state in order to seek specialty care. In Appalachia, there are 35% fewer mental health providers, 28% fewer specialty physicians, and 26% fewer dentists than in the country overall (Appalachian Regional Commission Health Disparities Report 2021). Another study titled "Access and Quality: Does Rural America Lag Behind?" compared access to and quality of medical care in urban and rural areas. Research shows that per capita physician supply is lower in rural areas and that smaller inpatient facilities in the area lack technology needed for intensive services. The supply of physicians, particularly specialists, is much lower in rural areas. There were 5.3 primary care providers and 5.4

specialists per 10,000 population in rural areas, as compared to 7.8 primary care physicians and 13.4 specialists per 10,000 population in urban areas (Reschovsky and Staiti). Due to lower population density and fewer health care providers in rural areas, patients usually wait longer for appointment dates, travel longer to see providers, and wait longer in doctors' offices. Less convenient care options essentially make health care more costly to use; having fewer health care providers usually leads to physicians being less likely to accept new patients and more likely to charge higher fees. Rural patients face financial barriers that discourage them from seeking care because they tend to be poorer and less likely to have health insurance coverage, compared to urban populations.

Another factor contributing to health disparities in Appalachia is the social determinants of health. The Centers for Disease Control and Prevention defines social determinants of health as "the conditions in the environments where people are born, live, work, play, worship, and age that affect a wide range of health, functioning, and quality-of-life outcomes and risks." Examples of social determinants of health include safe housing, transportation, neighborhoods, racism, discrimination, violence, education, job opportunities, income, access to nutritious foods and physical activity opportunities, polluted air and water, and language and literacy skills (Center for Disease Control and Prevention). Appalachians suffer from the effects of social determinants of health. The social determinants of health provide an important narrative about understanding and improving disparities experienced by Appalachian populations. Minority groups and individuals living in poverty or suffering from chronic health conditions experience greater vulnerability to mental health disorders. Social determinants impact a wide variety of quality-of-life outcomes. Life challenges associated with poverty generate

conditions that lead to poorer health habits, poor households, food insecurity, lower learning ability, and reduced physical and emotional well-being. “Poverty often leads to poor health, and poor health frequently leads to poverty” (Baffour, 2017). Appalachia is poverty-stricken, which ultimately leads to poor health. Research also links food insecurity with poor behavioral health. LeChance et al. (2014) found that adolescents who reported food insecurity and poor diet also reported increased stress, rage, shame, diminished concentration, and fatigue. Many Appalachians experience community factors that result in unreliable access to affordable and nutritious food. Small town and rural grocery stores are often far from distribution centers and lack profitability due to their limited customer base. As a result, rural residents may rely on small stores that charge higher prices while offering limited selections and reduced quality. Access to safe and affordable housing is one of the most important social determinants of health. According to the World Health Organization (2014), extreme poverty and housing are interrelated, as overcrowding and unhealthy conditions often produce home environments unconducive to learning for children. Providing affordable and permanent housing with support services can lead to improvements in health care delivery. Education also has a large role in health. Education is essential for building emotional resilience and reducing risk for mental health disorders (World Health Organization, 2014). Schools serve a critical role in identifying risks, assessing the need for individual and family services, and delivering health prevention programs to Appalachian youth and their families. Furthermore, social determinants of health play a role in Appalachian health as a whole. Because Appalachian residents struggle with poverty, a lack of education, isolation from transportation, healthy food choices, affordable housing, and so many other factors, this

leads to an overall decline in mental and physical health in Appalachian residents as compared to non-Appalachian residents.

Another factor contributing to health disparities in Appalachia is related to environmental issues. Occupations common in Appalachia such as coal mining and logging come with serious health consequences to not only the workers, but also the entire community. In Appalachia, 28 percent of all power plants are coal fired, compared with 15 percent of power plants in the rest of the nation (Hendryx). Coal releases more carbon dioxide, sulfur dioxide, nitrous oxide, mercury, arsenic, lead, and other toxic elements and compounds per unit of energy than any other source. Pollution from coal combustion contributes to acute and chronic morbidity and mortality and it causes about 24,000 premature deaths among Americans every year (Physicians for Social Responsibility, 2007). Air quality levels in Appalachia are among the worst in the nation. If a county fails to meet air pollutant criteria for ozone, carbon monoxide, nitrogen dioxide, sulfur dioxide, lead, or other matter, the EPA designates it as a "nonattainment area." Between 2004 and 2006, 23 percent of Appalachian counties had one or more nonattainment episodes, compared with 16 percent of non-Appalachian counties (Environmental Protection Agency). Arsenic in water is clearly linked to lung and skin cancer (Ferreccio, 2000). Environmental pollutions found in coal and coal processing are liked to a variety of serious illnesses, including cardiovascular, respiratory, kidney diseases, and some forms of cancer. Table 1 shows variables that compare behavioral, socioeconomic, and health care disparities between Appalachian counties with and without coal mining and compared with the rest of the nation. It can be seen that coal mining areas are significantly worse in terms of smoking, poverty, unemployment, and

college education. Logging is another major economic activity in Appalachia. Logging is recognized as one of the top occupational causes of death and injury (Kennard, 2020). In 2007, there were 89 fatalities in the logging industry, equating to 90.8 fatalities per 100,000 full-time workers, which makes logging the deadliest occupation in the country (Bureau of Labor Statistics, U.S. Department of Labor).

The disparities and challenges that Appalachian residents face have a large effect on Appalachian college students. Largely, higher education is not valued in Appalachia. Most families are poverty-stricken and either do not have the financial means to send their children to college, or simply encourage their children to start in the workforce without obtaining a bachelor's degree. Only 23 percent of the working age population (ages 25-64) in the Appalachian region have a bachelor's degree – 7 percentage points lower than the U.S. average (Pollard & Jacobsen, 2012). Residents of the Appalachian region are less likely to enter and eventually succeed in college than non-Appalachian populations (Bradbury & Mather, 2009). Most college students that are from Appalachia are first-generation students, which refers to students whose parents did not graduate from college. First generation students tend to come from lower-income families and have lower educational aspirations in high school (Pratt & Skaggs, 1989). First generation students are disadvantaged when it comes to the level of family support, degree expectations, planning, and college preparation. Education attainment levels in the Appalachian region are low. Average high school completing in Appalachia is only 64% versus 80% for United States as a whole (Shaw et al., 2004). A study titled "The Integration of First-Year, First-Generation College Students from Ohio Appalachia" examined the academic, social, and interpersonal experiences of first-generation,

Appalachian college students. The study found four important factors that affected the Appalachian students' transition into college: the pull of home, adjustment, belonging, and financial realities. The study found that strong connections with home played a critical role in student success, in both positive and negative ways. Some first-generation, Appalachian students had strong family support to pursue a college degree, which positively affected the students' experiences. However, some students experienced guilt and worry as a result to their family ties. Some students had to drive back and forth from their hometown and their college town to help with tasks at home on the weekends, spend time with family, etc. The study also showed that financial concerns created barriers for nearly all first-generation Appalachian students. Poverty rates in Appalachia are high. Per capita income for residents in the Appalachian region is approximately $8,600 below the average for the nation (Bradbury & Mather, 2009). Most of the participants worked 12-25 hours each week to earn money to help pay for the cost of their education. This workload, on top of a full college course load, has the potential to have a negative effect on grades.

There are several factors that contribute to health disparities and the poor health outcomes that plague Appalachia. Reading this information drove my desire to study this topic more and conduct a study of my own.

Purpose/Hypothesis

The purpose of this study is to investigate the health disparities of Appalachian college students compared to non-Appalachian college students. By understanding these health disparities, this research project will be able to lead to ideas and legislation that help close the gap in health care between urban and rural areas. As a college student at

Eastern Kentucky University, it is my goal to assess the differences in EKU Appalachian students as compared to EKU non-Appalachian students. As a regional higher education institution, EKU serves a 22-county service region in Kentucky. Fourteen of the 22 counties in EKU's service region are categorizes as having a distressed economic status by the Appalachian Regional Commission (Appalachian Regional Commission, 2013). The ARC defines distressed counties as the most economically depressed counties in the region, and they are ranked in the bottom 10% of the nation's counties. According to data from the United States Census Bureau (2013), 13 of the 22 counties in EKU's service region are in the top 100 poorest counties per median household income in the United States. The goal of this study is to analyze EKU's Appalachian students' background and experiences in health care as compared to EKU's non-Appalachian students. This study would benefit EKU's administration, faculty, and student body by closing the gap between Appalachian and non-Appalachian students.

Methods

Study Design

A Google survey was electronically sent out and data was collected. Participants were contacted via email from their professors and student organization leaders.

Study Population

The survey was accessible for all male and female undergraduate and graduate students at Eastern Kentucky University.

Baseline Assessment

The survey consisted of 18 questions, each created with a specific purpose to prove a variety of factors about health disparities and other challenges faced by

Appalachian and non-Appalachian students. The first few questions asked the participants about their race and ethnicity, gender, and home state/town. The primary researcher was curious to breakdown nay commonalities throughout these questions and also to see if they were in correlation to previous research findings. The survey taken then went on to ask each participant the range of their total household income of their childhood home and whether or not they had health insurance, in order to assess the financial aspect of health disparities in Appalachia, The participants were asked if they had a usual place to go for medical care, to rate the access to healthcare in their hometown, whether they were able to seek needed medical care, dental care, and prescription medicine, if they were able to get needed emergency care, whether themselves or a family member suffer from any chronic diseases, and if it was necessary to travel to seek medical attention in order to assess access to health care in Appalachian areas versus non-Appalachian areas. The survey went on to ask about healthy food choices and the importance of a healthy lifestyle in their childhood home in order to assess these differences between Appalachia and non-Appalachia.

Results

Over the course of 9 days, the survey had 444 total responses. Figure 3 shows the percentages of the race/ethnicity of the respondents. 75.7% of respondents were female, 24.1% were male, and 0.2% were non-binary (Figure 4). The results showed that 55.2% of the respondents were from an Appalachian area, and 44.8% were non from an Appalachian area (Figure 5). One question in the survey asked respondents to choose a range of total household income during most of their childhood. The results showed that

31.1% of respondents had a total household income of $20,000 - $60,000, 33.8% of respondents chose $60,001 - $99,000, and 24.3% of respondents chose $100,000 - $200,000 (Figure 6). Out of the Appalachian respondents, 37.1% of respondents chose $20,000 - $60,000 as compared to only 23.6% of Non-Appalachian respondents. Only 20.8% of Appalachian respondents had a total household income of $100,000 - $200,000 as compared to 28.6% of non-Appalachian (Figure 7). This is consistent with research that shows that Appalachian residents usually have a lower total household income than non-Appalachian residents (Eberhardt & Pamuk, 2004) . Another question in the survey asked respondents whether or not they had health insurance. The primary researcher predicted that most Appalachians would not have health insurance, however 95.9% of respondents had health insurance (Figure 8). This can be explained by some respondents being eligible for Medicaid services (Benitez & Seiber, 2018). Another question in the survey asked respondents to rate their access to healthcare in their hometown on a scale from 1-5, 1 being difficult to access and 5 being easy to access. According to the results, more Appalachian respondents rated access to healthcare lower on the scale, and more non-Appalachian respondents rated access to healthcare higher on the scale (Figure 9). This correlates with research showing that Appalachian residents have a greater challenge to access to healthcare as compared to non-Appalachian residents (Behringer et al., 2018). Another question in the survey asked if respondents were able to get needed emergency care in the last 12 months. The question was scale based with 1 representing never, 2 representing sometimes, 3 representing usually, 4 representing almost always, and 5 representing always. For ratings 1-4, Appalachian residents were at a higher percentage. For rating 5, non-Appalachian residents were at a higher percentage (Figure

10). This is consistent with data showing that access to emergency healthcare is more difficult for Appalachian residents (Kronefield, 2013). Another question in the survey asked respondents whether it was necessary or not to travel outside of their hometown to seek medical care. Out of all respondents, 15.1% responded that it was always necessary to travel, 44.4% responded that sometimes it was necessary to travel, and 40.5% responded that it was not necessary to travel for medical care. Out of Appalachian respondents, 17.1% responded that it was always necessary to travel for medical care, 51.4% responded it was sometimes necessary to travel, and only 31.5% of Appalachian respondents responded that it was not necessary to travel for medical care. Out of non-Appalachian respondents, 12.6% responded that it was necessary to travel for medical care, 35.7% responded that it was sometimes necessary to travel, and 51.8% responded that it was not necessary to travel for medical care (Figure 11). This data correlates with research stating that it is often necessary for Appalachians to travel to seek specialty medical care (Phillips and McLeroy, 2004). One question in the survey asked how many miles the nearest supermarket was from their childhood home. This question was meant to assess access to healthy and reliable food choices. The results showed that 25.7% of Appalachian respondents were located 10 or more miles from the nearest supermarket, as compared to only 16.6% of Non-Appalachians who were located 10 or more miles from the nearest supermarket. 21.1% of non-Appalachian respondents were less than 1 mile from the nearest supermarket, as compared to 15.1% of Appalachian residents who were located less than 1 mile (Figure 12). This data corresponds to research that Appalachian residents struggle with access to healthy and reliable food sources due to geographical isolation (LeChance et al., 2014). Another question in the survey asked respondents to

rate the importance that their household placed on living a healthy lifestyle (prioritizing exercise, healthy meals, mental health exercises, etc.). A scale score of 1 represented no importance, and 5 represented high importance. The results are shown in Figure 13. More Appalachian respondents answered a lower rating for the importance of a healthy lifestyle, and more non-Appalachian respondents answered a higher rating for the importance of a healthy lifestyle. This correlates with data showing that Appalachian residents usually do not prioritize living a healthy lifestyle, which leads to poorer health outcomes (Ludke & Obermiller, 2012). One question in the survey asked if the respondents or a family member of the respondents' suffered from any chronic diseases. This was an open ended question. 96.2% of respondents answered yes, indicating that either themselves or a family member suffered from a chronic disease. These diseases include, but are not limited to multiple sclerosis, cancer, diabetes, Alzheimer's, asthma, COPD, kidney disease, heart disease, depression, and hypertension. Only 3.8% of all respondents answered no to this question (Figure 14). This indicates that most respondents or their family members suffer from a chronic disease that they may or may not be able to seek medical attention for due to lack of financial resources, lack of medical care in their area, lack of health insurance, or other reasons (MacKinney, et al., 2019). One last question of the survey was an open ended question that asked respondents if they have ever had a medical issue that they could not seek medical attention for because of lack of access to a healthcare provider, financial reasons, or other reasons. This question had a lot of interesting responses. Respondents answered with a variety of answers, some including that they could not seek medical attention because of financial reasons, extensive travel to see a healthcare provider, lack of health insurance,

their insurance did not cover the specialty care they needed, they were unable to afford mental health care, and many other responses. Only 7.7% of all respondents answered "no" to this question. This shows that 92.3% of all respondents have once had a medical issue that they could not seek attention for because of the financial, geographical, or access to healthcare situation they were in (Figure 15). This correlates to research explaining that many Appalachian residents are unable to seek attention for needed medical care, and this can explain why overall quality of life and health in Appalachian regions is not equal to other parts of the country (Reschovsky & Staiti, 2005).

Conclusions and Discussion

To relay the central purpose of conducting this study, the goal was to investigate health disparities of Appalachian college students compared to non-Appalachian college students. Through my research and the survey results, there appeared to be s striking difference between the Appalachian results and the non-Appalachian results. As predicted, the Appalachian respondents mostly fell behind in healthcare quality, access, prioritizing a healthy lifestyle, total household income, and other areas.

There were a few limitations in conducting this analysis. One limitation was the use of a convenience sample. By sending the survey to past professors, student led organizations, and people the primary researcher was in direct contact with, the respondents may not be a true representative population of Eastern Kentucky University. It would have been more efficient to get results from more students at EKU. Another limitation I found while researching is the type of questions I asked. There were some questions in the survey I could have asked in a better way or had more results to choose from. For example, on the "Do you have health insurance?" question, it would have been

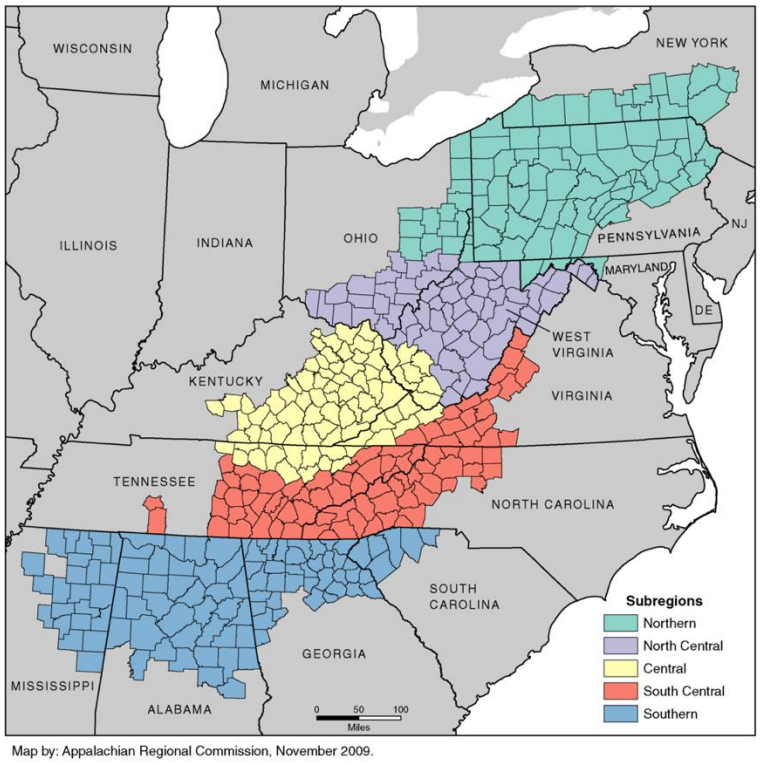
more effective if the respondents specified whether they had independent health insurance, Medicaid, etc. One more limitation to the study was that I only compared frequencies in the data. Results would have been more accurate following statistical analysis.

Learning about these disparities that Appalachian students face, I think it is important that Universities, health care systems, local and state government understand the challenges that Appalachian students face and appropriately accommodate them. Once we can fully understand these challenges, we can hopefully work towards closing the gap in opportunities, health care, educational attainment, and overall quality of life between Appalachian and non-Appalachian students. By learning about these issues, Eastern Kentucky University and eventually other universities can work to supply Appalachian students with what they need in order to be successful.

Appendix

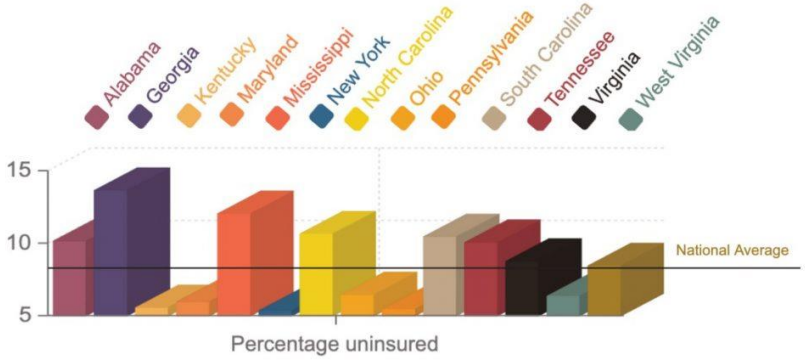
Figure 1: Appalachian Region

Map by: Appalachian Regional Commission, November 2009



Map by: Appalachian Regional Commission, November 2009.

Figure 2: Percentage Uninsured in Appalachia



Graphic: Dana Coester/ 100 Days in Appalachia Data Source: U.S. Centers for Disease Control and Prevention

Figure 3: Survey Question: What race/ethnicity best describes you?

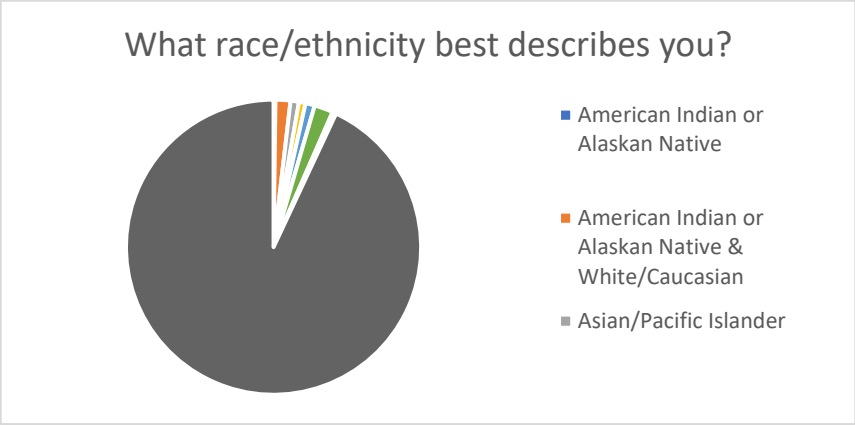


Figure 4: Survey Question: What is your gender?

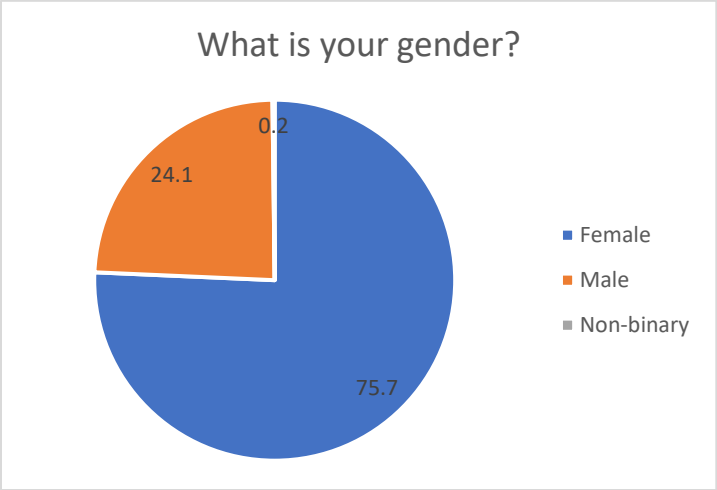


Figure 5: Survey Question: Is your hometown considered Appalachian?

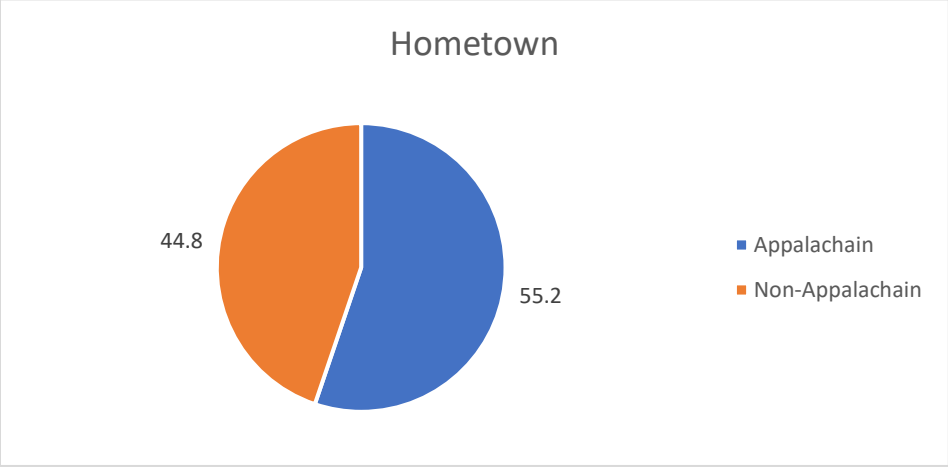


Figure 6: All Respondents Total Household Income

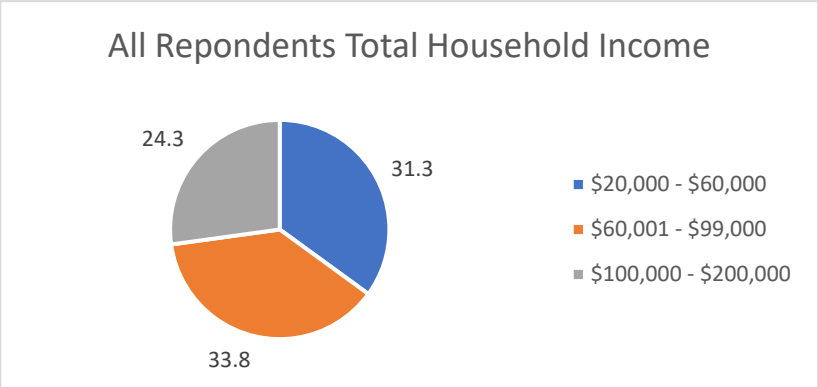


Figure 7: Appalachian vs. Non-Appalachian Household Income

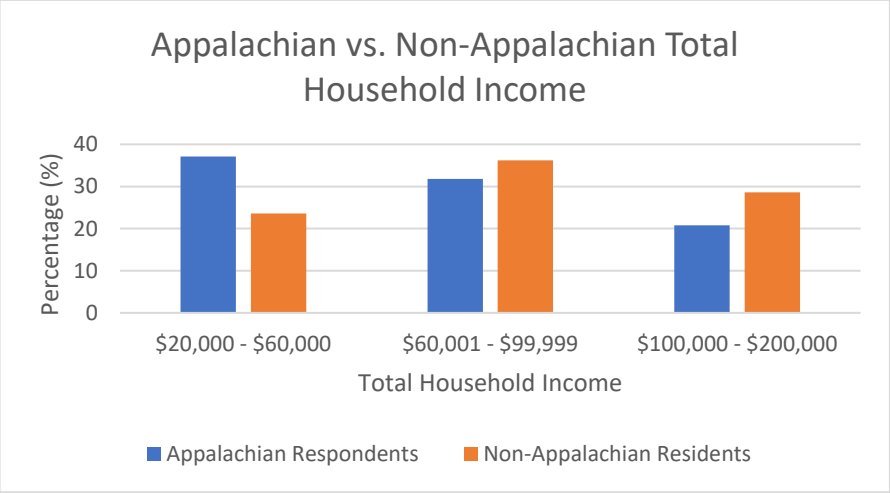


Figure 8: Survey Question: Do you have health insurance?

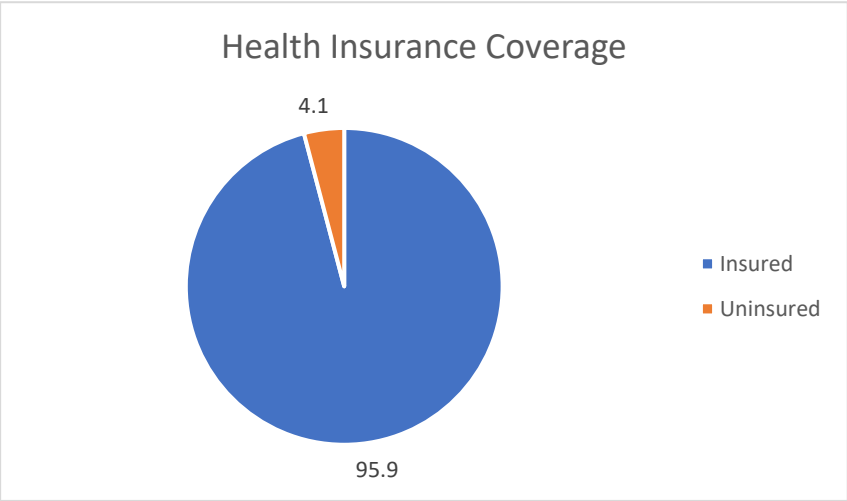


Figure 9: Survey Question: How would you rate access to healthcare in your hometown?

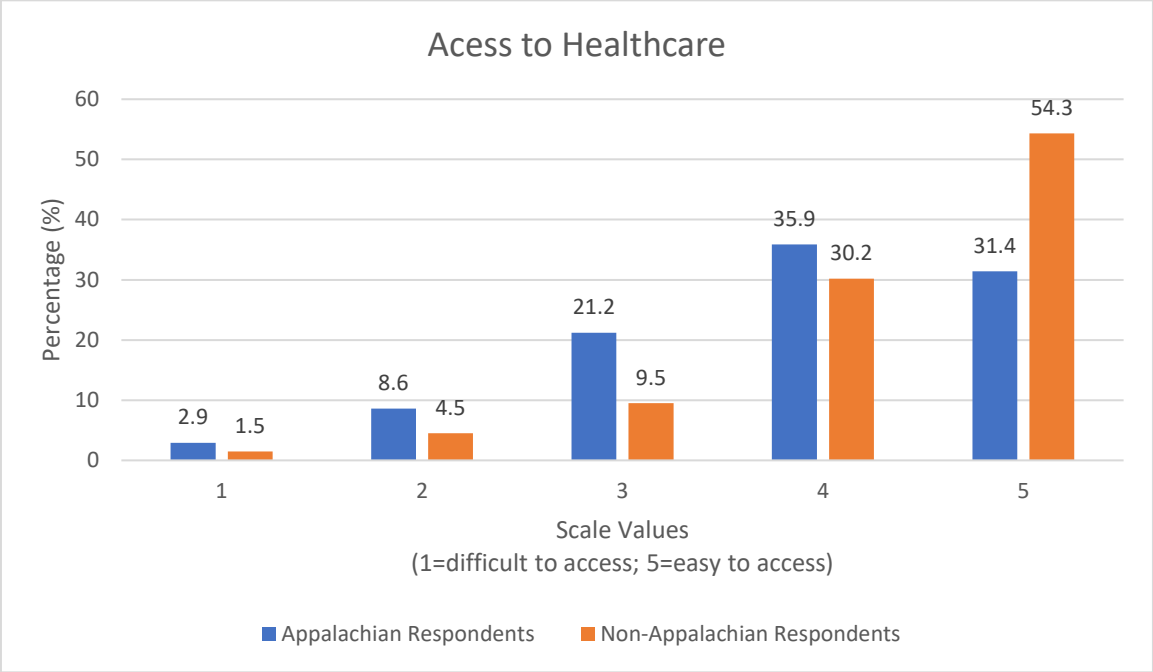


Figure 10: In the last 12 months, I was able to get needed emergency care right away.

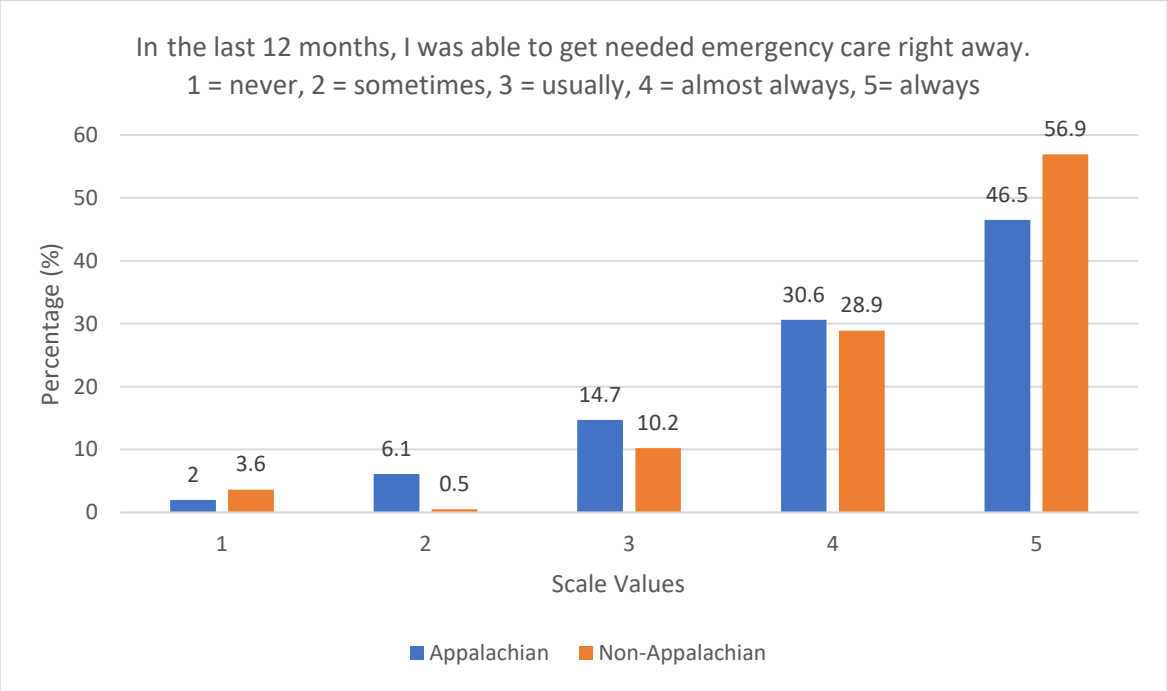


Figure 11: Survey Question: Was is necessary to travel outside of your hometown for medical care?

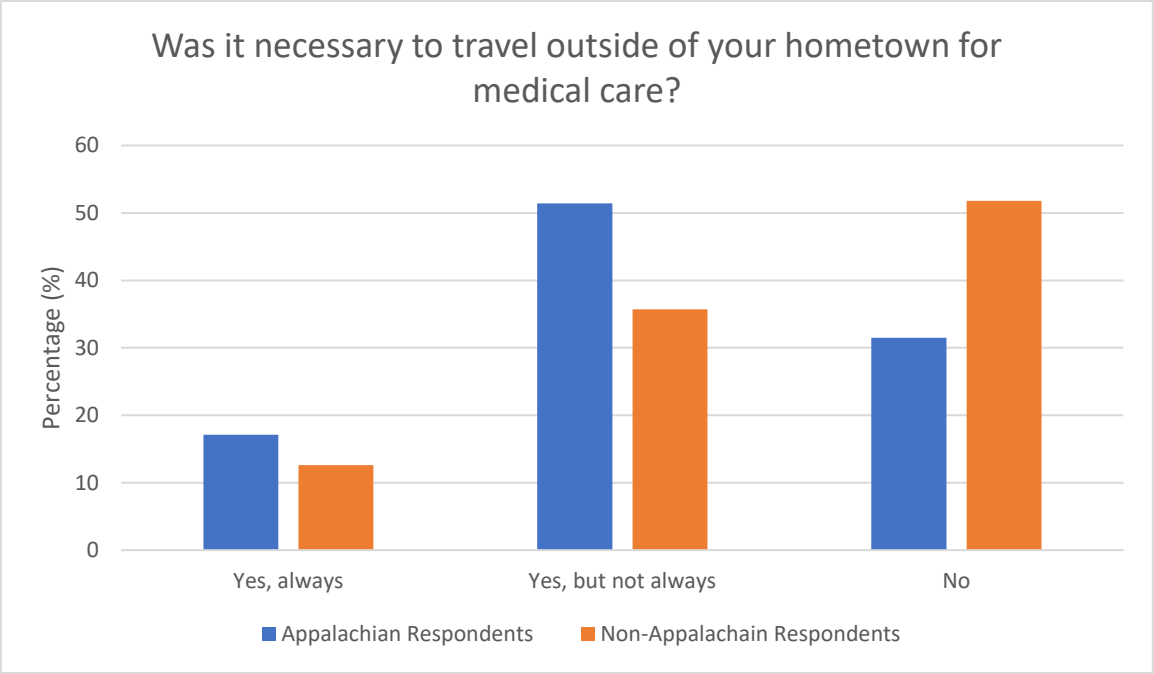


Figure 12: Survey Question: How far is the nearest supermarket from your family home?

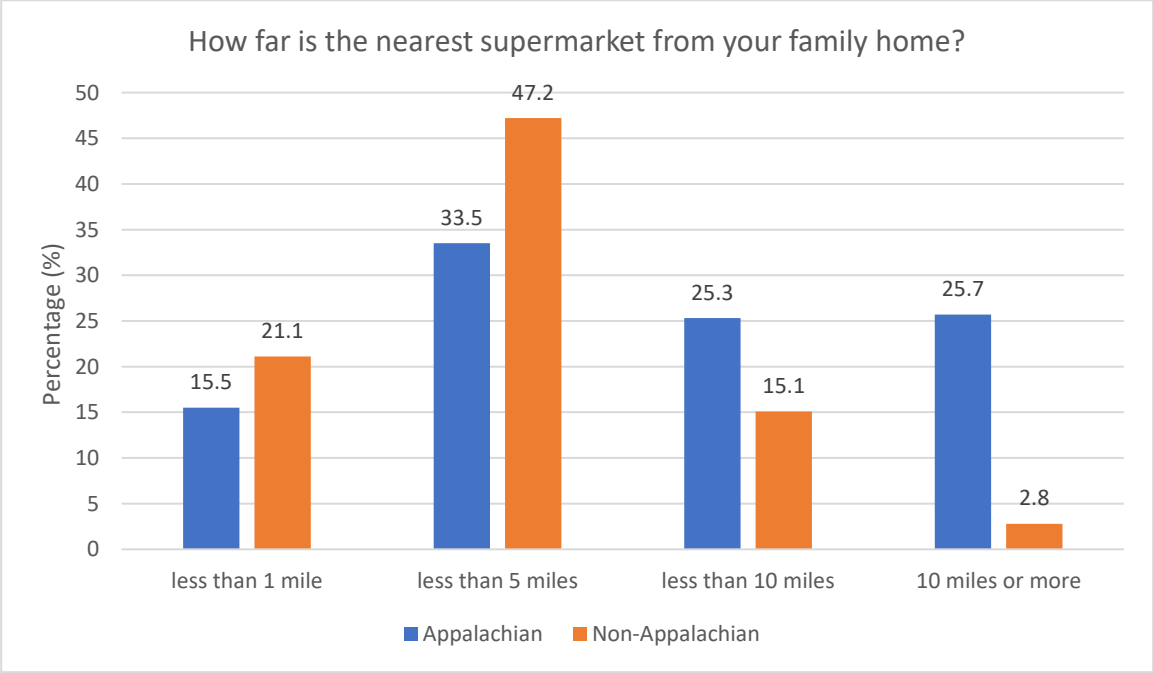


Figure 13: Survey Question: On a scale from 1-5, how would you rate the importance that your household placed on living a healthy lifestyle? (prioritizing exercise, healthy meals, mental health exercises, etc.)

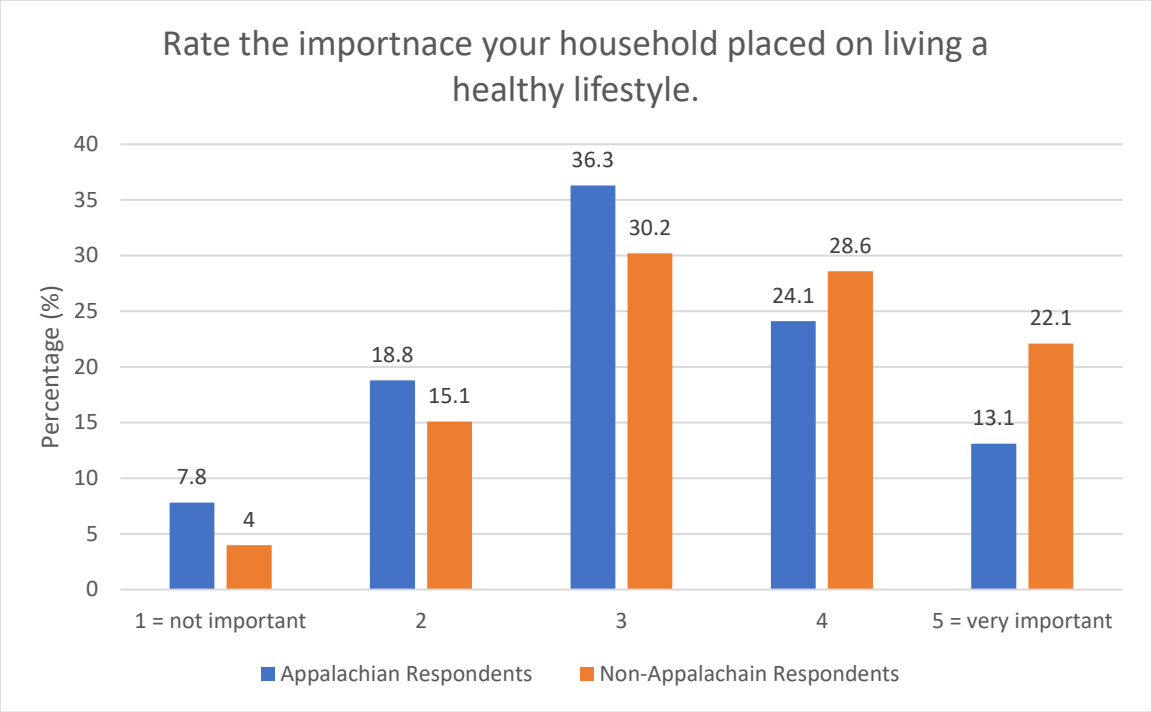


Figure 14: Survey Question: Do you and/or a family member suffer from any chronic diseases?

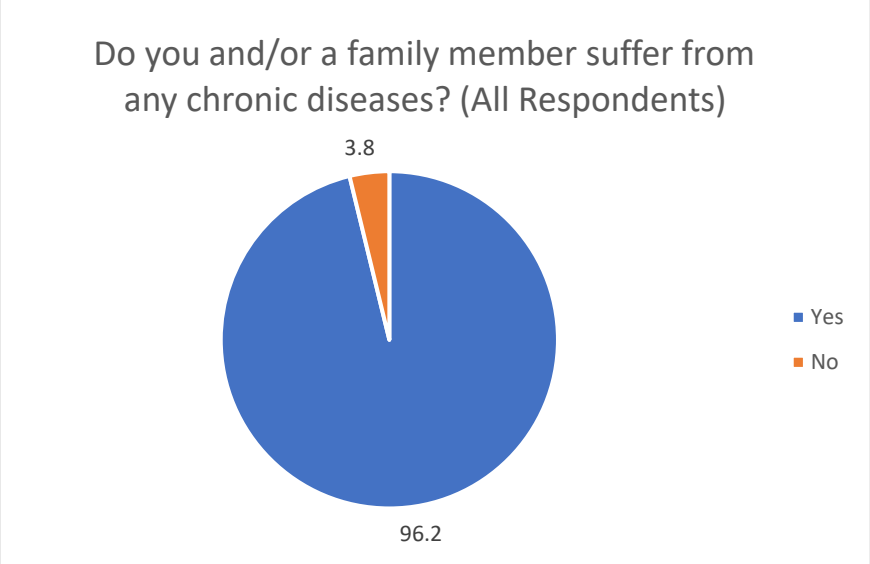


Figure 15: Survey Question: Have you ever had a medical issue that you could not seek medical attention for because of access to a healthcare provider, financial reasons, or any other reasons?

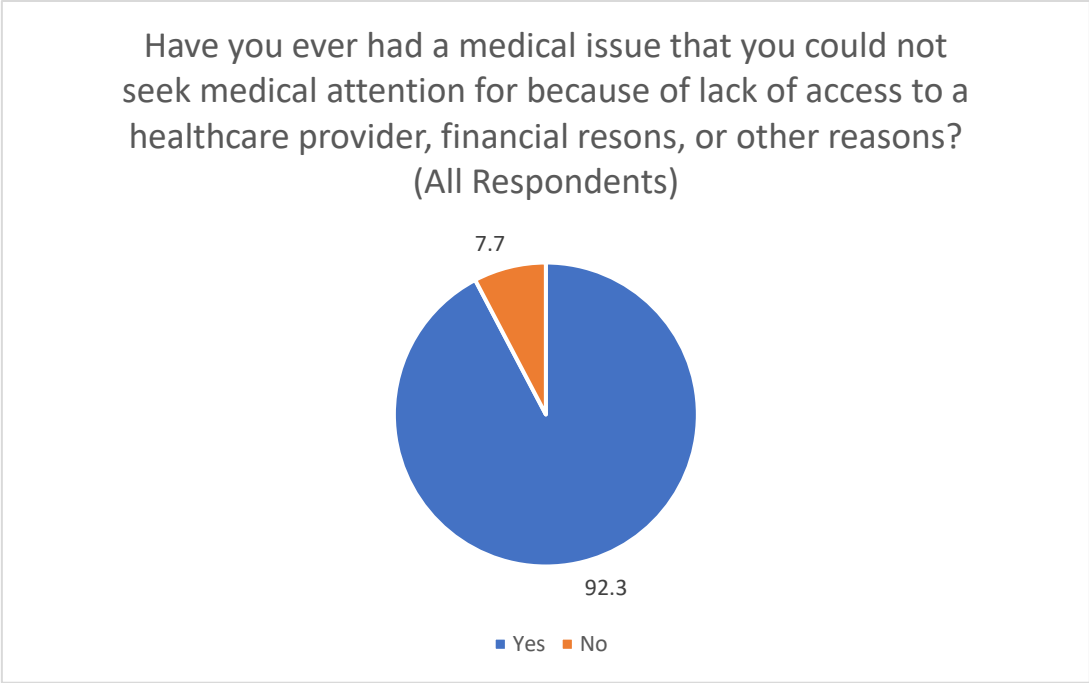


Table 1: Behavioral, Socioeconomic, and Health Care Disparities between Appalachian Counties with and without Coal Mining and Compared with the Rest of the Nation

	Appalachia, Coal Mining	Appalachia, No Mining	Rest of Nation
Smoking rate (%), 2003	27.2*	24.8	21.8
Obesity rate (%), 2003	24.8	24.8	23.7
Mean per capita income, 2000-2002	$20,841	$21,023	$23,602
Poverty rate (%), 2000-2002	17.3*	14.5	13.3
Unemployment rate (%), 2000-2003	6.8*	5.9	5.2
Percentage with high school education, 2000	70.6	71.5	78.3
Percentage with college education, 2000	11.9*	13.8	17.0
Percentage without health insurance, 2000	13.9	13.8	14.9
Primary care physicians per 1,000 population, 2001	1.36	1.32	1.31
Specialist physicians per 1,000 population, 20001	0.37	0.36	0.34

Note: Based on an analysis of county-level data from the 2006 Area Resource File and Behavioral Risk Factor Surveillance System data from the Centers for Disease Control and Prevention. Appalachian counties are those designated as such by the Appalachian Regional Commission as of 2007. Coal mining counties are those with any level of coal production from 1994 through 2006, based on statistics reported by the Energy Information Administration. *Appalachian coal mining areas are significantly different from both non-mining areas and the rest of the nation (post hoc F test, $p < .05$ or better)

References

Adams, L. V., and Butterly, John R. 2015. Diseases of Poverty: Epidemiology, Infectious Diseases, and Modern Plagues. *Dartmouth College Press*.

Appalachian Regional Commission 2013. *County economic status in Appalachia, FY 2013.* Retrieved March 22, 2021, from http://www.arc.gov/research/MapsofAppalachia.asp?MAP_ID=64

Appalachian Regional Commission. https://www.arc.gov/

Baffour, T. D. 2017. Addressing the Social Determinants of Behavioral Health for Racial and Ethnic Minorities: Recommendations for Improving Rural Health Care Delivery and Workforce Development. *Journal of Best Practices in Health Professions Diversity*, 10(2), 1111.

Behringer, B., & Fridell, G.H. 2006. Appalachia: Where Place Matters in Health. *Preventing Chronic Disease,* 3(4).

Benitez, J. A., & Seiber, E. E. 2018. US Health Care Reform and Rural America: Results from the ACA's Medicaid Expansions. *The Journal of Rural Health: Official Journal of the American Rural Health Association and the National Rural Health Care Association*,34(2), 213-222.

Beverly, E. A., Ritholz, M.D., Cook, K., Johnson, L.K., Ruhil, A., Singh, R.P., & Berryman, D.E. 2020. Diabetes in Appalachia: Providers' Perspectives. *Primary Health Care Research & Development* 21(11): 1-7.

Braveman, P. 2012. Health Inequalities by Class and Race in the US: What Can We Learn from the Patterns? *Social Science & Medicine*,74: 665-667.

Bureau of Labor Statistics, U.S. Department of Labor. Injuries, illnesses, and fatalities. Available at: http://www.bls.gov/iif/oshnotice10.htm.

Centers for Disease Control and Prevention. *Social Determinants of Health.* Social Determinants of Health – Healthy People 2030. https://health.gov/healthypeople/objectives-and-data/social-determinants-health.

Chubinski, J. & Sprigg, S. 2017. Presence of and Change in Self-Reported Chronic Disease in White Appalachian Adults Compared to White Adults in the Greater Cincinnati Region, 2005-2013. *Journal of Appalachian Studies,* 23(1): 114-124

Eberhardt, M. S., & Pamuk, E. R. 2004. The Importance of Place of Residence: Examining Health in Rural and Nonrural Areas. *American Journal of Public Health*,94(10).

Environmental Protection Agency. The Green Book nonattainment areas for criteria pollutants. Available at: http://www.epa.gov/air/oaqps/greenbk/.

Ferreccio C., Gonzalez, C., Milosavjlevic, V., Marshall, G., Sancha, A. M., & Smith A. H. 2000. Lung cancer and arsenic concentrations in drinking water in Chile. *Epidemiology.* 11:673-679.

Harrington, R.A., Califf, R.M., Balamurugan,A., Brown, N., Benjamin, R.M., Braund, W.E., Hipp, J., Konig, M., Sanchez, E., & Joynt Maddox, K.E. 2020. Call to Action: Rural Health: A Presidential Advisory From the American Heart Association and American Stroke Association. *American Heart Association,* 141(10): 615-644.

Huttlinger, K., Schaller-Ayers, J., & Lawson, T. 2004. Health Care in Appalachia: A Population-Based Approach. *Public Health Nursing,* 21(2):103-110.

Institute of Medicine. 2006. *Rebuilding the Unity of Health and the Environment in Rural America: Workshop Summary*. Washington, DC: The National Academics Press.

Jansen, A. S. 2009. Rural America: Issues and Developments. *Nova Science Publishers, Inc.*

Keefe, S. E. 2015. Appalachian Mental Health. *The University press of Kentucky*, 2015.

Kennard, D. Timber Supply in the southern Appalachians,. Available at: http://www.forestencyclopedia.net/p/p2349.

Klassen, J.2020. The U.S. Healthcare System. *U.S. Healthcare System – Research Starters Sociology:*1-8.

Kronenfield, J. 2013. Social Determinants, Health Disparities, and Linkages to Health and Health Care. *Bingley: Emerald Group Publishing Limited.*

LeChance, L. R., Martin, M. S., Kaduri, P., Godoy-Ruiz, P., Ginieniwicz, J., Tarasuk, V., & McKenzie., K. 2014. Food insecurity, diet quality, and mental health in culturally diverse adolescents. *Ethnicity and Inequalities in Health and Social Care*, 7(1), 14-22.

Leider, J.P., Meit, M., McCullough, J.M., Resnick, B., Dekker, D., Alfonso, N., & Bishai, D. 2020. The State of Rural Public Health: Enduring Needs in a New Decade. *American Journal of Public Health*, 110(9): 1283-1290.

Ludke, R L. & Obermiller, P. J. 2012. Appalachian Health and Well-Being. *The University Press of Kentucky*.

MacKinney, C., Dudley, D., & Schoephoerster, G. 2019. Aging Well in Rural America – the Role and Status of Healthcare. *Journal of the American Society on Aging*.

McGarvey, E., Leon-Verdin, M., Killos, L.F., Guterbock, T., & Cohn, W. 2011.Health Disparities Between Appalachian and Non-Appalachian Counties in Virginia USA. *Journal of Community Health,* 36(3):348-356.

McGuire, T., Alegria, M., Cook, B. L., Wells, K. B., & Zaslavsky, A.M. 2006. Implementing the Institute of Medicine definition of disparities: An Appalachian to mental health care. *Health Services Research, 41,* 1997-2005.

Novak, N., Baqyuero, B., Askelson, N.M., Diers, L., Dunn, B., Haines, H., Afifi, R., & Parker, E.A. 2020. Health Equity in Midsize Rural Communities: Challenges and Opportunities in a Changing Rural America. *American Journal of Public Health,* 110(9): 1342-1343.

Peters, D. J. 2020. Community Susceptibility and Resiliency to COVID-19 Across the Rural-Urban Continuum in the Unites States. *The Journal of Rural Health,* 36: 446-356

Phillips, C. D., & McLeroy, K. R. 2004. Health in Rural America: Remembering the Importance of Place. *American Journal of Public Health,* 94(10).

Physicians for Social Responsibility. 2007. Coal-fired power plants: understanding the health costs of a dirty energy source. *Washington, DC: Physicians for Social Responsibility.*

Pollard, K., & Jacobsen, L.A. 2012. The Appalachian Region: a data overview from the 2006-2010 American community survey. *Appalachian Regional Commission.*

Pratt, P.A., & Skaggs, C.T. 1989. First-generation college students: Are they at greater risk for attrition than their peers? *Research in Rural Education,* 6, 31-34.

Reschovsky, J. D., & Staiti, A. B. 2005. Access and Quality: Does Rural America Lag Behind? *Health Affairs,* 24(4).

Shaw, T.C., DeYoung, A.J., & Rademacher, E.W. 2004. Educational attainment in Appalachia: Growing with the nation, but challenges remain. *Journal of Appalachian Studies*, 10(3), 307-330.

Starcher, R.W., Guerin, L., Shannon, L., & Whitley, A. 2017. Assessing the Likelihood of Seeking Health Care in Rural Kentucky: Applying the Barriers to Help Seeking Scale to Appalachian and Non-Appalachian Undergraduates. *Journal of Appalachian Studies*, 23(2): 239-258.

Taylor, K. 2018. 100 days in Appalachia: publication building toolkit. *West Virginia University.*

United States Census Bureau. 2013. *American fact finder.* Retrieved March 22, 2021 from http://quickfacts.cebsys.gov/qfd/states/21000.html

Warren, J. C. & Smalley, K. B. 2014. Rural Public Health: Best Practices and Preventative Models. *Springer Publishing Company*.

Wen, M., Fan, J.X., Kowaleski-Jones, L., & Wan, N. 2018. Rural-Urban Disparities in Obesity Prevalence Among Working Age Adults in the United States: Exploring the Mechanisms. *American Journal of Health Promotion,* 32(2): 400-408.

Whitcomb, M. E. 2005. The Challenge of Providing Doctors for Rural America. *Journal of the Association of American Medical Colleges,* 80(8): 715-716.

Zhang, P., Tao, G., & Anderson, L.A. 2003. Differences in Access to Health Care Services among Adults in Rural America by Rural Classification Categories and Age.*Australian Journal of Rural Health,* 11(2): 64-72.