A Cartographic Exploration of Healthcare Accessibility in Appalachia

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Introduction

Appalachia is an incredibly diverse region – consisting of bustling cities such as Pittsburg, Birmingham, and Ashville to countless rural towns and villages. All these cities and towns are separated to varying extents by the Appalachian Mountains and the result of that geographic behavior has cultivated a sense of separation not only within Appalachian populations but also a general separation of Appalachia from the rest of the country. When it comes to the topic of healthcare; geographic and economic barriers have made it uniquely difficult for people in the Appalachian region to get appropriate healthcare access. A report by the Appalachian Regional Commission reveals that out of the 41 measures of population health used as metrics in the report, Appalachia is behind the rest of the nation in 33 of those categories.

Previous attempts to address the health care disparities in Appalachia have included a wide variety of solutions including the creation of community-based task forces and mobile health clinic (RAM clinics). While these variety of interventions have made significant progress in helping some communities, they still have not been able to overcome the sheer lack of resources and health care deserts in Appalachia.

The goal of this study is to describe and quantify the accessibility of providers and hospitals with specialized care centers such as strokes centers, trauma centers, and perinatal units within Appalachia

Methods

Health care data was collected for 420 counties and 8 independent cities in the Appalachian Region for 2018 to provide a consistent snapshot in access for the area. Hospital data was aggregated at the county level and included: number of hospitals as well as presence of stroke centers, perinatal units, trauma centers, and JCAHO accredited facilities. Additionally, provider data was pulled from the County Health Rankings & Roadmaps from 2019-2021. This included: primary care provider, mental heath providers, dentists, and other providers. Standardized rates per 100,000 at county level were used for this project. Poor physical health days (average days per month) and poor mental health days (average days per month) were also pulled from the County Health Rankings to give an indication of health of residents in Appalachia compared to residents of the United States as a whole. Healthcare data and provider data were mapped using ArcMap 10.8.2 (ESRI, Redlands, CA) to look at the distribution within Appalachia. No statistical analysis was performed on hospital-related variables. Provider data and health day data were analyzed using z-test in SPSS 29.0 (IBM, Armonk, NY). Anything less than p-value ≤ 0.05 was considered statistically significant.

Results

Category	Number of Counties	Appalachia Mean	US Mean	p_value*
PCP	416	49.35	54.3	0.00498
Dentist	418	38.28	45.81	0
MHP	420	115.63	149.91	0.00001
Other	426	90.75	77.08	0
Physically Unhealthy	428	4.98	4.39	0
Mentally Unhealthy	428	5.37	4.67	0
				* 2-tailed

Table 1: mean concentration of physicians compared to the United States

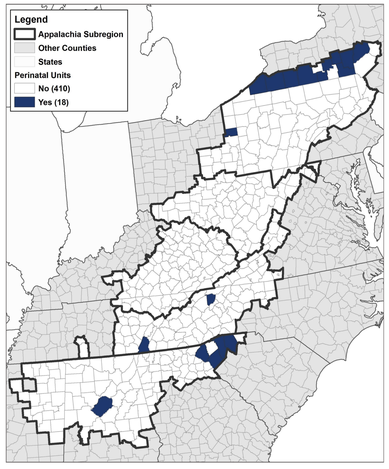

Figure 1: Map of Perinatal Units in the Appalachian Counties

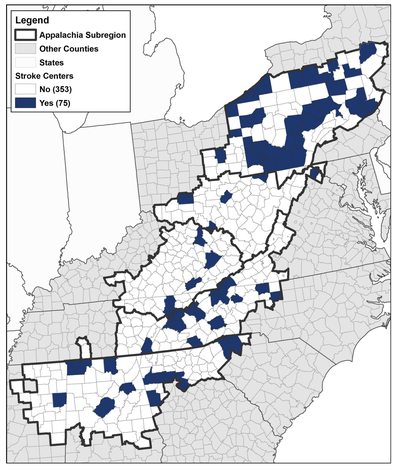

Figure 2: Map of Stroke Centers in the Appalachian Counties

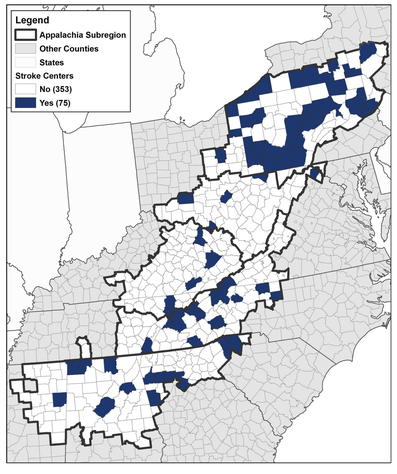

Figure 3: Map of Trauma Centers in the Appalachian Counties

Results cont.

Table 1 outlines how the concentration of primary care providers (PCP), dentists, mental health professionals (MHP), other health professionals, number of physically unhealthy days, and number of mentally unhealthy days compares to the rest of the country. The trends in every category are statistically significant. Compared to the rest of the nation, there are significantly fewer PCPs, dentists, and MHPs when compared county to county. Surprisingly, other health professionals (nurse practitioner (NP), physician assistants (PA)) are present at a higher rate in Appalachia when compared to the rest of the nation.

The three maps included in results show the accessibility of critical and intensive care facilities for children and adults in Appalachia.

Discussion

While the average of most providers is statistically lower, other professional are not (Table 1). One possible explanation for this could be that the focus of NP and PA schools is to explicitly fill in the gap in rural, underserved areas, so more NP and PA graduates are flocking to Appalachia. When comparing the average days of the month with physically and mentally unhealthy days, the average is higher for Appalachia compared to US. This can be explained by the lack of primary care and mental health physicians in the area (Table 1). If people do not have the option to see someone about their health concerns, then they will have more days where they are unwell, physically and mentally. Other explanations could be the affordability of and ability to seek out care.

Future areas of studies could involve using the maps to strategically plan and recommend the construction of more critical care centers (trauma units, stroke units, perinatal units) because in situations where time is of the essence, extensive travel distances can be the difference between life and death.

Acknowledgments

We would like to thank Laura McDavid and Daniel Handler for helping to collect the baseline data for the analyses.