

Research Brief

Mississippi Urban Research Center
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The Invisible Barrier: Health Literacy and Its Relationships to Health Factors in Mississippi Counties

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Abstract

This research brief is the second in a series of research activities examining health and health care in Mississippi. Its goal is two-fold: (1) examine the level of health literacy among Mississippi's 82 counties; and (2) explore the relationships between health literacy and related factors that potentially impact health at the county level.

Research findings indicated that: 1) Mississippi is one of the lowest health literacy state in the nation. Twenty-one percent of all Mississippi counties were at basic health literacy; 79% were at the intermediate health literacy; and no county was at the proficient level; 2) Mississippi health literacy score has significant association with length of life ($r = -.618$), quality of life ($r = -.883$), and health behavior ($r = -.839$); 3) Mississippi health literacy score has significant association with some health conditions and health behaviors, such as percentage of residents reporting poor or fair health ($r = -.877$), poor physical health days ($r = -.846$), poor mental health days ($r = -.79$), prevalence of obesity ($r = -.758$), diabetes ($r = -.911$), premature age adjusted mortality ($r = -.641$), adult smoking ($r = -.788$), physical inactive percent ($r = -.534$), and food index ($r = .751$); and 4) Mississippi health literacy scores are significantly correlated with education level, unemployment, income, race, and health insurance rate. The statistical significant level was set at 0.05.

Many factors could impact Mississippians' health conditions, some of them are easily identifiable while others are more difficult to realize. Although health literacy seems to be invisible, it plays a critical role in appropriate medical decision makings. Policy recommendations to improve Mississippi's health literacy rates included: 1) Promote more general education and health education, 2) Establish an effective health information delivery system at the community level, 3) Promote and educate communication skills between health professionals and patients, and 4) Increase funding and support to Mississippi public health and public health prevention.

Introduction

This research brief is the second in a series of research activities examining health and health care in Mississippi. Its goal is two-fold: (1) examine the level of health literacy among Mississippi's 82 counties; and (2) explore the relationships between health literacy and related factors that potentially impact health at the county level. By identifying potential correlations between health literacy and related factors, Mississippi policymakers will have a better understanding of health literacy as an invisible barrier and will be in a better position to develop policy initiatives that improve health literacy and health across the state.

Understanding Health Literacy

Health literacy is defined as the degree to which individuals have the capacity to obtain, process, and understand basic health information and services needed to make appropriate health decisions (U.S. Department of Health & Human services). A person's level of health literacy hinges on understanding three elements: their medical condition or disease; the reasons a specific treatment has been selected for them; and the appropriate behaviors and use of treatments that can improve their condition while minimizing the risk of side effects (Rosenblatt 2016). According to the National Assessment of Adult Literacy (NAAL), 12% of adults in the U.S. have "Below basic" health literacy, 24% have "Basic" health literacy, 53% have "Intermediate" health literacy, and only 12% have "Proficient" health literacy. That means over a third of U.S. adults (77 million) would have difficulty using the health information provided by healthcare professionals such as following the directions on a prescription drug label (U.S. Department of Health & Human services).

Limited health literacy is not a disease that makes itself easily visible. In fact, it is very difficult to determine a person's level of health literacy just by looking at that person --- thus it becomes an invisible barrier and serious challenge to improve a person's health outcomes. People with low health literacy have a difficult time understanding the relationship between lifestyle factors and causes of diseases. Research data showed that low health literacy was highly prevalent among patients with some of the most commonly and costly diseases in society—diabetes, hypertension, and asthma—as well as a strong correlation between patients' poor knowledge of their conditions and higher rates of medication errors (Williams 1998, Schillinger 2003, Williams & Baker 1998). Also, low health literacy is related to increased hospitalization rates, less frequent screening for diseases, and disproportionately high rates of diseases and mortality (Baker 2002, Gordon 2002, Baker and Gazmararian 2002). Although the relationship between health literacy and some health factors has been studied at the nation level, the prevalence and connection between limited health literacy and health disparities in Mississippi at the county-level remain largely unknown. This research brief seeks to fill this void by examining the prevalence and connection of health literacy factors here in Mississippi.

Research Methodology

This research brief utilized a non-experimental correlation design to identify key relationships among selected variables. This design was selected because it explores the relationship between key variables. While this design does not support the establishment

of causation, it does allow for identifying the predictive relationship between two or more variables. Data sources used included the 2016 Mississippi County Health Ranking data and the Health Literacy Data Map developed by the University of North Carolina at Chapel Hill. Descriptive statistics were used to analyze estimated health literacy levels of Mississippi's 82 counties.

The health literacy estimates are based on 2003 NAAL. The categories of health literacy level defined by NAAL are as following: below basic (0-184), basic (184-225), intermediate (226-309), and proficient (310-350) (NAAL 2003). Health literacy estimate scores in the current brief ranged from 177-280, with the higher number indicating higher health literacy.

Data was analyzed using SPSS 25 statistical analysis software. Forty-six variables were included in the data set for analysis (e.g., length of life, quality of life, health behavior, percent African American, median household income). The statistically significant (p value) level was set at 0.05. Data are presented in tables and figures that examine relationships between health literacy and health variables. Policy recommendations are made based upon an analysis of the data.

Research Findings

As stated earlier, the goal of this research brief is two-fold: (1) examine the level of health literacy among Mississippi's 82 counties; and (2) explore the relationships between health literacy and related factors that potentially impact health at the county level in Mississippi. The following four sections present research findings that directly address these two goals.

1. Overview of Mississippi's Health literacy

Table 1 shows descriptive statistics of Mississippi's health literacy levels. The average health literacy score of the nation was 244. Mississippi had the second lowest health literacy score (237) among the 50 states followed by New Mexico (236).

In examining health literacy scores in Mississippi's 82 counties, those scores ranged from minimum 217 to a maximum of 255. Twenty-one percent of all Mississippi counties (17 counties) were at basic health literacy, 79% (65 counties) were at the intermediate health literacy, and no county was at the proficient level. The 3 bottom health literacy counties were Humphreys, Issaquena, and Holmes while the 3 top health literacy counties were Lafayette, Rankin, and Lamar. Also, the data analysis results indicated that Mississippi's urban counties (Mean score =239) had a statistically significant higher health literacy score than rural counties (Mean score =231) (P=0.000).

Table 1. Descriptive Statistics of Health literacy of Mississippi Counties and the Nation.

	N	Mean	SD	P-value
MS Rural County	59	231.42	7.63	0.000
MS Urban County	23	238.98	8.65	
MS (Counties)	82	236.52	14.63	
US (States)	50	243.63	5.31	

2. Health Literacy and Health Outcomes

The correlation analysis showed a statistically significant negative relationship between health literacy and length of life ($r = -.618$), quality of life ($r = -.883$), and health behavior ($r = -.839$) (See Figure 1). Thus, counties with lower health literacy scores were more likely to have shorter life expectancy, lower quality of life, and unhealthy behavior than counties with higher health literacy. These findings were consistent with research at the national level that reported low health literacy being strongly correlated with poor health outcome (e.g. life expectancy, quality of life) (Berkman 2011).

3. Health Literacy and Health Conditions

In this section, results suggested that health literacy associated significantly with several health conditions such as percent of residents reporting poor or fair health ($r = -.877$), poor physical health days ($r = -.846$), poor mental health days ($r = -.79$), prevalence of obesity ($r = -.758$), diabetes ($r = -.911$), premature age adjusted mortality ($r = -.641$), adult smoking ($r = -.788$), physical inactive percent ($r = -.534$), and food index ($r = .751$). Thus, counties with lower health literacy were likely to report poor or fair health, and more poor physical and mental health days than higher health literacy counties. Lower health literacy counties were also more likely to experience a higher prevalence of premature mortality, obesity, diabetes, and adult smoking. Meanwhile, residents in counties with lower health literacy were likely to have less access to healthy food than higher health literacy counties' residents (See Figure 1).

4. Health Literacy and its Possible Causes

In this section, the correlation analysis showed Mississippi's health literacy scores were significantly associated with education level, unemployment, income, race, and health insurance rate. The correlation coefficients were as following: High school graduate rate ($r = .502$), college percent ($r = .563$); unemployment percent ($r = -.798$); median household income ($r = .755$), percent of children with single parents ($r = -.797$); percent African American ($r = -.872$), percent White ($r = .86$); and health uninsured rate ($r = -.264$). The results indicated counties with lower rates of high school graduate or

college education and low percent White were more likely to have lower health literacy. Also, counties with a higher percent of unemployment, children with single parents, African American population, and health uninsured rate were more likely to have lower health literacy (See Figure 1). Additionally, STD prevalence ($r = .086, p = 0.443$), and HIV prevalence ($r = 0.063, p = 0.579$) did not indicate any association with health literacy scores in this study.

It is interesting that some studies reported adults age 65 or older were more likely to have below basic or basic health literacy skills than those under age 65 (HHS brief, 2008). In this research, Mississippi health literacy scores with percent of elderly population, age 65 or older ($r = -.048, p = 0.672$) did not show such association.

Figure 1. Correlation among Health Indicators and Health Literacy

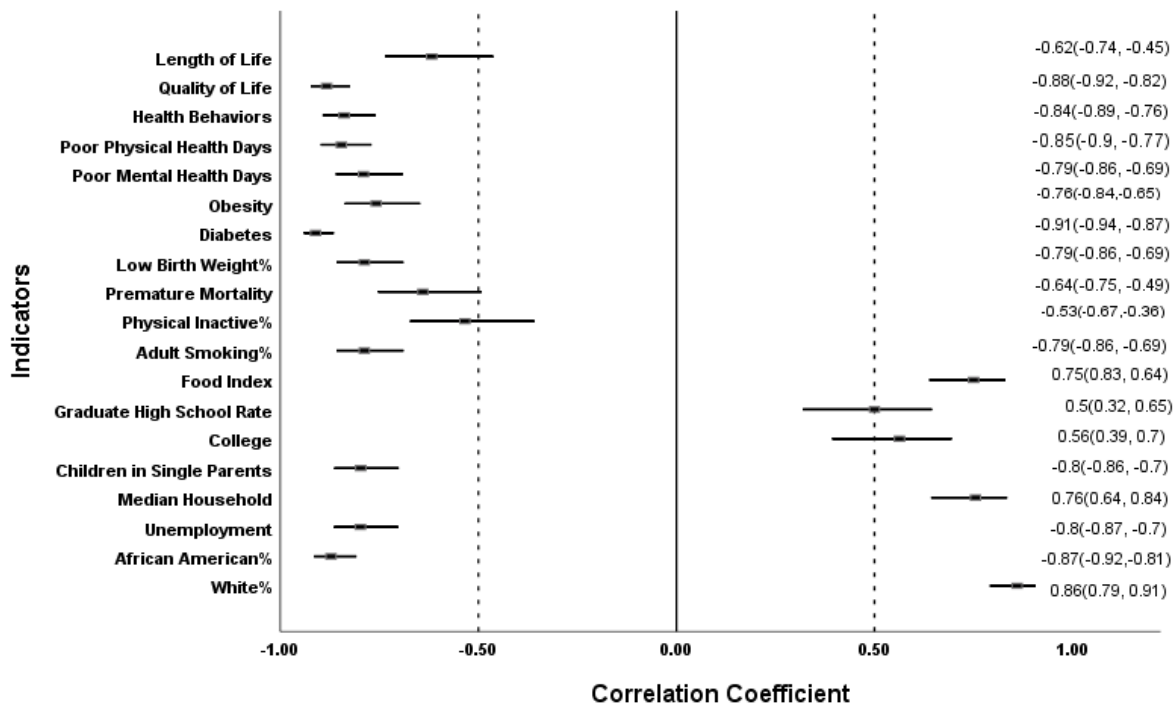


Figure 1 shows the correlation among health indicators and health literacy. All correlations were statistically significant at $p < 0.05$ level with 95% confident interval.

5. Regression Models

The education, median household income, and percent African American variables were placed in a regression analysis with health literacy as the dependent variable. Two multiple linear regression models were used to analyze the data. The first model contained the variables of education (percent of college), median household income, and percent of African American. It explained 92% of the change in health literacy scores ($r^2 = 0.92, F(3, 78) = 317.19, p = 0.000$). The second model contained the variables education (percent of college) and percent African American. It explained 91%

of the change in health literacy scores ($r^2 = 0.91$, $F(2, 79) = 405.44$, $p = 0.000$). These two models indicated that health literacy was more likely to be explained by the variables percent African American and education, especially the percent of college in Mississippi.

Table 2. Association among Health Literacy and Health Indicators

Health Indicators	Health Literacy Coefficient	
	b	P-value
Model 1:		
College Percent	0.298	0.000
Median Household Income	0	0.000
Percent of African American	-0.295	0.000
Model 2:		
College Percent	0.38	0.000
Percent of African American	-0.331	0.000

Discussion

While health literacy has been studied with health outcomes at the national level, limited research has been conducted to examine the prevalence of limited health literacy in Mississippi at the county level. Furthermore, this study shows disparities in health literacy and its relationships on health in the state of Mississippi. As identified in this study, Mississippi has one of the lowest health literacy rates in the nation. Twenty-one percent of its counties scored at the basic and below basic health literacy levels and no county scored proficient in health literacy. Mississippi's low health literacy levels have shown strong connection with poor quality of life, short life expectancy, and unhealthy behavior. Also, Mississippi's low health literacy has shown a strong association with the prevalence of chronic diseases such as diabetes, obesity, and smoking. Findings from this research show limited health literacy has a similar relationship with poor health status in Mississippi counties.

In the two regression models, health literacy showed the strongest association with education. This finding indicates that improving education could also improve health literacy. Education as used in this research also includes general education and especially health education. People with limited health education are more likely to get confused with various medical terms and therefore make improper health decisions, even if they have strong general literacy skills. Health education is a social science that draws from the biological, environmental, psychological, physical, and medical sciences to promote health and prevent diseases, disability, and premature death through education-driven voluntary behavior change activities. Health education is a major aspect of health

promotion activity (Coalition of National Health Education Organizations). Through health education, people's knowledge in physical, mental, emotional, and social fields can be raised. Increasing health awareness among people could change behaviors and lifestyles, and encourage people to adopt positive attitudes towards their wellbeing. Health education can also positively influence the health behaviors of individuals and communities as well as the living and working conditions that influence their health. As a result, the quality of life for all people can be enhanced, and the health status of the communities could be improved.

Additionally, health education can reduce the costs that individuals, employers, families, insurance companies, medical facilities, communities, the states, and the nation would spend on medical treatments. As mentioned in the first research brief (Zhang, 2017), Mississippi's health care expenditures were increasing faster than overall household income. Increasing healthcare expenses have become a huge economic burden to Mississippi residents and the government. Compared to people with low health literacy, people with adequate health literacy spend \$108 less in the emergency room costs, \$1551 less in hospitalization, and \$1543 less as inpatients (Howard, 2005). The National Institutes of Health (NIH) identifies the lack of health literacy as a "major source of economic inefficiency in the US healthcare system" and attributes \$106 billion to \$238 billion each year to its side effects (Vernon, 2010). Although Mississippi has made progress in some health care areas, the improvement of health in Mississippi would be difficult to achieve without improving health literacy and health education. Additional research is needed to provide more insight.

Policy Recommendations

As described above, low health literacy has been associated with poorer health, higher medical expenses, increased medication non-adherence, and hospitalization. As the Institute of Medicine states: Health literacy is "A Prescription to End Confusion". Efforts to improve quality, reduce costs, and reduce disparities cannot succeed without simultaneous improvements in health literacy (Institute of Medicine, 2004). The following recommendations are presented for consideration by policymakers, health care administrators, educators, and health care and public health professionals:

- **Promote more general education and health education.** Improve high school graduation rates and college education rates in Mississippi, and improve health literacy among all citizens. Promote and implement health education starting from elementary school to high school by adopting curriculum designed by National Health Education Standard. Promote continued health education to college and other higher education levels.
- **Establish an effective health information delivery system at the community level.** Health information should be designed as a preventive purpose, and materials should be easily understood and usable by all people regardless of reading level. Furthermore, health information delivery methods should be easy to reach and access, using such delivery methods as radio/television, internet, text message, grocery stores, public libraries, churches, community centers, and/or

neighborhood associations. Health literacy is an invisible weapon to fight poor health. A person may not notice it until they need it. Public health professional need to go to communities and equipped them with this weapon.

- **Promote and educate communication skills between health professionals and patients.** Information from health professionals is considered one of the most important sources of information on health topics for any health literacy levels. Patients with inadequate health literacy experienced lower quality and clarity of hospital communication along multiple domains (Kripalani, 2010). It is urgent to educate and encourage health professionals to improve their communication skills to help patients understand health information; ensure they understand instructions; and ensure they are able to navigate throughout the health care system.
- **Increase funding and support to Mississippi public health and public health prevention.** To address health literacy, increase funding in various health and health care settings, and promote health literacy activities, such as health events, workshops, especially in poor, rural counties in Mississippi. Encourage health literacy studies and adopt best practice and known interventions that improve health literacy.

Conclusion

Many factors could impact Mississippians' health conditions, some of them are easily identifiable while others are more difficult to realize. Although health literacy seems to be invisible, it plays a critical role in appropriate medical decision makings. Current findings suggest that health literacy has a strong connection with Mississippi residents' quality of life, length of life, health conditions, and health behaviors. Thus, persons with low health literacy are more likely to have a shorter life, poorer quality of life, higher prevalence of some diseases, and inappropriate health behaviors. Notwithstanding, health literacy an invisible weapon to fight poor health because it can help patients better understand their health conditions and become involved in their health care and health treatment decisions. Clearly, the combined effort of individuals, communities, and state government is needed for communities with low education levels to make informed health care decisions.

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