

Health Disparities in Cardiovascular Disease and High Blood Pressure among Adults in Rural Underserved Communities

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Abstract

Purpose: This study examined the factors contributing to health disparities in cardiovascular disease (CVD) and high blood pressure (HBP) among adults in three rural underserved communities in southeast Georgia. Socioeconomic status as well as geographic location plays a significant role in one's quality of health outcomes.

Methods: Individuals in three counties in southern Georgia participated in the study. The study was motivated by review of retrospective data from the 2008 Georgia Cardiovascular Health Initiative (CVHI) database to explain the factors contributing to the incidence of health disparities. A survey questionnaire was administered by telephone to adult members of

households to determine the incidence of health disparities in CVD and HBP among rural African American and White adult populations. Six hundred respondents participated in the survey but four hundred completed surveys were used in the study, yielding a 67% response rate. Data were analyzed using applied multivariate logistic analysis.

Findings: Findings indicated that older men and male residents in Counties A and B regardless of racial background were significantly more likely to be diagnosed with both HBP and CVD. College educated women were significantly less likely to have HBP. Findings also revealed that married men were significantly less likely to have CVD. Uncontrolled elevated cholesterol levels contributed to the incidence of chronic HBP and CVD.

Conclusions: The findings add to the current knowledge of research and to the understanding of the critical elements in reducing health disparities among populations in rural underserved communities.

Keywords: Health disparities, Cardiovascular disease, High blood pressure, Rural underserved communities, African Americans, Caucasians

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In a series of reports, the U.S. Department of Health and Human Services (U.S. DHHS) noted the importance of health disparities in the nation, especially in rural areas (U.S. DHHS, 2011). Previous studies indicated that rural adults were more likely to report poor health status, obesity and limitations in activity than urban residents (Downey, 2013; Office of Minority Health (OMH), 2012; National Advisory Committee on Rural Health and Human Services, 2011;

National Rural Health Association, 2007; Patterson, Moore, Probst, & Shinogle, 2004). Health disparities refer to racial or ethnic differences in morbidity and mortality, and access to health care (Braverman, 2006).

In a report launched in January 2000, the DHHS admitted the gravity of the problem of health disparities and also committed the nation to eliminate it (U.S. DHHS, 2000). A subsequent 2004 report by the U.S. DHHS (U.S. DHHS, 2004) documented significant disparities in health care access and costs between rural and urban areas. The report found that rural residents often faced barriers to quality care in chronic disease morbidity and mortality, especially in cardiovascular disease (CVD) and diabetes. The *Health, United States 2011* report also documented some of the health disparities experienced by rural residents (National Center for Health Statistics, 2012). For example, African Americans had the highest incidence of high blood pressure (HBP), which was associated with the largest death rates related to CVD and stroke (Centers for Disease Control and Prevention [CDC], 2014; OMH, 2012; OMH, 2014).

In November 2010, Secretary Kathleen Sebelius charged U.S. DHHS with developing a Department-wide Action Plan to reduce racial and ethnic health disparities that would influence other key national initiatives such as *Healthy People 2020*, the First Lady's *Let's Move!* Initiative, and the President's National HIV/AIDS strategy (U.S. DHHS, 2011). The Action Plan acknowledged the existence of persistent and well-documented health disparities between racial and ethnic populations making health equity elusive. The Action Plan also committed the Department to continuously assess the impact of policies and programs on racial and ethnic health disparities, and to promote integrated approaches that are evidence-based and apply best practices to reduce these disparities.

Differences in health status across racial and ethnic groups in the United States, particularly between African Americans (or blacks) and Caucasians (or whites), have been the subject of numerous public health and social science research (Fowler-Brown, Ashkin, Corbie-Smith, Thaker, & Pathman, 2006; Opara et al., 2013; James, Thomas, Lillie-Blanton, & Garfield, 2007; Karlamangla, Merkin, Crimmins, & Seeman, 2010; Kressin, Orner, Manze, Glickman, & Berlowitz, 2010; Mujahid, Roux, & Morenoff, 2008; Rooks et al., 2008). Some studies apply a variety of health measures to delineate the relatively worse health status in African-American men and women compared with that of Caucasians for a number of chronic diseases such as high blood pressure, CVD, and diabetes (Adler & Rehkopf, 2008; Dressler, Oths, & Gravelee, 2005; Farmer & Ferraro, 2005; Keita et al., 2014; Kressin et al., 2010).

Evidence of contributing factors related to health disparities such as socioeconomic status and geographical location are well documented (Adler & Rehkopf, 2008; Farmer & Ferraro, 2005; Fowler-Brown et al, 2006; Kressin et al., 2010; Thorpe, Brandon, & LaVeist, 2008). There is evidence that suggests that health inequities affect individual and community economic development (Karlamangla et al., 2010; Keita et al., 2014; Morenoff et al., 2007; Mujahid et al, 2008). Geographically, minorities, particularly, African Americans in the rural South have been found to frequently perceive persistent racial barriers to medical care, fueling mistrust and dissatisfaction with care (Fowler-Brown et al., 2007). However, obtaining usable estimates for health services and access measures among rural residents is a challenge. Many studies use nationally representative datasets that are limited by the number of rural respondents.

In the United States, about 77.9 million (1 out of 3) adults have HBP. For Caucasians, 33.4 percent of men and 30.7 percent of women have HBP as compared to 42.6 percent of men and 47 percent of women among African Americans. The 2009 overall death rate from HBP was 18.5

per 100,000. Death rates were 17 percent for white males, 14.4 percent for white females, 51.6 percent for black males and 38.6 percent for black females. The estimated direct and indirect costs of HBP in 2009 were \$51 billion (American Heart Association, 2013). Heart disease is the first leading cause of death for men and women in the United States. CVD accounts for more than one-third (33.6 percent) of all U.S. deaths. In 2010, the total costs of CVD in the U.S. were estimated to be \$444 billion (CDC, 2014).

In the State of Georgia, CVD is the leading cause of death; accounting for one-third of all deaths at 21,042 (Georgia: Burden of chronic diseases, 2008). Georgia's CVD death rate was 9% higher than the national rate in 2007; and was 1.4 times higher for men than women and 1.3 times higher for African Americans than Caucasians in the same reported year. The cost of CVD in Georgia in 2007 was also estimated at \$11.2 billion, which included direct health care costs and lost productivity from morbidity and mortality (Georgia Department of Community Health, 2009). The Georgia Department of Public Health (http://health.state.ga.us/pdfs/epi/cdiee/CVD_Program_and_Data_Summary) reported that in 2010 approximately 137,000 hospitalizations occurred among Georgia residents due to CVD, and total hospital charges for CVD in Georgia increased by over \$2.1 billion between 2003 and 2010, from \$3.4 billion to \$5.5 billion. Additionally, the percentage of adults in Georgia with HBP increased from 26% in 1999 to 31% in 2009. The report also stated that HBP compounds CVD risk but can be controlled through lifestyle changes such as physical activity and healthy diet and, if necessary, medications. Unfortunately, similar information on the rural sector is lacking.

Moreover, Alkadry and Tower (2010) reveal that geographical location (for example rural underserved Georgia) also restricts the type of treatment available to residents, particularly access to quality healthcare, availability of qualified health care providers, facilities and

insurance coverage. Uneven access to healthcare services and lower quality of care combined with cultural barriers tend to decrease minority trust in the healthcare system (Downey, 2013; Moulton, 2009; Rooks et al., 2008).

Study Aims and Research Questions

The objective of this study was to explore the incidence of health disparities in rural underserved counties in southern Georgia with respect to CVD and HBP. Additionally, the study investigated the factors contributing to disparities in these diseases among adult men and women residents in the rural underserved communities. Research on the existing health disparities in these underserved rural communities is important since understanding rural patterns of health status in the communities has important implications for improving the rural health outcomes so as to reduce any disparities. The U.S. DHHS, Health Resources and Services Administration (HRSA) defines medically underserved areas/populations as areas or populations designated by HRSA as having too few primary care providers, high infant mortality, high poverty and/or high elderly populations.. The research questions addressed were:

1. Are there significant health differences in CVD and HBP among adult African American and Caucasian men and women in the selected rural underserved communities in Georgia?
2. Do demographic and socioeconomic characteristics such as race, age, gender, level of education, income and marital status play a significant role in explaining health outcomes of men and women in rural underserved communities in Georgia?

Methods

Sample

Initial baseline data on CVD was undertaken through the Georgia Cardiovascular Health Initiative (CVHI) which was launched in 2004. Demographic telephone survey was undertaken

by the Bureau of Business Research and Economic Development (BBRED) at Georgia Southern University, following approval of the study by the Institutional Review Board (IRB) at the University (H08152), with the underlying motivation to analyze factors influencing choice of health behaviors and perceptions about health disparities and access to health services in rural Georgia. The U.S. Census Bureau (2010) classifies a county with the population of 50,000 or less as a rural county.

Rural Counties A and B had populations of 11,452 and 11,455 residents, respectively, in 2008 whereas the peri-urban County C had the population of 58,491. African Americans made up 23%, 34%, and 44%, respectively of the population in the three counties. The composition of other ethnicities (Hispanic, Native American and Asian) was less than 1%. Therefore, the study focused on the two principal demographic groups of Caucasians and African Americans. Additionally, all three counties are designated by the HRSA as medically underserved areas. Such designation is determined at <http://muafind.hrsa.gov/index.aspx> by clicking on the relevant state and county.

State of Georgia data explains that death from CVD may be related to a number of risk factors such as lack of regular exercise, poor diet, HBP, high cholesterol, and diabetes (Georgia Department of Community Health, 2009). Therefore, initially the study focused on three diseases that are associated with the leading cause of deaths in the state of Georgia; CVD, hypertension or HBP, and hypercholesterolemia or high cholesterol.

Instrument Description and Statistical Methods

The household survey used for data collection was designed as a stratified multistage sample. Questions were based on a modification of the 2006 Georgia Stroke and Heart Attack Awareness Survey (Clarkson, 2008). The survey reported in this research was conducted by an

interviewer on a telephone using a systematic random sampling approach. Participants were at least 18 years of age. A total of 600 respondents participated in the three county survey. However, only 400 fully completed responses were used in this study.

The survey respondents were asked if they were ever told by a doctor that they had a particular disease, which required an answer of yes or no. Variables were created for the disease diagnosis (yes = 1 and no = 0), separately for all three diseases; CVD, HBP, and high cholesterol diagnoses. The survey questionnaire also contained standard questions about the respondent's income, availability of health insurance, marital status, age, race, gender, education level, and county of residence. These questions comprise the independent variables. Binary variables were created for those variables that required "yes" and "no" answers.

To validate those variables included in the study, separate cross tabulations for each dependent variable with each of the selected independent variables were implemented by using the Chi-square test. The likelihood ratio was used to determine significance of the relationships between the dependent and independent variables. Those independent variables that had the strongest relationships with the dependent variable, according to the Chi-square test, were chosen and used in a logistic multivariate-regression model. For example, access to health insurance was not significant with any of the dependent variables and was excluded in the statistical model. However, Wang, Shi, Nie, and Zhu (2013) showed that low socioeconomic status was associated with lesser access to care and lesser utilization of healthcare, even among those with health insurance. Also, Opara et al. (2013) studied 30,852 adults and found that respondents with HBP were more likely to have less than 12 years education, be unemployed, or have low income.

Respondents that reported that they had been diagnosed by a physician with HBP and CVD also reported that they had been diagnosed with high cholesterol. Current knowledge of the

genetic links associated with diseases such as CVD and stroke indicates that these links may be strongest through an associated risk factor such as hypercholesterolemia (Macdonald, Waters, & Wekwete, 2005). Based on this known information, a multivariate analysis model was used to explain the incidence of HBP and CVD among the identified racial groups using high cholesterol as an explanatory variable.

The education variable was stratified into two binary responses; one for those whose highest education attainment was high school completion and another for those who have completed college education, respectively. For marital status, a single variable was used; married (coded as 1) versus single (coded as 0). Age was a continuous variable measured in years. Household income of more than \$45,000 was coded equal to 1, and income of \$45,000 or less was 0. For the gender variable, male was coded as 1 and female as 0, and for the race variable, consistent with the 2006 Georgia Survey, African American was coded 1 and 0 for Caucasian. Residence in rural counties A and B were respectively coded as binary variables where residence in either one was 1 and 0 in County C (with slightly more than 50,000 residents). Of the 400 (n=400) reported in the study, 240 were from Counties A and B, and 160 from County C.

Logistic Model Description

The logistic model was utilized to parameterize and estimate separate equations for CVD diagnosis and high blood pressure diagnosis. Consistent with previous studies (Wang et. al, 2013; Opara et al., 2013), the standard logistic regression model was used to estimate coefficients to explain the two chronic diseases. Results were computed using the Statistical Package for the Social Sciences (SPSS). The model formulation was as follows:

$$\text{Prob} (D = 1) = F (\beta_i x_i),$$

$$\text{Prob} (D = 0) = 1 - F (\beta_i x_i)$$

where the probability of disease (D) being diagnosed was a function of $\beta_i x_i$. $D = 1$ if an individual had been diagnosed with a certain medical condition, and $D = 0$ otherwise. The two key diseases (dependent variables) upon which the regression model was based were HBP and CVD. The parameter β was a vector of coefficients to be estimated and x_i was a vector of independent variables based on individual i 's responses to the survey questionnaire. The probability model was expressed as a regression of the form:

$$E[y] = 0 [1 - F (\beta_i x_i)] + 1 [F (\beta_i x_i)]$$

$$= F (\beta_i x_i)$$

Assuming logistic disturbances, the density function was of the form:

$$\text{Prob} (D = 1) = \frac{e^{\beta_i x_i}}{1 + e^{\beta_i x_i}}$$

The inverse function of the logistic model was easy to obtain (if we let $\text{Prob} = P$) as:

$$\ln [P / (1 - P)] = \beta_i x_i.$$

Consistent with literature reviewed on previous studies, as already discussed, included in the explanatory variables were social and economic data of respondents such as age, race, gender, level of education, household income, marriage status, and high cholesterol. Additionally, residence in Counties A and B were included separately to delineate the two rural and underserved communities as compared to the peri-urban County C. Therefore, the probability of diagnosing HBP and CVD by the model was explained as follows: $\ln [P / (1 - P)] = \beta_0 + \beta_1 \text{Age} + \beta_2 \text{Race} + \beta_3 \text{Gender} + \beta_4 \text{Education} + \beta_5 \text{Household Income} + \beta_6 \text{High Cholesterol} + \beta_7 \text{Married} + \beta_8 \text{County A} + \beta_9 \text{County B} (1)$

Results

Descriptive Data

Table 1 shows sample characteristics of the respondents. Four hundred respondents were included in the study; 124 males and 276 females with a mean age of 50 years. About 39% of the respondents had HBP, 35% had high cholesterol, and 9% had CVD. About 67% of the respondents were married, 26% were African American, 37% of the households were earning \$45,000 or more, about 90% had completed high school, 22% had graduated from college, and 31% were males and 69% were females.

Table 1

Summary Descriptive Statistics of Study Sample

Variable	N = 400	Percent (%)
<u>Counties</u>		
A	120	30.0
B	120	30.0
C	160	40.0
<u>Gender</u>		
Male	124	31.0
Female	276	69.0
<u>Education</u>		
High School Completion	358	89.5
College Education	88	22.0
<u>Income</u>		
Equal or Less than \$45,000	252	63.0
Greater than \$45,000	148	37.0
<u>Diseases</u>		
High Cholesterol	140	35.0
High Blood Pressure (HBP)	156	39.2
Cardiovascular Disease (CVD)	104	25.8
<u>Race</u>		
African American	104	26.0
Caucasian	296	74.0
Age: Mean 50.1 years (Range 19 to 94 years; SD± 50.1)		

Table 2 presents the logistic regression results of HBP for the combination of men and women, and separately for men (table 3) and women (table 4). In the combined results, individuals diagnosed with high cholesterol were positively associated with being diagnosed with HBP. The result was statistically significant with a relatively large odds-ratio (OR = 4.924). This positive and significant association of high cholesterol with HBP was also observed in the separate results for men and women. Higher education was negatively but not significantly related to HBP for the combined results for men and women. However, there were important differences in the results obtained separately for educated women as compared to educated men. Women with higher education had a negative and significant association with being diagnosed with HBP. However, for men, there was a positive relationship between higher education and HBP, although the result was not significant.

The results also showed that there were differential effects of having HBP among African American males and females relative to Caucasians. Being an African American male was positively and significantly associated with being diagnosed with HBP, with large odds ratio (OR = 4.496). Odds ratios were reported with 95% CI. This finding was neither significant for African American females nor for the combined results for men and women. Findings also revealed older males were significantly more likely to be diagnosed with HBP (OR = 1.079) but not older women. Invariably, men and women living in the rural underserved community B were significantly more likely to have HBP (OR = 2.52), although the results also showed that being a male resident in Counties A and B significantly increased the likelihood of being diagnosed with HBP. Higher income was negatively related to HBP in all the results, although it was not significant in all cases.

Table 2

Logistic Regression Results for High Blood Pressure: Combined Men and Women

Variable	β	Standard Error	t-test	p-value	Odds-Ratio
Constant	-1.213	0.263	4.613	0.000	
Age	0.001	0.001	1.381	0.167	1.001
Education	-0.565	0.301	1.875	0.061	0.568
High Cholesterol	1.594	0.236	6.765	0.000	4.924
Married	-0.182	0.254	0.718	0.4725	0.833
African American	0.351	0.268	1.307	0.191	1.420
Income	-0.039	0.261	0.148	0.882	0.962
Gender	-0.008	0.027	0.291	0.771	0.992
Rural County A	0.464	0.302	1.537	0.124	1.590
Rural County B	0.945	0.299	3.162	0.002	2.52
Chi-Squared	78.535				
Log-likelihood	228.674				
McFadden R ²	0.146				
N	400				

Table 3

Logistic Regression Results for High blood Pressure: Men

Variable	β	Standard Error	t-test	p-value	Odds-Ratio
Constant	-6.720	1.405	4.783	0.000	
Age	0.076	0.0195	3.907	0.0001	1.079
Education	0.435	0.605	0.720	0.472	1.545
High Cholesterol	1.757	0.550	3.195	0.001	5.798
Married	0.676	0.623	1.084	0.278	1.965
African American	1.503	0.670	2.245	0.025	4.496
Income	-0.285	0.548	0.520	0.603	0.752
Rural County A	2.102	0.820	2.563	0.010	8.185
Rural County B	1.853	0.682	2.719	0.006	6.380
Chi-Squared	64.098				
Log-likelihood	52.822				
McFadden R ²	0.378				
N	124				

Table 4

Logistic Regression Results for High Blood Pressure: Women

Variable	β	Standard Error	t-test	p-value	Odds-Ratio
Constant	-0.673	0.296	2.270	0.023	
Age	0.001	0.001	0.981	0.326	1.001
Education	-1.304	0.409	3.188	0.001	0.271
High Cholesterol	1.396	0.284	4.919	0.000	4.039
Married	-0.416	0.294	1.413	0.158	0.659
African American	0.308	0.324	0.950	0.342	1.361
Income	-0.066	0.325	0.204	0.839	0.935
Rural County A	0.082	0.355	0.231	0.818	1.085
Rural County B	0.469	0.376	1.247	0.212	1.599
Chi-Squared	52.535				
Log-likelihood	158.507				
McFadden R ²	0.142				
N	276				

Regression results for CVD were also reported for the combination of men and women (table 5), and separately for men (table 6) and women (table 7). The combined results show that diagnosis of high cholesterol was positively and significantly related to the diagnosis of CVD. High cholesterol was also positively and significantly related to diagnosis of CVD among men (OR = 17.527) but not significantly among women. Additionally, older age positively and significantly explained CVD in the combined results for men and women and also separately for the results for men and women.

Table 5

Logistics Results for Heart Disease: Combined Men and Women

Variable	β	Standard Error	t-test	p-value	Odds-Ratio
Constant	-6.407	1.089	5.883	0.000	
Age	0.056	0.014	3.952	0.0001	1.058
Education	-0.342	0.536	0.637	0.524	0.711
High Cholesterol	0.911	0.390	2.333	0.0196	2.486
Married	-0.023	0.423	0.054	0.957	0.977
African American	-1.528	0.494	0.522	0.602	0.773
Income	-0.389	0.469	0.830	0.407	0.678
Gender	0.575	0.410	1.400	0.162	0.776
Rural County A	0.775	0.496	1.563	0.118	2.170
Rural County B	1.130	0.437	2.584	0.010	3.095
Chi-Squared	51.159				
Log-likelihood	97.734				
McFadden R ²	0.207				
N	400				

The results also showed that married males were significantly less likely to have CVD; although that result was not significant for the combination of men and women. Additionally, men and women living in rural county B were significantly more likely to have CVD (OR = 3.095). In general, there was a positive and significant likelihood for males in rural Counties A and B of being diagnosed with CVD with high odd-ratios of 12.568 and 13.397, respectively. However, being African American *per se* did not significantly lead to being diagnosed with CVD.

Table 6

Logistic Regressions Results for Heart Disease: Men

Variables	β	Standard Error	t-test	p-value	Odds-Ratio
Constant	-9.924	3.278	3.027	0.002	
Age	0.107	0.046	2.326	0.020	1.112
Education	-1.515	1.083	1.398	0.162	0.219
High Cholesterol	2.864	1.019	2.811	0.005	17.527
Married	-2.785	1.135	2.455	0.014	0.062
Income	0.735	1.060	0.694	0.488	2.086
African American	0.523	1.060	0.495	0.621	1.688
Rural County A	2.531	1.193	2.122	0.034	12.568
Rural County B	2.595	1.023	2.537	0.011	13.397
Chi-Squared	43.870				
Log-likelihood	21.899				
McFadden R ²	0.50				
N	124				

Table 7

Logistics Results for Heart Disease: Women

Variable	β	Standard Error	t-test	p-value	Odds-Ratio
Constant	-6.310	1.276	4.944	0.000	
Age	0.056	0.016	3.446	0.001	1.058
Education	-0.254	0.702	0.362	0.717	0.766
High Cholesterol	0.166	0.472	0.352	0.725	1.181
Married	0.856	0.547	1.564	0.118	2.353
Income	-0.542	0.596	0.909	0.363	0.582
African American	-0.242	0.624	0.388	0.698	0.785
Rural County A	0.542	0.590	0.918	0.358	1.710
Rural County B	0.797	0.549	1.453	0.146	2.219
Chi-Squared	25.924				
Log-likelihood	66.292				
McFadden R ²	0.164				
N	276				

Discussion

In response to the two research questions motivating the research study, first, it was discovered that there was significant health disparity in HBP between adult African American males and their Caucasian counterparts in the rural underserved counties, but not among adult women regardless of race. Nevertheless, the results did not reveal any significant health disparity in CVD among African Americans and Caucasians. This finding is consistent with previous studies that showed that African Americans have a higher prevalence of diabetes, high cholesterol and HBP (Moulton, 2009, Moreno, 2013, Opara et al., 2013, Holland, Carthron, Duren-Winfield, & Lawrence, 2014; LeFevre, 2014). Moreover, the American Heart Association (2013) reported that one in three African American adults – compared to the national average of one in four American adults – has HBP. The racial disparity in HBP is also captured by the Behavioral Risk Factor Surveillance System (BRFSS), conducted by the Center for Disease Control and Prevention (CDC). Using the prevalence data and data analysis tools at http://www.cdc.gov/brfss/data_tools.htm nationally there is a higher percentage of blacks (42%) who reported that they have been told they have HBP than whites (32.5%). It is important, therefore, that healthcare providers in the rural underserved communities bring awareness and encourage behavior modification and treatment of HBP among adult African American males. Improving access to health care is an important factor in enhancing overall health.

Second, the study revealed that older males were significantly more likely to have HBP while both older males and women were significantly likely to have CVD. Also, generally having higher levels of education significantly reduced the likely incidence of HBP among women but not among men in the rural underserved communities. This was similar to the results by Opara et al. (2013); except in the latter African Americans of both sexes with lower education

also had HBP. However, higher educational attainment did not significantly explain the incidence of CVD. Third, consistent with national data, adult men in the two rural counties were significantly more likely to have both HBP and CVD, although married men were significantly less likely to have CVD. Higher income in the rural counties did not significantly influence health outcomes.

Study Limitations

First, the ethnic and other racial compositions (Native Americans, Asian Pacific and Hispanic) of the three counties were very few that they were excluded from the study. Second, there were many incomplete or missing survey responses about access to health insurance that contributed to its exclusion following the likelihood ratio test. The survey was administered by telephone and that means the data were self-reported and subject to recall biases. Third, the survey did not collect data on access to a personal doctor or health care provider and whether or not cost was a consideration in gaining access to health care.

Conclusions and Clinical Implications

The results from this study provide important information that adds to the current knowledge in understanding disparities in the incidence of HBP and CVD among adult residents in the rural underserved communities in southern Georgia that are similar to studies undertaken in more urban settings. The results provide health care practitioners (including nurses) and policy makers with critical information to design culturally appropriate health promotion and education policies for rural and medically underserved counties similar to those on which this research was based. The findings add to the existing body of knowledge in encouraging healthy behaviors to improve health outcomes for all populations, particularly, those in rural underserved communities.

While great progress has been made in understanding the factors contributing to health disparities among people in rural and medically underserved communities, access to health care providers, including nurses and physicians, become so compelling. Health disparities can be reduced if appropriate resources such as funding and health care personnel are committed to improve the quality of health access for all people irrespective of socioeconomic status and geographic location. The findings reinforce the important role of nurses and other health care providers to educate individuals, particularly, African Americans at risk for high blood pressure and heart disease about dietary and lifestyle modification for healthier outcomes. For at risk populations, uncontrolled high blood pressure cannot be taken lightly. It can lead to stroke, renal failure, heart disease, and other comorbidities.

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