Published in final edited form as:

Ethn Health. 2017 April ; 22(2): 196–208. doi:10.1080/13557858.2016.1232805.

Disparities in chronic medical conditions in the Mid-South

Bradford E. Jackson^{a,b}, Gabriela R. Oates^a, Karan P. Singh^{a,b}, James M. Shikany^a, Mona N. Fouad^{a,b}, Edward E. Partridge^{a,b}, and Sejong Bae^{a,b}

^aSchool of Medicine, University of Alabama at Birmingham, Birmingham, AL, USA

^bComprehensive Cancer Center, University of Alabama at Birmingham, Birmingham, AL, USA

Abstract

Objective—This study examined differences in socio-demographic characteristics and health behaviors relevant to chronic medical conditions (CMCs) in the Mid-South region (Alabama, Mississippi, Louisiana, Kentucky, Tennessee, and Arkansas), and identified subpopulations with increased burden of chronic disease.

Methods—Data were obtained from the 2013 Behavioral Risk Factor Surveillance System. The top five most prevalent CMCs in the Mid-South were analyzed: asthma, high blood pressure (HBP), obesity, arthritis, and depression. Adjusted odds ratios (AOR) and confidence intervals (CI) of race–gender combinations were estimated using logistic regression. Differences in associations between socio-demographic characteristics and CMCs according to income were also examined.

Results—The weighted prevalence estimates of the top five CMCs ranged from 66% (asthma) to 20% (depression). Higher income and employment were associated with better outcomes in all five CMCs. Higher educational attainment and physical activity were associated with better HBP, obesity, and arthritis status. Black and white females had higher odds of asthma compared to white males (black AOR = 1.7, CI: 1.1–2.6, white AOR = 1.7, CI: 1.3–2.2). Black males had lower odds of arthritis (AOR = 0.8, CI: 0.6–0.9), while white females had higher odds (AOR = 1.3, CI: 1.2–1.4). Similarly, the odds of depression were lower among black males (AOR = 0.5, CI: 0.4–0.6) and higher among white females (AOR = 2.2, CI: 2.0–2.5). Income-related differences by race were observed for HBP and obesity.

Conclusion—Disparities in CMCs are associated with income and disproportionately affect the black population. In the Mid-South, race and gender disparities in the top five chronic conditions are more prominent among higher-income rather than lower-income individuals.

Keywords

Chronic medical conditions; health disparities; physical activity; Mid-South

CONTACT Sejong Bae, BSejong@uab.edu, Division of Preventive Medicine, University of Alabama at Birmingham, 1717 11th Ave. South, MT 645, Birmingham, AL 35294-4410, USA.

Disclosure statement

No potential conflict of interest was reported by the authors.

Introduction

Chronic medical conditions (CMCs), such as heart disease, stroke, diabetes, and obesity, are among the most prevalent, costly, and preventable health problems (Vogeli et al. 2007). Currently, 83% of the US health-care resources are consumed by individuals who have a CMC (Emanuel 2012). Despite nationwide efforts to control CMCs, substantial geographic variation exists (Barker et al. 2011; Tanner et al. 2013; Vaughan, Kramer, and Casper 2014), with the Mid-South states continuously reporting higher burden.

The importance of social, economic, cultural, and environmental factors for driving and sustaining the disparities in CMC burden has been demonstrated (Diez-Roux et al. 1997; Lutfey and Freese 2005). These factors, termed social determinants of health (WHO 2008), constitute a fundamental cause of disease that puts people ‘at risk of risk’ and serves as a meta-mechanism perpetuating the specific proximate mechanisms (Link and Phelan 1995; Phelan, Link, and Tehranifar 2010).

Among the various social determinants of health, income is one of the most common proxy measures of one’s socioeconomic position (Krieger, Williams, and Moss 1997). A large body of research has documented significant associations between income and various health measures. Adults living in poverty are more than five times as likely to report being in fair or poor health as adults with incomes at least four times the federal poverty line (Braveman and Egerter 2008). Race is another potent predictor of variations in health status. Compared to whites, minorities experience earlier onset of illness, greater severity of disease, and poorer survival (Williams et al. 2010).

The Mid-South region has been the target of several studies examining the relationship between multiple risk factors and CMCs (Li et al. 2011; Harrington et al. 2014). Localized community interventions targeting preventive health behaviors have also shown to be successful (2015). Regardless of these efforts, a comprehensive socio-demographic study of factors associated with the high CMC burden in this geographic region has not been attempted. The purpose of this paper is to examine patterns of CMCs by socio-demographic characteristics in the Mid-South region. By assessing variation, we elucidate factors that contribute to CMC disparities and identify subpopulations that would benefit from further interventions and public health initiatives targeting CMCs.

Methods

Data source

This study constitutes a cross-sectional analysis of data from the 2013 Behavioral Risk Factor Surveillance System (BRFSS). The BRFSS, described in detail elsewhere (BRFSS 2011), utilizes a probability-based sampling scheme of the non-institutionalized population aged 18 years or older in the US to estimate the prevalence of behavioral risk factors in the general adult population. In brief, the survey uses a random-digit dialing methodology to contact cell phones and landlines in order to identify adults aged 18 years and older in the civilian non-institutionalized US population. Each state is administered a core module of

questions, and responses are based on self-report. Survey results are used to focus on intervention strategies at the federal or the state level.

Study population

The study population included individuals from the Mid-South region (comprised of the states of Alabama, Mississippi, Louisiana, Kentucky, Tennessee, and Arkansas) who self-identified as non-Hispanic black or non-Hispanic white. While the proportion of Hispanics in the 2013 BRFSS data set is 16.5%, only 3.3% of all Mid-South participants self-identified as Hispanic, precluding us from including a Hispanic category in our analyses.

Variables

The outcome variables of interest were CMCs. Twelve CMCs were available in the BRFSS database: obesity, diabetes, coronary heart disease (CHD), stroke, myocardial infarction (MI), arthritis, high blood pressure (HBP), asthma, cancer (other than skin), chronic obstructive pulmonary disease (COPD), depression, and chronic kidney disease (CKD). All CMCs with the exception of obesity were assessed based on self-reported responses to the question, ‘Has a doctor, nurse, or other health professional ever told you that you had the following? For each, tell me “Yes,” “No,” or “Not sure.”’ Obesity was assessed based on each respondent’s calculated body mass index (BMI). Subjects with a BMI ≥ 30 were classified as obese, and subjects with BMI <30 were classified as non-obese. Based on the distribution of the 12 CMCs in the target population, we chose to examine the top five CMCs most prevalent in the Mid-South: HBP, obesity, asthma, depression, and arthritis.

Socio-demographic characteristics included age (18–24, 25–44, 45–64, and 65+ years), race (white, black), educational level (high school, some college, college graduate), employment status (employed/self-employed, unemployed/out of work, other/student/homemaker/retired), and annual household income ($<\$25k$, $\geq \$25k$).

Health-related characteristics included health-care coverage, smoking status, physical activity level, and healthy eating. Health-care coverage was dichotomized as yes/no based on answers to the question, ‘Do you have any kind of health care coverage including health insurance, prepaid plans such as Health Maintenance Organizations, or government plans such as Medicare, or Indian Health Service?’ Smoking status was classified as current/former/never based on answers to the questions, ‘Have you smoked at least 100 cigarettes in your entire life?’ and ‘Do you now smoke cigarettes every day, some days, or not at all?’ Physical activity was assessed by responses to the questions, ‘During the past month, other than your regular job, did you participate in any physical activities or exercises such as running, calisthenics, golf, gardening, or walking for exercise?’, ‘How many times per week or per month did you take part in this activity?’, and ‘When you took part in this activity, for how many minutes or hours did you usually keep at it?’ Based on responses, physical activity behavior was categorized according to the 2008 Physical Activity Guidelines for Americans (DHHS 2008). Respondents who reported physical activity that met the 300-minute (or vigorous equivalent) weekly aerobic recommendation were classified as ‘Highly Active.’ Respondents who reported 150–300 minutes (or vigorous equivalent) weekly were classified as ‘Active.’ Respondents who reported weekly physical activity of 11–149

minutes were classified as ‘Insufficiently Active.’ Respondents who reported no physical activity were classified as ‘Inactive.’ Healthy eating was defined using the Centers for Disease Control and Prevention 2013, State Indicator Report on Fruits and Vegetables (McGuire 2013). The methodology uses the frequency of fruits and vegetables consumption as an indicator of healthy eating, with calculated variables for number of fruits consumed per day and the sum of all vegetables consumed per day.

Data analysis

We examined patterns of socio-demographic and health-related disparities in CMCs for all Mid-South respondents stratified by race and gender. Categorical variables were presented as frequency and weighted percentages. To examine differences across subpopulations, we used the Rao-Scott Chi-square test. We performed separate multivariable logistic regressions to examine associations between subject characteristics and prevalence odds of each of the top five most prevalent CMCs. Factors in the model included race–sex group, age group, education, employment, income, health-care coverage, smoking status, physical activity category, and fruit-and-vegetable consumption. Accounting for the complex survey design, we estimated the adjusted odds ratios (AOR) and corresponding 95% confidence limits (CL) and present the Type-3 overall *p*-values.

Because income is the downstream result of both education and employment, and because low income as a measure of social disadvantage has been found to be associated with poor health outcomes (Braveman et al. 2010), we examined differences in CMCs according to annual household income (< \$25k, \$25k). This cutoff point was chosen based on the 2013 US Department of Health and Human Services Federal Poverty Level (DHHS 2013). The BRFSS does not provide specific annual income data for respondents; the 2013 poverty guideline for a family of four in the contiguous US was \$23,550. Therefore, we utilized the next available cutoff point provided in the BRFSS, that of \$25,000, as an income threshold. To assess if income-level differences affects the relationship between race–gender combinations and the prevalence of the top five CMCs differently, we examined the two-way interaction between race and annual household income. We observed statistically significant interactions ($p < .05$) for HBP and obesity, while the data did not suggest effect measure modification for asthma, arthritis, or depression. For both HBP and obesity we used domain analysis to examine the adjusted measures of association according to income strata. We analyzed subject characteristics according to income level using domain analysis. Since the data suggested that the relationship between race–gender combination and prevalence of CMCs was different according to income level for HBP and obesity, we present our findings for asthma, arthritis, and depression separately since it would not be appropriate to present the multivariable analyses for HBP and obesity in light of the effect modification. All analyses were performed using SAS version 9.4 (SAS Institute Inc., Cary, NC) and incorporated the complex survey design parameters.

Results

The BRFSS dataset included 41,303 respondents from the Mid-South region (Table 1). In brief, the Mid-South was comprised of 20% black respondents, 51% with high-school

education or less, 20% unemployment, and approximately 38% with less than \$25,000 annual household income. In terms of health-related characteristics, approximately 24% of Mid-South respondents were current smokers and 58% were physically inactive or insufficiently active. The top five self-reported CMCs were asthma (65%), HBP (40%), obesity (34%), arthritis (29%), and depression (20%). There were statistically significant ($p < .001$) differences in the distributions of socio-demographic characteristics, health-related behaviors, and CMCs across race and gender strata.

Examination of subpopulations by race and gender revealed that the black population overall had worse socioeconomic and health-related characteristics and the poorest health outcomes compared to other subgroups. Among Mid-South blacks, the female subgroup had the highest percent unemployment (30.01%) and income below \$25k (61.05%), and the lowest physical activity (insufficiently active and inactive = 67.26%). Black males had the highest percent less than high-school education (62.46%), the second-highest percent unemployment (27.09%) and income below \$25k (51.60%), the highest percent without health-care coverage (28.83%), the highest percent current smokers (29.32%), and the lowest frequency of vegetable consumption (1.32 times a day) among all subgroups. White females had the second-highest proportion of physical inactivity (insufficiently active and inactive = 59.05%), and white males had the second-highest percent of current smokers (26.72%) and lowest frequency of fruit consumption (1.08 times per day).

In terms of the five most prevalent CMCs, the proportion of respondents reporting asthma was higher among females than males in both race groups. HBP rates were similar among black and white males but not among females, being 48.54% for black females and 38.46% white females. White males and females had similar proportions of obesity (~32%), whereas black males had a slightly higher proportion and black females had the highest proportion of obesity, with nearly half of them classified as obese. Arthritis was higher among females and whites. The proportion of female respondents reporting depression was almost twice that of males, and higher among whites.

Table 2 presents the AOR and corresponding CL for asthma, arthritis, and depression. After adjusting for covariates, we observed statistically significant associations between race and asthma. Notably, both black and white females had higher adjusted odds of asthma compared to white males (black female AOR = 1.7; 95%CL: 1.1, 2.6, white female AOR = 1.7; 95%CL: 1.3, 2.2). Higher prevalence odds were observed for those aged 45–64 and 65+ years compared to those aged 18–24 years. Lower adjusted odds were observed for those who were currently employed, had \$25k income, and reported consuming more vegetables per day.

In terms of self-reported arthritis, we observed statistically significant associations across race groups. Compared to white males, black males had lower adjusted odds (AOR = 0.77; 95% CL: 0.63, 0.94) whereas white females had higher adjusted odds (AOR = 1.3; 95% CL: 1.17, 1.43). In addition, we observed a trend of higher adjusted odds with age, as well as higher odds among those with health-care coverage and those who were current or former smokers. Lower adjusted odds of arthritis were observed among those with higher education,

currently employed, with \$25k income, and those who were physically active to some degree (highly active, active, and insufficiently active) compared to those who were inactive.

In terms of the adjusted prevalence odds for depression, compared to white males black males had lower odds (AOR = 0.50; 95% CL: 0.38, 0.64) whereas white females had higher odds (AOR = 2.24; 95% CL: 2.00, 2.50). In addition, we observed a trend of higher adjusted odds with age, as well as higher odds among those who were current and former smokers. Lower adjusted odds of arthritis were observed among those who were currently employed, with \$25k income, and physically active to some degree (highly active and active) compared to those who were inactive.

Based on the statistically significant two-way interactions between race and income observed in HBP (interaction p -value = .0006) and obesity (interaction p -value < .0001), we performed subgroup analysis to examine how income level modified the associations between subject characteristics and the two CMCs. Table 3 presents the AOR and corresponding 95% CL for HBP and obesity for both <\$25k and \$25k annual household income. Among respondents with <\$25k annual household income, compared to white males black females had significantly higher odds of HBP (AOR = 1.60, 95% CL: 1.26, 2.03). Among respondents with \$25k annual household income, compared to white males both black males and black females had higher adjusted odds of HBP (black male AOR: 1.45; 95% CL: 1.15, 1.83; black female odds ratios (OR): 1.39; 95% CL: 1.15, 1.67) while white females had lower adjusted odds (AOR = 0.64; 95% CL: 0.57, 0.71). Among both income classifications, there was an increase in the adjusted odds of HBP with age, as well as lower odds among respondents with better education and currently employed. Income-level differences were observed for health-care coverage, smoking status, physical activity, and vegetable consumption. In the <\$25k income subgroup, health insurance coverage and increased vegetable consumption were positively associated with HBP, while in the \$25k subgroup increased vegetable consumption and any physical activity were positively associated with HBP.

In terms of obesity, among the <\$25k respondents, both black and white females had higher adjusted odds of obesity (black AOR: 2.29; 95% CL: 1.85, 2.85; white AOR: 1.31; 95% CL: 1.10, 1.57). Among those with \$25k annual income, compared to white males both black males and black females had higher odds of obesity (black male AOR: 1.31; 95% CL: 1.05, 1.64; black female AOR: 1.48; 95% CL: 1.23, 1.78), whereas white females had a lower adjusted odds of obesity (AOR: 0.87; 95% CL: 0.78, 0.97). Higher education, employment, and physical activity were associated with lower odds of obesity. The patterns of relationships between other covariates and obesity were similar in the two income classifications, but the magnitude by age was notably larger in the \$25k income classification.

Discussion

The objective of this study was to examine differences in CMCs, socio-demographic characteristics, and health-related behaviors in a geographic region with increased burden of chronic disease. Based on the distribution of the CMCs in the target population, we

examined the top five CMCs most prevalent in the Mid-South region: HBP, obesity, asthma, depression, and arthritis.

Our results showed that the poor health profile of the Mid-South disproportionately affects the black population. Mid-South black females had the highest percentages of obesity, HBP, diabetes, and stroke among all subgroups, along with the lowest level of physical activity. Black males had the second-highest percentages of obesity, HBP, diabetes, and MI among all subgroups, as well as the lowest fruit and vegetable intake and highest current smoking rates.

Racial and gender differences in the top five CMCs persisted after adjusting for covariates. Income subgroup analysis highlighted differences in measures of association for HBP and obesity. These racial disparities in CMC burden went hand in hand with pronounced socioeconomic disparities: Mid-South black females had the highest unemployment and the lowest annual income of all subgroups, while the Mid-South black males had the lowest educational attainment and the second-highest unemployment and low income (after the Mid-South black females); they also had the lowest rates of health insurance coverage.

Because of such close parallels between racial and socioeconomic health disparities, understanding the health status of racial/ethnic minorities requires an integration of both racial stratification and stratification by social class (Williams et al. 2010).

Our results were consistent with other findings that, after adjusting for covariates, asthma, arthritis, and depression affect females more so than males; however, associations were still observed for both blacks and whites. These findings reflect the under-diagnosis of depression among blacks as reported previously, as well as known disparities in the diagnosis and treatment of asthma and arthritis among ethnic minorities.

In our adjusted analyses, increased fruit consumption had a statistically significant inverse relationship with the adjusted odds of depression (OR = 0.95; 95% CL: 0.91, 1.00). This finding is supported by a recent meta-analysis, which highlights an inverse relationship between fruit and vegetable consumption and the risk of depression.

Perhaps one of the most interesting findings of this study is the differential effect of income disparities by race and gender on both HBP and obesity. In particular, income stratification had an inverse relationship with obesity for black males, a finding that mirrors the one from analysis of the National Health and Nutrition Examination Survey. Socioeconomic disparities in health-related behaviors, including lower physical activity and lower fruit and vegetable consumption, have been documented previously. In the <\$25k annual income subgroup, the adjusted odds of HBP were higher among those with greater vegetable consumption per day (AOR = 1.07; 95% CL: 1.07, 1.13); in contrast, in the \$25k annual income subgroup, the adjusted odds of HBP were lower for those with greater vegetable consumption (AOR = 0.96; 95% CL: 0.92, 1.00). Caution must be taken in drawing any conclusions based on these results, as they are likely an artifact of the cross-sectional analysis. It should be noted that we observed a statistically significant association between HBP and physically active vs. inactive subjects in the lower-income category (AOR = 1.30; 95% CL: 1.03, 1.64) and an inverse association among the higher-income category (AOR =

0.84; 95% CL: 0.73, 0.98). Again, such results should be interpreted with caution due to the unknown temporality of event timing. However, these findings illustrate the damaging effect of poverty for health regardless of race. Characterized by both concentrated poverty and higher proportion of black population, the Mid-South region is at a double disadvantage as evidenced by the higher CMC burden.

Our study identified high-risk populations in a region where poor health has been an issue for many. The Mid-South has the highest prevalence of obesity, as well as the lowest levels of physical activity. Both obesity and physical inactivity are modifiable lifestyle factors associated with multiple CMCs. Continued emphasis on public health initiatives focusing on these conditions may improve future health outcomes of individuals in the Mid-South.

The study has both strengths and limitations. Data from the BRFSS provided the most representative state-level information to explore variations in CMCs. Our analyses incorporated a large, regionally representative sample, which contributes to the external validity of our results. It should be noted that due to the sparse population of Hispanics and Other races in our Mid-South sample, the findings cannot be generalized to those respective populations within the Mid-South. This analysis, however, is subject to limitations: the CMC data were obtained by self-report, and the estimates exclude persons who have not been diagnosed. If there is potential underreporting of CMCs, then our conclusions are based on conservative estimates, which underestimate the magnitude of the problem. Finally, the data were aggregated over large areas, and while the state data are intended to be regionally representative at the state level, the estimates may differ from local-level analyses.

In summary, our findings suggest that a great burden in terms of socio-demographics, health-related behaviors, and CMCs disproportionately affect blacks in the Mid-South region. Our analysis highlighting subpopulations with higher CMC burden is intended to serve as a guide for targeting specific subgroups at increased risk for CMCs. Future studies should tailor and test customized interventions addressing the specific needs of targeted subgroups in order to elevate their overall health status.

Acknowledgments

Funding

This manuscript was funded by a grant from the National Institute on Minority Health and Health Disparities [U54MD008176] to the Mid-South Transdisciplinary Collaborative Center for Health Disparities Research.

References

- Barker LE, Kirtland KA, Gregg Edward W, Geiss Linda S, Thompson Theodore J. Geographic Distribution of Diagnosed Diabetes in the U.S.: A Diabetes Belt. *American Journal of Preventive Medicine*. 2011; 40(4):434–439. [PubMed: 21406277]
- BRFSS. Behavioral Risk Factor Surveillance System 2011. Atlanta, GA: Centers for Disease Control and Prevention; 2011. http://www.cdc.gov/brfss/annual_data/2011/pdf/2011_summary_data_quality_report.pdf
- Braveman PA, Cubbin C, Egerter Susan, Williams David R, Pamuk Elsie. Socioeconomic Disparities in Health in the United States: What the Patterns Tell Us. *American Journal of Public Health*. 2010; 100(Suppl. 1):S186–196. [PubMed: 20147693]

- Braveman P, Egerter S. Overcoming Obstacles to Health. 2008A report from the Robert Wood Johnson Foundation to the Commission to Build a Healthier America
- DHHS, U. S.. 2008 Physical Activity Guidelines for Americans: Be Active, Healthy, and Happy!. Washington, DC: U.S Dept of Health and Human Services; 2008.
- DHHS. 2013 Poverty Guidelines. Washington, D.C.: U.S. Department of Health and Human Services, Assistant Secretary for Planning and Evaluation; 2013. <https://aspe.hhs.gov/2013-poverty-guidelines>
- Diez-Roux AV, Nieto FJ, Muntaner C, Tyroler HA, Comstock GW, Shahar E, Cooper LS, Watson RL, Szklo M. Neighborhood Environments and Coronary Heart Disease: A Multilevel Analysis. *American Journal of Epidemiology*. 1997; 146(1):48–63. [PubMed: 9215223]
- Emanuel EJ. Where are the Health Care Cost Savings? *JAMA*. 2012; 307(1):39–40. [PubMed: 22215161]
- Harrington DM, Champagne CM, Broyles Stephanie T, Johnson William D, Tudor-Locke Catrine, Katzmarzyk Peter T. Steps Ahead: A Randomized Trial to Reduce Unhealthy Weight Gain in the Lower Mississippi Delta. *Obesity (Silver Spring)*. 2014; 22(5):E21–28. [PubMed: 24376252]
- Krieger N, Williams DR, Moss NE. Measuring Social Class in US Public Health Research: Concepts, Methodologies, and Guidelines. *Annual Review of Public Health*. 1997; 18:341–378.
- Li W, Wang Y, Chen Liwei, Horswell Ronald, Xiao Ke, Besse Jay, Johnson Jolene, Ryan Donna H, Hu Gang. Increasing Prevalence of Diabetes in Middle or low Income Residents in Louisiana from 2000 to 2009. *Diabetes Research and Clinical Practice*. 2011; 94(2):262–268. [PubMed: 21889811]
- Link BG, Phelan J. Social Conditions as Fundamental Causes of Disease. *Journal of Health and Social Behavior*. 1995:80–94. [PubMed: 7560851]
- Lutfey K, Freese J. Toward Some Fundamentals of Fundamental Causality: Socioeconomic Status and Health in the Routine Clinic Visit for Diabetes. *American Journal of Sociology*. 2005; 110(5): 1326–1372.
- McGuire S. State Indicator Report on Fruits and Vegetables, 2013, Centers for Disease Control and Prevention, Atlanta, GA. *Advances in Nutrition: An International Review Journal*. 2013; 4(6):665–666.
- Phelan JC, Link BG, Tehranifar P. Social Conditions as Fundamental Causes of Health Inequalities: Theory, Evidence, and Policy Implications. *Journal of Health and Social Behavior*. 2010; 51(Suppl):S28–40. [PubMed: 20943581]
- Tanner RM, Gutierrez OM, Judd Suzanne, McClellan William, Bowling C Barrett, Bradbury Brian D, Safford Monika M, Cushman Mary, Warnock David, Muntner Paul. Geographic Variation in CKD Prevalence and ESRD Incidence in the United States: Results from the Reasons for Geographic and Racial Differences in Stroke (REGARDS) Study. *American Journal of Kidney Diseases*. 2013; 61(3):395–403. [PubMed: 23228944]
- Vaughan AS, Kramer MR, Casper Michele. Geographic Disparities in Declining Rates of Heart Disease Mortality in the Southern United States, 1973–2010. *Preventing Chronic Disease*. 2014; 11:140203. doi: <http://dx.doi.org/10.5888/pcd11.140203>.
- Vogeli C, Shields AE, Lee Todd A, Gibson Teresa B, Marder William D, Weiss Kevin B, Blumenthal David. Multiple Chronic Conditions: Prevalence, Health Consequences, and Implications for Quality, Care Management, and Costs. *Journal of General Internal Medicine*. 2007; 22(Suppl. 3): 391–395. [PubMed: 18026807]
- Williams DR, Mohammed SA, Leavell Jacinta, Collins Chiquita. Race, Socioeconomic Status, and Health: Complexities, Ongoing Challenges, and Research Opportunities. *Annals of the New York Academy of Sciences*. 2010; 1186:69–101. [PubMed: 20201869]
- World Health Organization. Final Report of the Commission on Social Determinants of Health. Geneva Geneva, Switzerland: World Health Organization; 2008. http://www.who.int/social_determinants/thecommission/finalreport/en/

Key messages

1. The poor health profile of the Mid-South disproportionately affects the black population.
2. Continued emphasis on public health initiatives focusing on the identified conditions may improve future health outcomes of individuals in the Mid-South.

Table 1
Overall and race–gender stratified characteristics of the Mid-South population in the 2013 BRFSS.

Characteristics	White				Black					
	Overall		Male		Female		Male		Female	
	n = 41,303	%	n = 11,480	%	n = 19,977	%	n = 2,373	%	n = 5,756	%
Race	NH white	31,457	72.44	-	-	-	-	-	-	-
	NH black	8129	20.65	-	-	-	-	-	-	-
Hispanic		503	3.36	-	-	-	-	-	-	-
	NH Other	1214	3.55	-	-	-	-	-	-	-
Sex	Male	14,600	48.19	-	-	-	-	-	-	-
	Female	26,703	51.81	-	-	-	-	-	-	-
Age group	18-24	1911	13.01	591	12.14	685	10.23	181	18.02	288
	25-44	8067	33.35	2380	31.89	3416	30.13	555	36.88	1215
	45-64	16,808	34.55	4684	36.67	7872	35.56	1046	32.73	2562
Education level	65+	14,517	19.10	3825	19.30	8004	24.09	591	12.37	1691
	High school	18,903	50.74	4785	49.32	8981	48.26	1352	62.46	3034
	Some college	10,894	29.71	2901	29.17	5519	31.23	588	26.08	1415
Employment	College	11,319	19.55	3745	21.51	5378	20.51	427	11.46	1286
	Employed	16,909	51.62	5803	59.84	7195	43.84	1010	52.78	2126
	Unemployed	7796	19.45	1739	16.56	3320	17.84	674	27.09	1714
Income	Other	16,351	28.93	3880	23.60	9343	38.32	679	20.13	1876
	< \$25k	12,351	37.50	2493	28.85	5423	34.18	983	51.60	2859
	\$25k	19,462	62.50	6748	71.15	9289	65.82	949	48.40	1729
Health coverage	Covered	35,806	80.61	10,046	82.15	17,870	84.96	1844	71.17	4721
	Not covered	5364	19.39	1402	17.85	2048	15.04	515	28.83	1022
Smoking status	Current	7913	24.24	2352	26.72	3700	23.68	592	29.32	893
	Former	10,709	23.82	4087	31.42	4692	21.98	598	17.73	925
Physical activity	Never	21,318	51.94	4681	41.86	10,961	54.34	1082	52.95	3734
	Highly active	9465	25.13	3193	28.53	4443	23.74	532	26.20	914
	Active	5805	16.71	1625	16.44	2888	17.22	342	17.55	712
Insufficiently active	7223	21.20	1907	20.28	3486	21.26	440	22.06	1077	

Characteristics	White						Black					
	Overall		Male		Female		Male		Female		Rao-Scott <i>p</i> -value	
	<i>n</i> = 41,303	%	<i>n</i> = 11,480	%	<i>n</i> = 19,977	%	<i>n</i> = 2,373	%	<i>n</i> = 5,756	%		
	14,195	36.95	3512	34.75	7054	37.79	742	34.18	2333	45.14		
Inactive (mean, SE)												
Fruits per day	1.16	0.01	1.08	0.03	1.17	0.02	1.14	0.05	1.34	0.04	<.0001	
Veggies per day (mean, SE)	1.73	0.01	1.71	0.02	1.88	0.01	1.32	0.04	1.52	0.04	<.0001	
Asthma	3721	65.50	639	56.61	2073	71.55	176	58.75	624	70.11	<.0001	
HBP	21,171	40.45	5775	42.02	9658	38.46	1344	43.93	3697	48.54	<.0001	
Obesity	13,287	33.52	3696	32.25	5590	31.01	868	34.72	2627	47.77	<.0001	
Arthritis	16,498	29.20	3845	27.05	8743	35.09	779	22.32	2531	29.60	<.0001	
Depression	8770	20.24	1757	15.74	5239	27.67	309	11.87	1061	18.06	<.0001	
Diabetes	6790	12.29	1814	12.03	2897	11.70	494	13.64	1355	16.77	<.0001	
COPD	4786	9.39	1200	9.13	2606	11.10	192	7.24	559	7.54	<.0001	
MI	3092	5.89	1243	8.31	1224	4.56	183	6.30	307	3.54	<.0001	
CHD	3202	5.57	1128	7.02	1441	5.31	151	4.78	357	3.95	<.0001	
Stroke	2472	4.27	592	4.49	1187	4.33	161	3.87	430	5.07	.2989	
CKD	1529	2.62	349	2.11	757	3.00	112	3.05	248	3.28	.0009	

Notes: Overall includes all ethnic and gender combinations. Due to the relatively small number of Hispanic and Other races in the Mid-South, presentation of results is restricted to white and black. Column totals and percentages for subgroups will not sum to 100%. NH – non-Hispanic; SE – standard error; HBP – high blood pressure; COPD – chronic obstructive pulmonary disease; MI – myocardial infarction; CHD – coronary heart disease; CKD – chronic kidney disease.

%; Weighted.

Table 2

AOR for asthma, arthritis, and depression in the Mid-South population, BRFSS 2013.

Characteristics	Overall	Asthma			Arthritis			Depression		
		AOR	LCL	UCL	AOR	LCL	UCL	AOR	LCL	UCL
Race	BLF vs. WHM	1.73	1.14	2.64	1.15	0.99	1.34	1.01	0.85	1.20
	BLM vs. WHM	0.91	0.56	1.46	0.77	0.63	0.94	0.50	0.38	0.64
	WHF vs. WHM	1.71	1.32	2.22	1.30	1.17	1.43	2.24	2.00	2.50
Age group	25–44 vs. 18–24	1.21	0.75	1.94	4.81	2.99	7.73	1.67	1.31	2.13
	45–64 vs. 18–24	2.02	1.26	3.24	14.16	8.90	22.52	1.66	1.31	2.09
	65+ vs. 18–24	1.76	1.04	3.00	23.23	14.65	36.82	1.08	0.84	1.39
Education level	College vs. HS or Less	1.16	0.85	1.58	0.71	0.64	0.79	1.09	0.96	1.24
	Some college vs. HS or Less	1.14	0.85	1.52	0.96	0.87	1.07	1.23	1.10	1.39
Employment	Employed vs. Unemployed	0.54	0.38	0.77	0.31	0.27	0.36	0.26	0.22	0.29
	Other vs. Unemployed	0.86	0.58	1.26	0.47	0.41	0.55	0.37	0.32	0.43
Income	\$25k vs. <\$25k	0.60	0.44	0.82	0.73	0.66	0.82	0.65	0.57	0.73
Health coverage	Covered vs. Not covered	1.01	0.72	1.42	1.49	1.29	1.74	1.11	0.96	1.29
Smoking status	Current vs. Never	1.06	0.77	1.46	1.28	1.14	1.45	1.88	1.67	2.12
	Former vs. Never	0.84	0.63	1.12	1.31	1.18	1.45	1.25	1.11	1.41
Physical activity	Highly active vs. Inactive	0.86	0.64	1.16	0.78	0.70	0.88	0.77	0.68	0.88
	Active vs. Inactive	0.81	0.57	1.15	0.74	0.65	0.84	0.74	0.64	0.86
	Insufficiently active vs. Inactive	0.97	0.69	1.37	0.73	0.65	0.83	0.88	0.77	1.01
Fruit consumption per day		1.08	0.96	1.20	0.98	0.96	1.01	0.95	0.91	1.00
Veggie consumption per day		0.87	0.79	0.96	1.03	1.00	1.06	1.01	0.97	1.05

Notes: AOR – Adjusted Odds Ratio; LCL – 95% Lower Confidence Limit; UCL – 95% Upper Confidence Limit; BLF – non-Hispanic black female; WHM – non-Hispanic white male; BLM – non-Hispanic black male; WHF – non-Hispanic white female; HS – High School; AOR were estimated using multivariable logistic regression adjusting for race, age, education, employment, health coverage, smoking status, physical activity, and both fruit and vegetable consumption per day.

Table 3
Income-level domain analysis for HBP and obesity in the Mid-South population, BRFSS 2013.

Characteristics	HBP						Obesity					
	< \$25k			\$25k			< \$25k			\$25k		
	AOR	LCL	UCL	AOR	LCL	UCL	AOR	LCL	UCL	AOR	LCL	UCL
Race												
BLF vs. WHM	1.60	1.26	2.03	1.39	1.15	1.67	2.29	1.85	2.85	1.48	1.23	1.78
BLM vs. WHM	1.10	0.82	1.48	1.45	1.15	1.83	0.82	0.63	1.09	1.31	1.05	1.64
WHF vs. WHM	0.85	0.70	1.03	0.64	0.57	0.71	1.31	1.10	1.57	0.87	0.78	0.97
Age group												
25–44 vs. 18–24	4.69	3.13	7.02	3.23	2.14	4.87	1.92	1.41	2.61	2.89	2.09	4.01
45–64 vs. 18–24	13.99	9.47	20.68	10.19	6.83	15.20	2.01	1.50	2.71	3.41	2.48	4.68
65+ vs. 18–24	25.73	17.07	38.79	20.46	13.58	30.84	1.23	0.90	1.69	2.53	1.83	3.50
Education level												
College vs. HS or less	0.61	0.48	0.78	0.82	0.72	0.93	0.70	0.55	0.90	0.72	0.64	0.82
Some college vs. HS or less	0.81	0.68	0.96	1.02	0.89	1.16	0.85	0.72	1.00	1.04	0.92	1.19
Employment												
Employed vs. Unemployed	0.53	0.44	0.65	0.52	0.42	0.65	0.74	0.62	0.89	0.73	0.60	0.89
Other vs. Unemployed	0.73	0.59	0.90	0.71	0.57	0.88	0.60	0.49	0.73	0.66	0.53	0.82
Health coverage												
Covered vs. Not covered	1.28	1.07	1.54	1.13	0.92	1.39	1.07	0.90	1.27	0.96	0.79	1.17
Smoking status												
Current vs. Never	0.91	0.76	1.09	1.04	0.89	1.21	0.53	0.45	0.64	0.59	0.50	0.69
Former vs. Never	1.24	1.02	1.52	1.09	0.97	1.22	1.02	0.85	1.23	1.01	0.90	1.13
Physical activity												
Highly active vs. Inactive	0.92	0.75	1.13	0.77	0.68	0.88	0.71	0.58	0.86	0.65	0.56	0.74
Active vs. Inactive	1.30	1.03	1.64	0.84	0.73	0.98	0.79	0.63	0.98	0.68	0.59	0.79
Insufficiently active vs. Inactive	0.93	0.74	1.16	0.85	0.74	0.98	0.86	0.70	1.05	0.72	0.63	0.83
Fruit consumption per day	0.98	0.91	1.06	1.01	0.98	1.03	0.97	0.91	1.04	0.98	0.96	1.01
Veggie consumption per day	1.07	1.00	1.13	0.96	0.92	1.00	1.05	0.98	1.11	0.98	0.94	1.02

Notes: HBP – high blood pressure; AOR – Adjusted Odds Ratio; LCL – 95% Lower Confidence Limit; UCL – 95% Upper Confidence Limit; BLF – black female; WHM – white male; BLM – black male; WHF – white female; HS – High School; AOR were estimated using multivariable logistic regression adjusting for race, age, education, employment, health coverage, smoking status, physical activity, and both fruit and vegetable consumption per day.