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Sociodemographic Patterns of Chronic Disease:

How the Mid-South Region Compares to the Rest of the Country

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Abstract

Introduction—States in the Mid-South region are among the least healthy in the nation. This descriptive study examines sociodemographic differences in the distribution of chronic diseases and health-related behaviors in the Mid-South versus the rest of the U.S., identifying subgroups at increased risk of chronic disease.

Methods—Data were obtained from the 2013 Behavioral Risk Factor Surveillance System; analyses were completed in January 2016. Twelve chronic health conditions were assessed: obesity, diabetes, high blood pressure, coronary heart disease, myocardial infarction, stroke, chronic kidney disease, cancer, arthritis, asthma, chronic obstructive pulmonary disease, and depression. Evaluated health-related behaviors included smoking, physical activity, and fruit and vegetable consumption. Age-standardized percentages were reported using complex survey design parameters to enhance generalizability.

Results—The Mid-South population had increased rates of chronic disease and worse health-related behaviors than the rest of the U.S. population. Mid-South blacks had the highest percentages of obesity, diabetes, high blood pressure, and stroke of all subgroups, along with lower physical activity and fruit and vegetable consumption. In both races and regions, individuals with lower income and education had higher rates of chronic disease and unhealthy behaviors than those with higher income and education. However, black men in both regions had higher obesity and cancer rates in the higher education category. In general, education-level disparities were more pronounced in health-related behaviors, whereas income-level disparities were more pronounced in chronic health conditions.

Conclusions—Future studies should test tailored interventions to address the specific needs of population subgroups in order to improve their health.

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Introduction

Chronic diseases are among the most prevalent and costly health problems. About half of U.S. adults have at least one chronic condition, and a quarter have two or more.[1] Currently, 83% of healthcare resources in the U.S. are consumed by individuals with chronic disease.[2] Substantial geographic variation exists in chronic disease incidence, prevalence, and mortality.[3–5]

The importance of socioeconomic factors for disparities in chronic disease has been established.[6,7] Termed social determinants of health,[8] they have been described as "fundamental causes of disease"[9] that can promote or prevent disease.[10] Significant associations between income, education, and health measures have been documented. Adults living in poverty are more than five times as likely to report fair or poor health as adults with incomes at least four times the Federal Poverty Line.[11] Every additional year in educational attainment reduces the odds of dying by 1%–3%[12]; half of all male deaths and 40% of all female deaths among those aged 25–64 years would not occur if everyone experienced the mortality rates of college graduates.[13] Though related, income and education have different associations with health outcomes[14] and cannot be used as proxies for each other.[15] Additionally, earnings at similar educational levels vary, especially across racial/ethnic, gender, and age groups, which further reinforces the need to consider both variables.[15] Race is another potent predictor of variations in health status. Compared with whites, minorities experience earlier onset of illness, greater severity of disease, and poorer survival.[16]

Several studies have examined relationships between risk factors and chronic disease in select Mid-South states.[17–19] Regardless of these efforts, a comprehensive description of sociodemographic factors associated with the burden of chronic disease in this region has not been attempted. A descriptive understanding of sociodemographic disparities in health is important in multiple ways: for understanding trends in health disparities, to inform causal investigations, for targeting prevention and treatments resources, and for increasing public awareness of existing health disparities.[14] The goal of this paper is to examine patterns of chronic diseases and related health behaviors by sociodemographic characteristics in the Mid-South versus the rest of the country in order to highlight factors that contribute to disparities and identify subpopulations that would benefit from targeted interventions.

Methods

The study employed a cross-sectional analysis of data from the 2013 Behavioral Risk Factor Surveillance System (BRFSS). BRFSS, described in detail elsewhere,[20] utilizes a probability-based sampling scheme of the non-institutionalized population aged ≥18 years in the U.S. Each state administers a core module of questions, and responses are based on self-report.

The study population consisted of individuals from the 48 contiguous states who self-identified as black or non-Hispanic white. Although nationally the 2013 BRFSS included 16.5% Hispanics, only 3.4% of Mid-South participants self-identified as Hispanic, precluding inclusion of a Hispanic category in the analyses. Geographic location was

categorized as Mid-South versus non-Mid-South. The Mid-South region comprised the states of Alabama, Mississippi, Louisiana, Kentucky, Tennessee, and Arkansas; the non-Mid-South region comprised the remaining 42 states.

Measures

The main outcome variables were chronic health conditions (CHCs). Twelve CHCs were available: obesity, diabetes, coronary heart disease (CHD), stroke, myocardial infarction (MI), arthritis, high blood pressure (HBP), asthma, cancer (other than skin cancer), chronic obstructive pulmonary disease (COPD), depression, and chronic kidney disease (CKD). All CHCs, 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 respondents' calculated BMI. Participants with a BMI ≥30 were classified as obese, and those with BMI <30 as non-obese.

Sociodemographic characteristics included age (18–24, 25–44, 45–64, ≥65 years), gender (male, female), race (white, black), educational attainment (≤high school, some college, college graduate), employment status (employed/self-employed, unemployed/out of work, other/student/homemaker/retired), annual household income (<$25,000, ≥$25,000), and healthcare coverage (yes, no). Healthcare coverage was dichotomized based on answers to the question: *Do you have any kind of health-care coverage including health insurance, prepaid plans such as HMOs, or government plans such as Medicare, or Indian Health Service?*

Health-related behaviors included smoking status (current, former, never), physical activity (yes, no), and healthy eating (yes, no). Smoking status was determined 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 question: *During the past week, other than your regular job, did you participate in any physical activities or exercises such as running, calisthenics, golf, gardening, or walking for exercise?*

Healthy eating was defined based on frequency of fruit and vegetable consumption[21]: (1) consuming fruit one or more times per day (yes, no); (2) consuming vegetables one or more times per day (yes, no); and (3) consuming both at least one fruit and at least one vegetable per day (yes, no).

Statistical Analysis

Descriptive analysis was used to examine patterns of disparities. The percentage of respondents with CHCs age standardized to the U.S. 2010 population was estimated,[22] along with distribution of sociodemographic and health-behavior characteristics in two regions: Mid-South and non-Mid-South. To examine differences across subpopulations, each region was stratified by race and gender.

Because low income has been associated with poor health outcomes,[23] differences in CHCs according to annual household income levels (<$25,000, ≥$25,000) were examined. The cut

off point was chosen based on the 2013 U.S. DHHS Federal Poverty Level.[24] BRFSS does not provide specific annual income data for respondents; the 2013 poverty guideline for a family of four in the contiguous U.S. was $23,550. Therefore, the next available cut off point in BRFSS ($25,000) was used as an income threshold. Differences in CHCs according to educational attainment (≤high school, >high school) were also examined. Categorical data were presented as weighted percentages, and between-group differences were assessed using chi-square tests. Missing data were excluded from the analysis. With the exception of income level and current asthma, the percentages of missing data were <8% across all variables in the overall sample. Analyses were performed using SAS, version 3 and were completed in January 2016.

Results

The number of respondents in the Mid-South and non-Mid-South regions were 41,303 and 430,126, respectively. All differences in the distribution of sociodemographic characteristics, health-related behaviors, and CHCs across geographic, race, and gender strata were statistically significant ($p<0.001$) (Appendix Table 1). In terms of sociodemographics, the Mid-South population had a higher proportion of blacks and was characterized by lower education, employment, income, and healthcare coverage than the non-Mid-South population. In terms of health-related behaviors, the Mid-South population had a greater percentage of current smokers, lower physical activity, and less fruit and vegetable consumption than the non-Mid-South population. In terms of CHCs, the Mid-South had a higher percentage of individuals with chronic conditions (except asthma and CKD) than the non-Mid-South population.

The Mid-South black population had the worst socioeconomic characteristics, health behaviors, and health outcomes of all subgroups. Among Mid-South blacks, women had the highest unemployment (29.9%) and low income (48.7%) and the lowest physical activity (51.9%) of all subgroups. In terms of CHC burden, Mid-South black women had the highest obesity (44. 9%), HBP (51.7%), diabetes (17.9%), stroke (5.6%), arthritis (32.1%), and CKD (3.5%) of all subgroups. Mid-South black men had the highest percentage without high school education (62.9%), the second highest unemployment (27.1%) and income < $25,000 (42.2%), the highest percentage without healthcare coverage (26.7%) and current smokers (27.8%), and the lowest percent of fruit, (42.4%), vegetable (45.4%), and fruit and vegetable consumption (27.5%) among all subgroups. In terms of CHC burden, Mid-South black men had the second highest percentage HBP (47.9%), diabetes (15.5%), CHD (5.4%), stroke (4.6%), MI (7.2%), and CKD (3.5%) among all subgroups.

The Mid-South white population had poor health characteristics as well. Mid-South white women had the highest percentage of cancer (9.0%), COPD (10.3%), and depression (28.0%) of all subgroups. Mid-South white men had the second highest percentage of current smokers (26.4%), the second lowest percent of fruit consumption (44.2%), the highest percentage of CHD (6.4%) and MI (7.7%), and the second highest percentage of COPD (8.7%) of all subgroups.

Within the Mid-South, a number of relative (≥10%) racial differences by gender were observed. Compared with white men, black men reported higher percentage of obesity, diabetes, HBP, asthma, and CKD. Compared with white women, black women reported higher percentage of obesity, diabetes, HBP, stroke, and CKD. White men reported higher percentage of CHD, COPD, and depression than black men, while white women reported higher percentage of cancer, COPD, and depression than black women.

Outside of the Mid-South, black men reported higher percentage of obesity, diabetes, HBP, stroke, asthma, and CKD compared with white men. Black women reported higher percentage of obesity, diabetes, HBP, CHD, stroke, MI, asthma, COPD, and CKD compared with white women. White men reported higher percentage of CHD and depression than black men, and white women reported higher percentage of cancer and depression than black women.

Figure 1 presents the percentage differences in physical activity and fruit and vegetable consumption by income. Positive estimates indicated that the <$25,000 income stratum had lower physical activity or fruit and vegetable consumption than the ≥$25,000 income stratum. Across all subpopulations, the percentage of those reporting physical activity outside of work was considerably lower in the <$25,000 income stratum (Figure 1A). The largest difference in physical activity between the two income strata was observed among white men and women, and this income disparity was more pronounced in the Mid-South region (white men, 17.3%; white women, 17.5%) than the rest of the country (white men, 13.5%; white women, 15.5%). In terms of fruit and vegetable consumption, individuals in the <$25,000 income stratum fared worse than those in the ≥$25,000 stratum (Figure 1B). Income-level differences were most apparent in the consumption of vegetables.

Figure 2 presents the percent differences in CHCs between income strata. Negative estimates indicated that the lower income stratum had worse health status. However, among black men in both regions, obesity (Figure 2A) was higher for those with ≥$25,000 income, and the disparity was greater in the Mid-South (8.0%) than the non-Mid-South (4.1%). In addition, in both regions, black men with ≥$25,000 income reported a slightly higher (1% Mid-South, 0.6% non-Mid-South) rates of cancer (Figure 2I). For all other CHCs, the prevalence was higher among individuals with <$25,000 income.

Disparities in CHD, MI, HBP, asthma, COPD, and depression by income (Figures 2C, 2E, 2G, 2H, 2J, and 2K) were similar in the two regions; in general, income disparities in these conditions were larger among whites than blacks in both regions. The percentage of those reporting diabetes (Figure 2B) was higher for all subpopulations with income <$25,000, with the largest income disparity being among white women in both regions. Stroke disparities by income (Figure 2D) were observed only in the Mid-South, with the disparity being greater among men than women and whites than blacks. Arthritis disparities by income (Figure 2F) varied according to race and gender, with whites having the largest disparity by income in both regions. CKD disparities by income varied by region, race, and gender (Figure 2I). In the Mid-South, CKD disparities by income were greater among blacks than whites, whereas the opposite was true outside the Mid-South.

Figure 3 presents the percent differences in physical activity and fruit and vegetable consumption by education. Education-level differences in physical activity (Figure 3A) revealed a similar pattern as income-level differences, except that they were larger among all subcategories but white women in both regions and black men in the Mid-South. In terms of fruit and vegetable consumption (Figure 3B), education differences were also larger than income differences. Among Mid-South blacks, education-level differences in vegetable consumption had an inverse pattern compared with income-level differences: larger among women than men.

Figure 4 presents the percentage differences in CHCs by education. Negative estimates indicated that the lower education stratum had worse health status. In terms of CHCs prevalence, education-level differences were smaller than income-level differences. A notable exception was white men in both regions, who had more pronounced education-level than income-level disparities in obesity. Similarly, Mid-South women of either race had more pronounced education-level than income-level disparities in CKD. Black men in both regions had higher obesity and cancer rates in the higher education category, although not as pronounced as their elevated obesity and cancer rates in the higher income category.

Discussion

The study aimed to identify subpopulations with increased prevalence of CHCs and unhealthy behaviors by exploring the distribution of these variables by income, education, race, and gender in the Mid-South versus the rest of the country. Findings revealed increased rates of CHCs and unhealthy behaviors in the Mid-South, disproportionately affecting the black population. In both races and regions, individuals with lower income and education had higher rates of CHCs and worse health behaviors than those with higher income and education.

In general, across both regions, disparities by education were more pronounced in health behaviors, whereas disparities by income were more pronounced in CHCs. A large body of literature has differentiated the health effects of education and income. Herd et al.[25] propose that education plays a greater role in preventing the onset of disease, whereas income has a stronger effect on disease progression. This descriptive study does not allow an examination of mediating mechanisms. However, previous research suggests that education may be a stronger driver of disparities in health behaviors through its effect on lifestyle (tobacco and alcohol use, diet, and exercise), psychosocial resources (social support and self-efficacy), cognitive functioning, and social networks,[25,26] whereas income may be a stronger driver of disparities in health outcomes through the mediation of access to resources and services, including medical care.[25,27] This interpretation is supported by studies showing that health behavior has a larger role in explaining educational disparities compared with income disparities.[28]

Both the overall and the subgroup-specific results suggest higher prevalence of CHCs, less physical activity, and lower fruit and vegetable consumption in the Mid-South. This finding is consistent with other reports.[3–5,29] The poor health profile of this region affects disproportionately the black population. Mid-South black women have the highest

percentages of obesity, diabetes, HBP, stroke, arthritis, and CKD among all subgroups, along with the lowest physical activity. Black men have the second highest percentages of diabetes, HBP, CHD, stroke, MI, and CKD among all subgroups, as well as the lowest fruit and vegetable consumption and highest smoking rates.

These racial disparities in CHC burden go hand in hand with socioeconomic disparities: Mid-South black women have the highest unemployment and the lowest annual income of all subgroups, while Mid-South black men have the lowest educational attainment and the second highest unemployment and low income; they also have the lowest rates of healthcare coverage.

Because of such parallels between racial and socioeconomic health disparities, some have argued that race is not a determinant of health.[30] The concept of a determinant requires a mechanism of action, and there is little proof that race by itself produces differential health outcomes.[31] Rather, it is the convergence of socioeconomic, environmental, and cultural factors along racial lines that results in health disparities by race. Therefore, understanding the health status of blacks requires an integration of both racial and social stratification.[16]

Depression and COPD emerged as notable exceptions to the consistent health disadvantage of blacks compared with whites. In both conditions and for both genders, Mid-South whites reported worse outcomes than Mid-South blacks. These results appear to reflect the underdiagnosis of depression among blacks[32] and known disparities in diagnosis and treatment of COPD among blacks.[33] The lower percentage of COPD in blacks versus whites was limited to the Mid-South, pointing to potential regional differences in diagnosis and treatment of this condition.

Across both races, individuals with low income and education reported less physical activity and fruit and vegetable consumption than individuals with higher income and education. Such socioeconomic disparities in health-related behaviors have been documented previously.[34,35] Importantly, the income disparity in physical activity and CHCs was more pronounced among whites, especially in the Mid-South, illustrating the damaging health effect of poverty regardless of race. Consequently, across both races, those with lower income and education had higher burden of CHCs.

The study shows a differential health effect of income and education by geographic region, race, gender, and CHC. In particular, income stratification (and less so, education stratification) has an inverse relationship with obesity for black men, a finding that mirrors the analysis of the National Health and Nutrition Examination Survey.[36] Across both regions, higher percentages of obesity are found among black men with ≥$25,000 income, indicating the need for approaches specifically tailored to this segment of the population.

Limitations

The study has several limitations. First, CHC data were obtained by self-report, and the estimates exclude people who have not been diagnosed. Self-reporting may vary across geographic regions, additionally affecting estimates. Potential under-reporting may lead to underestimating the magnitude of the problem. Second, the data were aggregated over large

areas; although state data are intended to be representative at the state level, the estimates may differ from local-level analyses. Third, age-adjusted percentages may obscure important disparities that would be revealed by age-stratified data; similarly, the use of few income and education categories may obscure important social gradients in health. Fourth, CHC prevalence rates do not take into account disease severity or duration. Finally, the study did not consider community characteristics or neighborhood-level socioeconomic conditions, despite evidence that individual health can be influenced by the socioeconomic characteristics of the residential neighborhood above and beyond of individual-level SES through features of the physical/built, social, or service environments.[37,38] Future research should consider characteristics of both individuals and their neighborhoods.

Conclusions

The Mid-South region shoulders a great burden in terms of socioeconomic factors, health-related behaviors, and CHCs, which disproportionately affects the black population. Although similar trends were observed across income and education strata, education-level disparities were more pronounced in health-related behaviors, whereas income-level disparities were more pronounced in CHCs. This analysis can serve as a guide for targeting specific subgroups at increased risk for CHCs. Future studies should test tailored interventions to address the needs of these subgroups to improve their health status.

Supplementary Material

Refer to Web version on PubMed Central for supplementary material.

Acknowledgments

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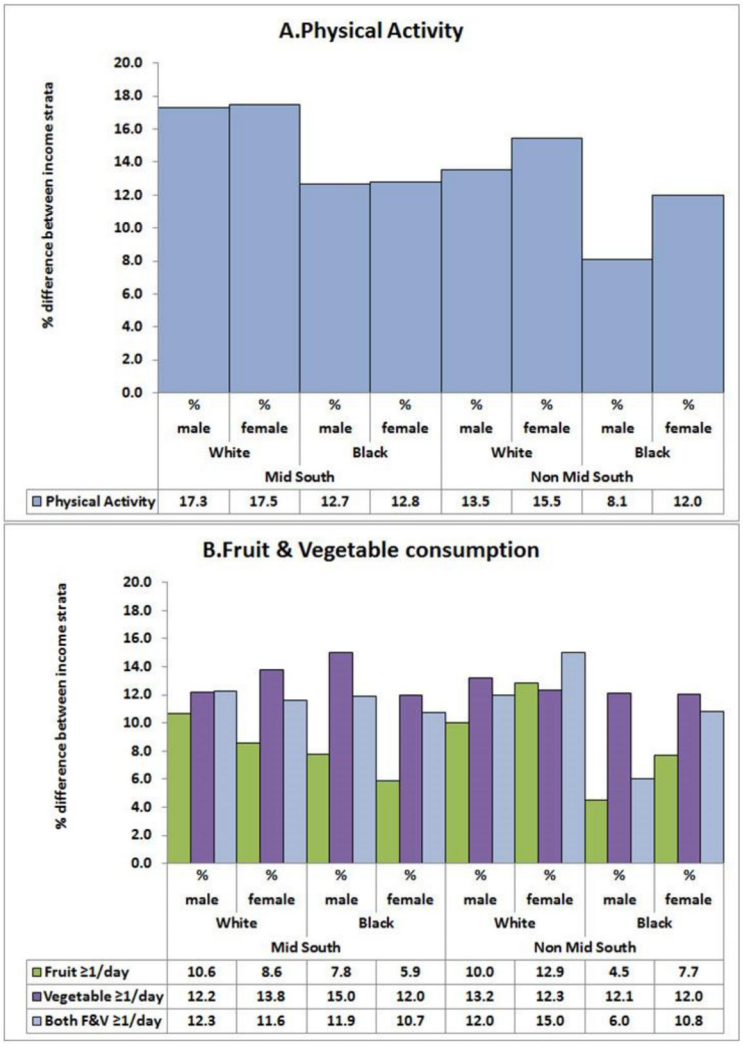

Figure 1.

Percentage difference between income strata for physical activity and fruit and vegetable consumption, 2013 Behavioral Risk Factor Surveillance System.

Note: Difference is calculated as ≥$25K strata minus <$25K strata. Positive estimates indicate that the <$25K income strata has a lower estimated percentage, indicative of lower physical activity or worse healthy eating habits.

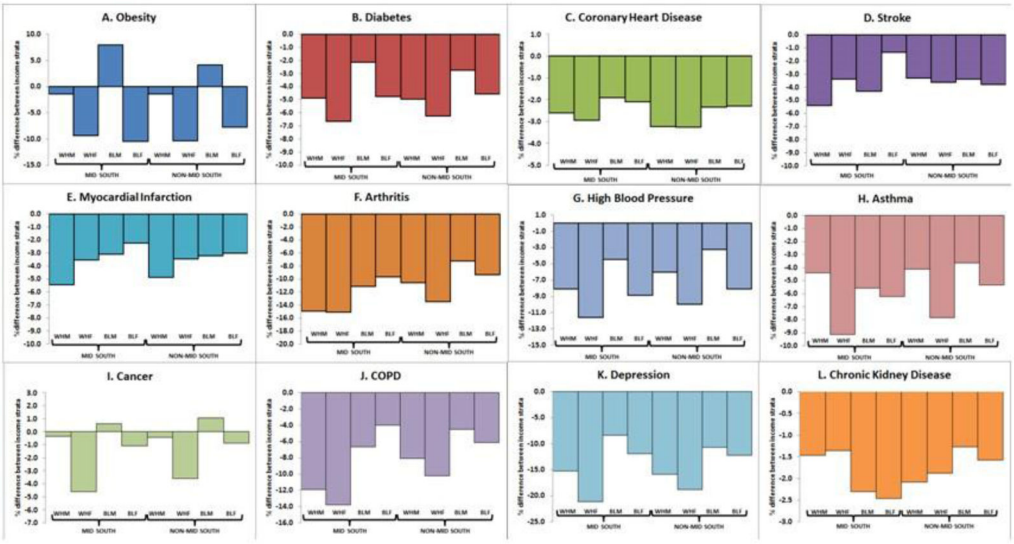

Figure 2.

Percentage differences between income strata for chronic health conditions (CHCs), 2013 Behavioral Risk Factor Surveillance System.

Note: Difference is calculated as ≥$25K strata minus <$25K strata. Negative estimates indicate that the <$25K income strata has higher percentage of CHCs, indicative of worse health status.

COPD, chronic obstructive pulmonary disease

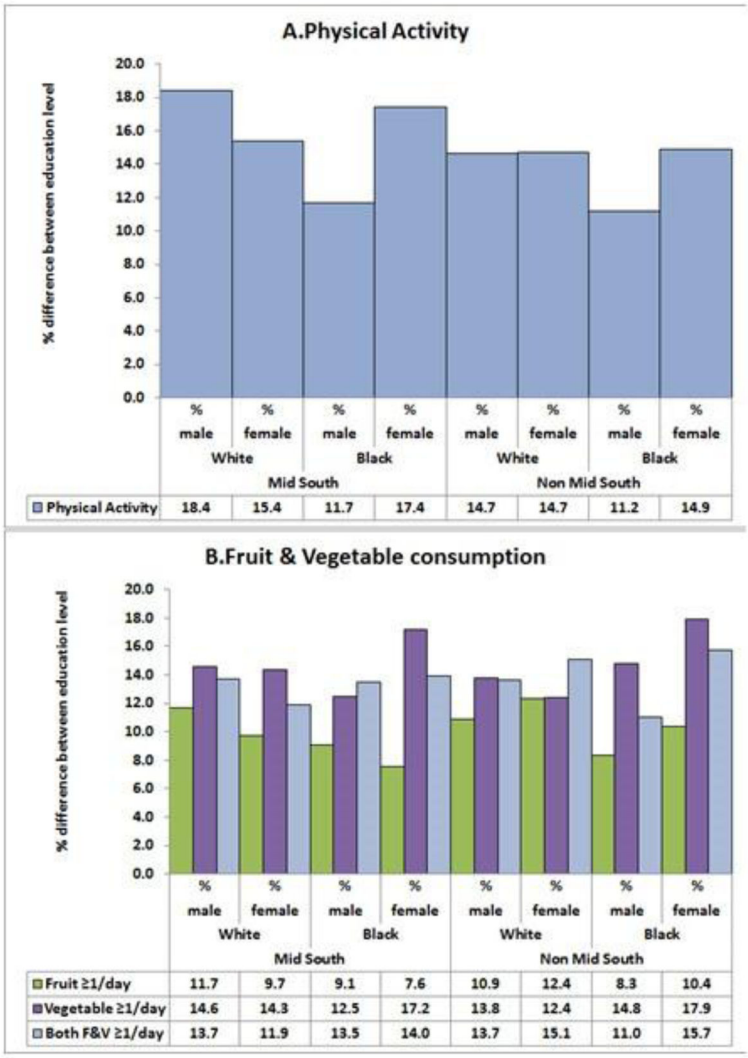

Figure 3.

Percentage difference between education strata for physical activity and fruit and vegetable consumption, 2013 Behavioral Risk Factor Surveillance System.

Note: Difference is calculated as >high-school education strata minus ≤high-school education strata. Positive estimates indicate that the ≤high-school education strata had a lower estimated percentage, indicative of lower physical activity or worse eating habits.

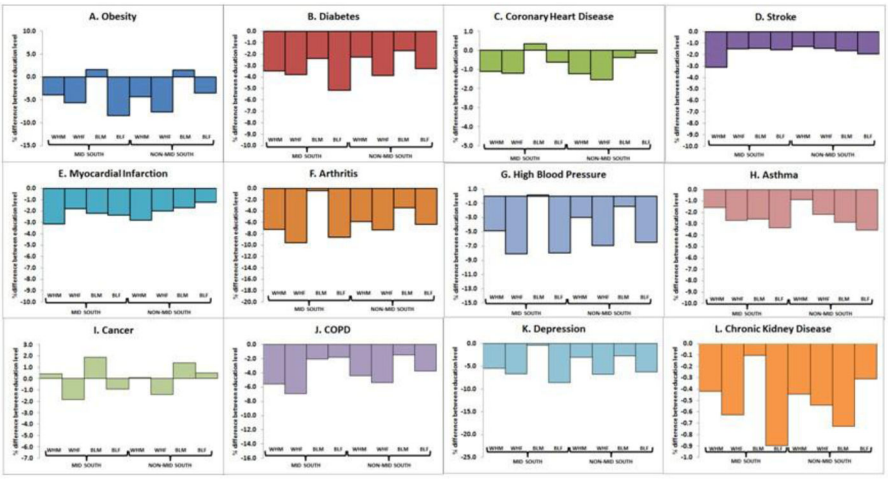

Figure 4.

Percentage differences between education strata for chronic health conditions (CHCs), 2013 Behavioral Risk Factor Surveillance System.

Note: Difference is calculated as >high-school education strata minus ≤high-school education strata. Negative estimates indicate that the ≤high-school education strata had higher percentage of CHCs, indicative of worse health status.

COPD, chronic obstructive pulmonary disease