Abstract

Purpose: In the Alabama Black Belt, poverty is high, and the educational level is low. Studies have found increased tobacco use among individuals exposed to high levels of stress. Few studies have been conducted in this region to measure smoking status, its sociodemographic determinants, and how smoking status relates to stressful environmental conditions.

Methods: A cross-sectional questionnaire survey of 1,387 individuals.

Findings: Approximately 25% of the respondents currently smoked cigarettes. Females were less likely to smoke compared to males (OR, 0.29; 95% CI, 0.23-0.38). Blacks were less likely to smoke cigarettes compared to whites (OR, 0.64; 95% CI, 0.43-0.95). Compared to individuals who were employed, participants who were unemployed or retired had increased odds of smoking (OR, 1.68; 95% CI, 1.15-2.20). The odds of being a current smoker were increased in the presence of moderate level stress (OR, 2.06; 95% CI, 1.38-3.07) or when there was a high level of stress (OR, 2.21; 95% CI, 1.47-3.31). Smoking was associated with increased odds of having a moderate level (OR, 2.06; 95% CI, 1.38-3.08) and a high level of stress (OR, 2.21; 95% CI, 1.47-3.32). Females who reported moderate to high levels of stress had increased odds of being smokers compared to males. Interaction between gender and stress showed deviation from additivity.

Conclusion: Our findings suggest a high rate of cigarette use in the area. Increased stress levels appear to predispose females more than males to cigarette smoking. The implications of this association may guide interventions targeted at reducing smoking and its complications.

Key words Alabama Black Belt, rural, smoking, sociodemographic determinants, stress.
stress and that smoking relieves them of stress and negative affect.\textsuperscript{8,11,12} On the other hand, there is also a battery of studies that show smoking does in fact increase or at least contribute to stress.\textsuperscript{3,12,13}

Whether as a cause of stress or as an effect of stress, the initiation of smoking, its maintenance, and its relapse after quitting is affected by personal (age, gender, marital status, education, income level) and environmental factors such as advertising and peer group influence. Studies conducted among urban African Americans show that smoking status is associated with being female, middle-aged, of lower income, and less educated.\textsuperscript{14-16} However, there is a paucity of research on smoking status, its sociodemographic determinants, and its psychosocial correlates among minorities who live in rural and economically disadvantaged areas such as the Black Belt region of Alabama. Health disparities exist between residents of this region and other parts of the United States.\textsuperscript{17} This is not only as a result of poverty but also because of difficulties experienced by residents in accessing health care facilities.\textsuperscript{18} These factors contribute toward the excess morbidity and mortality experienced by these residents, from heart disease (12%), diabetes (22%), and stroke (9%) whose rates are above national averages.\textsuperscript{19-22} Residents of this area may experience high levels of psychological stress resulting from perceptions of discrimination, racism, or socioeconomic status.\textsuperscript{23,24} In order to alleviate these psychological stressors, it is not unusual that individuals may smoke cigarettes and this coping mechanism may contribute to the observed rates of smoking behavior among this population.

While the prevalence of smoking among African Americans is known to be higher than the national average (26.1\% among males and 18.5\% in females),\textsuperscript{25} to the best of our knowledge, no systematic studies have been conducted among African Americans in this area to elucidate the determinants of smoking and the influence of environmental factors such as stress. The unique historical antecedents of this area place its African American residents among those with the lowest literacy rates and high school and college completion rates. The economic downturn of the region following the loss of rural-based industries means that fewer low-skill jobs are available.\textsuperscript{18} A survey of homeownership, a veritable yardstick for measuring fungible wealth, indicates that two-thirds of African Americans in the Black Belt region—compared to one-third of non-Hispanic Whites—did not own the house in which they resided.\textsuperscript{26} Hence, African Americans are often caught in the vicious cycle of low functional literacy, poverty and therefore poor health outcomes. This situation promotes out-migration by males and the more educated in search of employment elsewhere. Participants in this study were mostly African American females who may be exposed to higher levels of stress because they quite often are the household heads and responsible for the financial well-being of the family.\textsuperscript{18} Evidence suggests that women and children living in female-headed, single-parent families are more likely to be poor as a result of a combination of several factors. These factors include the aforementioned educational handicaps, labor market discrimination, and the need to rear children, which limits employment outside of the home.\textsuperscript{27,28} While the national poverty rate for African American female-headed families is approximately 45%,\textsuperscript{29} that for African American females living in the Alabama Black Belt with children under 6 years was 80\% in 2000.\textsuperscript{18} Invariably, many of these women experience financial and psychological distress arising from lack of social support, and challenges with accessing community resources aimed at helping low-income single parents.\textsuperscript{30,31} Although there are federally allocated and state funding sources for tobacco control efforts, there is limited information on local initiatives to curb cigarette smoking. Besides, efforts to reduce cigarette smoking in the area are hampered by declines in funding for tobacco control from the Alabama state government.

Against this backdrop, we aimed to investigate the prevalence of smoking, its sociodemographic determinants, and the relationship between cigarette smoking and stress in a rural area of Alabama known as the Black Belt. We hypothesized that smoking status would be associated with sociodemographic variables (such as age, gender, income, education) and that smokers might report having more stress than nonsmokers.

Methods

Study Setting

The Alabama Black Belt is part of the greater Black Belt region of the United States, which is characterized by a predominantly African American population with relatively high poverty rates and heavy dependence on public assistance programs.\textsuperscript{18} Other unique features of the area are rural decline, isolation, substandard housing, poor education programs, high unemployment rates, poor economies, and limited access to quality health care.\textsuperscript{32} The 2000 US census reports indicated that almost 50\% of adults and children in the region live below the federal poverty level, with median household incomes of $18,000 per annum or about half of the median income of other parts of the United States ($34,000).

Participants were drawn from 21 communities that were randomly selected from 7 Black Belt counties, namely Dallas (poverty rate 31\%), Lowndes (poverty rate 31\%), Marengo (poverty rate 26\%), Monroe (poverty rate...
rate 21%), Perry (poverty rate 35%), Sumter (poverty rate 39%), and Wilcox (poverty rate 40%). These counties are all in west-central Alabama. The communities are inhabited by a large proportion of African Americans compared to other parts of the United States. While unemployment, poor education and poverty are common, agriculture remains the main source of livelihood for the residents. The criteria for selection of the counties were based on 4 variables listed by the Alabama Rural Health Association (ARHA) as necessary for a county to qualify as being rural (each variable accounting for 25 of a possible 100 points). A higher overall score equates to the area being more “rural.” These criteria were derived from those used by the White House’s Office of Management and Budget (OMB).33 The 4 variables are as follows:

1. The percentage of total employment in the county that is made up of those employed by the public elementary and secondary school systems. Since the local school system is the largest single employer in many rural counties, the higher the percentage of employment in school system(s) in relation to total employment, the more rural a county is considered.

2. The dollar value of agricultural production per square mile of land. The greater the value of agricultural production per square acre, the more rural the county is considered.

3. The population per square mile of land. The fewer the number of persons per square mile, the more rural a county is considered.

4. An index is used to assign a score to counties, considering the population of the largest city in the county, the population of other cities in the county, and the population of cities which are in more than 1 county. Counties where the largest incorporated place has a population of fewer than 2,500 are assigned the highest index score of 25. Counties where the largest incorporated place has a population of 50,000 or more are assigned the lowest index score of 0.34

Based on these criteria, all 7 counties used in this study are classified as “heavily rural” as contrasted from “moderately rural” counties that score lower on the scale.

Study Participants

Adult members of the randomly selected communities were interviewed by trained interviewers. The latter were hired and trained by staff of the University of Alabama’s Center for the Study of Community Health. Interviewers were residents from the communities or from nearby communities and had at least an associate’s degree and were trained using standardized, institution-based training modules. As part of the recruitment process, participants were given an explanation of the purpose of the study in terms of the research question being asked, the potential benefit to the individual and the community, and asked if they would like to participate. They were assured of confidentiality, which was maintained by avoiding the use of any personal identifiers and also by locking all data in password-protected computers. Upon agreement, the informed consent form was described and potential participants were asked to read the consent form and to ask questions. For those with low literacy, the informed consent procedure was read to them by the surveyor. After all questions were answered, participants were then asked to sign the consent form. Those who were illiterate were asked to give their thumb print as proof of their agreement to participate in the study. Participation in the study was voluntary. Respondents received a $10 gift card for completing the survey. The interviewing resulted in a final sample size of 1,387. The Institutional Review Board (IRB) of the University of Alabama at Birmingham approved the study protocol prior to its implementation.

Study Design

This was a cross-sectional study. A 2-stage sampling technique was used. In the first stage, 43 communities that met the eligibility criteria were selected. From these communities, 21 communities were randomly selected: an investigator repeatedly dipped and picked out envelopes (without replacement)35 from a box containing 43 envelopes with names of the communities (thus each community had an equal chance of being picked), until 21 communities were picked. The criteria for inclusion were that a community has at least 200 members and some form of community leadership. The community leaders were identified from an existing Community Participation Board composed of civic leaders in the region. Each board member then provided a contact person who acted as a guide for the study team as they went from house to house in the study communities. Although the community leaders had no role in the conceptualization of the study, they were involved at the entry points into the communities with a view to establishing long-term, sustainable relationships. This relationship is essential for future interventions that may require inputs from community and opinion leaders.

In the second stage, all households in each community were enumerated and assigned numbers. From a simple ballot, the first household picked from the ballot box was designated as the starting point. Thereafter, the door of every other household was knocked on for potential
participants. All adult members over 19 years of age residing in the randomly selected households were enumerated and 1 was selected randomly for interview. Interviews were then conducted at respondents’ homes.

**Instruments and Measures**

The questionnaire was based on selected health questions from the Centers for Disease Control and Prevention’s 2004 Behavioral Risk Factor Surveillance System (BRFSS). Questions from the BRFSS focused on health conditions, stress, access to care, hypertension, diabetes, exercise, nutrition, weight control, tobacco use, and demographics.

**Stress Measures**

Questions derived from the well-validated BRFSS instrument were used to measure stress within the preceding 3 months. The 6-item inventory assessed the degree to which individuals perceived events in their lives as stressful. Typical items included, “In the last 3 months, how often have you felt irritable, fidgety, or tense?” and “How often have you felt restless?” Response options were rated on a 4-point Likert scale from 1 = “often” to 4 = “never.” Lower scores indicated higher levels of perceived stress. This measure demonstrated very good internal consistency (α = 0.80) in this sample. Stress measure variables were categorized into 3 variables with progressively higher degrees of stress score: “low stress level” was equivalent to score levels of ≤6, “moderate stress level” was rated as stress score of 7-9, while “high stress level” was based on stress scores ≥10.

**Smoking Measures**

Smoking status was measured based on whether respondents answered “Yes” or “No” to a question which asked if respondents “smoke cigarettes now.” Thus, cigarette smoking was dichotomized and coded as “current smoker”: Yes = 2 or No = 1. Self-reported smoking status has been validated in other studies.

**Statistical Analysis**

Basic descriptive statistics for observed frequency of smoking were computed for various participant characteristics. Sociodemographic characteristics known to be associated with smoking status were compared between smokers and nonsmokers using logistic regression. Odds ratios and associated 95% confidence intervals (CI) for the association between smoking status and stress levels were estimated by multinomial logistic regression. A stratified analysis to assess smoking status by gender was conducted. For adjusted models, a backward-selection process was performed, with all sociodemographic variables with a  P ≤ .1 included in the final model. In the final adjusted model, the determination of which variables should be retained as potential confounders was based on the change-in-estimate criteria using a value of 10%.

Relative excess risk due to interaction (RERI) was calculated in order to evaluate interaction on both an additive and multiplicative scale. RERI measures deviation from additivity of 2 risk factors being studied, and it is interpreted as the additional risk experienced as a result of the joint exposures. The Strengthening of Reporting of Observational Studies in Epidemiology (STROBE) recommends transparent presentation of the individual effect of each exposure as well as the summative (joint) effects with the unexposed group as the reference.

**Results**

**Sample**

Participants completed, in aggregate, 1,387 interviewer-administered, in-person surveys. The response rate was 77%. The main reasons for nonparticipation were refusals (12%), absence of an eligible adult (8%) and ill health (2%).

Most of the respondents that interviewers met at home at different times of the day were women. Females constituted 67.5% (n = 936) of the sample compared to 32.5% (n = 451) who were males. Overall, 24.5% (n = 340) of the participants reported currently smoking cigarettes, while 75.5% (n = 1,047) said they did not. Table 1 shows the sociodemographic characteristics of the 1,387 participants. The mean age ± SD was 50.8 ± 16.9 years. It was a largely African American population; 88% were Black, 11% were White, and 1% were either Asian or American Indian/Alaskan.

**Stress**

Nineteen percent (n = 266) of the participants were found to have a low level of stress compared to 42% (n = 583) who had a moderate level of stress, while 38% (n = 538) reported a high level of stress (not shown). Overall, approximately 70% of females reported high stress levels compared to 36% of males. In Table 2, bivariate analysis indicated that being a current smoker was associated with increased odds of having a moderate stress level (OR, 1.90; 95% CI, 1.30-2.78) and a high level of stress (OR, 2.10; 95% CI, 1.43-3.08). In the adjusted models the effect estimates were marginally increased. The increased
### Table 1  Sociodemographic Characteristics of 1,387 Study Participants

<table>
<thead>
<tr>
<th>Sociodemographic Variable</th>
<th>Current Smoker YES</th>
<th>Current Smoker NO</th>
<th>P Value</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Number (N)</td>
<td>Percent (%)</td>
<td>Number (N)</td>
</tr>
<tr>
<td>Age in years</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>19-29</td>
<td>28</td>
<td>8.2</td>
<td>114</td>
</tr>
<tr>
<td>30-39</td>
<td>31</td>
<td>9.1</td>
<td>189</td>
</tr>
<tr>
<td>40-49</td>
<td>88</td>
<td>25.9</td>
<td>246</td>
</tr>
<tr>
<td>50-59</td>
<td>87</td>
<td>25.6</td>
<td>185</td>
</tr>
<tr>
<td>60-69</td>
<td>54</td>
<td>15.9</td>
<td>133</td>
</tr>
<tr>
<td>≥70</td>
<td>52</td>
<td>15.3</td>
<td>180</td>
</tr>
<tr>
<td>Gender</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>185</td>
<td>54.4</td>
<td>266</td>
</tr>
<tr>
<td>Female</td>
<td>155</td>
<td>45.6</td>
<td>781</td>
</tr>
<tr>
<td>Race</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>White</td>
<td>49</td>
<td>14.5</td>
<td>108</td>
</tr>
<tr>
<td>Black</td>
<td>287</td>
<td>85.2</td>
<td>935</td>
</tr>
<tr>
<td>Marital status</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Married/Unmarried couple</td>
<td>120</td>
<td>35.0</td>
<td>357</td>
</tr>
<tr>
<td>Divorced</td>
<td>58</td>
<td>17.1</td>
<td>138</td>
</tr>
<tr>
<td>Widowed</td>
<td>55</td>
<td>16.2</td>
<td>175</td>
</tr>
<tr>
<td>Separated</td>
<td>34</td>
<td>10.0</td>
<td>69</td>
</tr>
<tr>
<td>Never been married</td>
<td>73</td>
<td>21.5</td>
<td>290</td>
</tr>
<tr>
<td>Educational status</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Some High school or less</td>
<td>130</td>
<td>38.2</td>
<td>245</td>
</tr>
<tr>
<td>High school graduate</td>
<td>138</td>
<td>40.6</td>
<td>450</td>
</tr>
<tr>
<td>Some Tech school/technical school graduate</td>
<td>19</td>
<td>5.6</td>
<td>82</td>
</tr>
<tr>
<td>Some college</td>
<td>26</td>
<td>7.7</td>
<td>136</td>
</tr>
<tr>
<td>≥College grad/Pro degree</td>
<td>27</td>
<td>7.9</td>
<td>126</td>
</tr>
<tr>
<td>Employment status</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Employed</td>
<td>37</td>
<td>10.88</td>
<td>169</td>
</tr>
<tr>
<td>Out of work, or homemaker</td>
<td>158</td>
<td>46.5</td>
<td>338</td>
</tr>
<tr>
<td>Retired or unable to work</td>
<td>145</td>
<td>42.7</td>
<td>522</td>
</tr>
<tr>
<td>Income level</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Less than $10,000</td>
<td>95</td>
<td>31.2</td>
<td>239</td>
</tr>
<tr>
<td>$10,000-$25,000</td>
<td>122</td>
<td>40.0</td>
<td>353</td>
</tr>
<tr>
<td>$25,000-$50,000</td>
<td>66</td>
<td>21.6</td>
<td>231</td>
</tr>
<tr>
<td>Over $50,000</td>
<td>22</td>
<td>7.2</td>
<td>67</td>
</tr>
</tbody>
</table>

Note: Numbers may not sum up to total due to missing values. Numbers in bold are statistically significant.

†Unable to due to illness, disability, etc.

*Earnings per annum.

### Table 2  Odds Ratios With 95% Confidence Intervals for the Association Between Smoking and Stress Levels and Stratification by Gender in the Alabama Black Belt

<table>
<thead>
<tr>
<th>Variable</th>
<th>Crude OR (95% CI)</th>
<th>Adjusted OR (95% CI)</th>
<th>Males No. (%)</th>
<th>Females No. (%)</th>
<th>Males a OR (95% CI) b</th>
<th>Females a OR (95% CI) b</th>
</tr>
</thead>
<tbody>
<tr>
<td>Stress level</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Low</td>
<td>Ref</td>
<td>Ref</td>
<td>102 (38.4)</td>
<td>164 (61.6)</td>
<td>Ref</td>
<td>Ref</td>
</tr>
<tr>
<td>Moderate</td>
<td>1.90 (1.30-2.78)</td>
<td>2.06 (1.38-3.07)</td>
<td>186 (31.9)</td>
<td>397 (68.1)</td>
<td>1.58 (0.95-2.62)</td>
<td>4.17 (1.96-8.89)</td>
</tr>
<tr>
<td>High</td>
<td>2.10 (1.43-3.08)</td>
<td>2.21 (1.47-3.31)</td>
<td>163 (30.3)</td>
<td>375 (69.7)</td>
<td>1.65 (0.99-2.78)</td>
<td>5.04 (2.37-10.70)</td>
</tr>
</tbody>
</table>

Numbers in bold are significant. Final models adjusted for sociodemographic variables age, race marital status, employment, and educational status.

a Sub-stratification by gender.

b OR, adjusted odds ratio; CI, confidence interval.
odds of having moderate-level stress (OR, 2.06; 95% CI, 1.38-3.07) or high-level stress (OR, 2.21; 95% CI, 1.47-3.31) with being a current smoker were retained.

A sub-analysis to assess smoking status by gender showed that females who reported having moderate to high levels of stress had increased odds of being smokers compared to the males. The effect estimates were substantially different.

Table 3 shows the relative excess risk for the interaction between gender and stress. The RERI (2.362-0.689-3.676 + 1) value of –1.003 indicates that interaction between gender and stress resulted in the relative risk being 1.003 lower than expected from the addition of the separate effects of gender and stress.

### Smoking Status

As shown in Table 4, bivariate analysis indicated increased odds of smoking among the age group 50-59 years compared to individuals aged 19-29 years (OR, 1.92; 95% CI, 1.18-3.11). There were reduced odds of being a smoker among females compared to males (OR, 0.29; 95% CI, 0.22-0.37). Blacks were less likely to be cigarette smokers than Whites (OR, 0.68; 95% CI, 0.48-0.98). Compared to individuals who were employed, participants who were unable to work or retired had increased odds of smoking (OR, 1.68; 95% CI, 1.29-2.19). Participants who had at least a high school education had reduced odds of currently smoking cigarettes compared to those who did not have a high school education. These associations were all statistically significant.

In multivariable analysis (Table 4), the statistically significant associations observed in bivariate analysis remained largely unchanged after adjusting for potential confounders (age, gender, race marital status, employment, educational status).

### Discussion

We investigated the association between current smoking status, sociodemographic factors and stress levels among a population of mostly African Americans living in the Black Belt of Alabama. The narrative on our observations is divided into 4 sections: a comparative description of the study sample based on cigarette smoking behavior; gender, stress and smoking; sociodemographic characteristics and smoking; and the limitations of the study and conclusions.

### Smoking Among Participants

The proportion of current smokers (~25%) in this area is quite high compared to the national average of approximately 20%. This finding is similar to what has been found by other investigators in terms of smoking habit among African Americans being higher than the national average. However, this figure is a bit less than what has been found by other investigators working with African Americans living in urban areas. It could be that the
lower income level of these residents limits their ability to initiate and sustain smoking cigarettes. It is also possible that residents engage in other forms of tobacco consumption such as tobacco chewing, use of tobacco pipes, and cigars that were not covered by this investigation. With respect to gender differences in smoking, our finding that males had increased odds of being current smokers corroborates findings by the 2006 national health interview survey, which reported that smoking prevalence was higher among men (23.9%) than women (18.0%). This gender difference had been observed in a study that compared smoking status among African American males and females living in an urban area. However, studies among African Americans living in some urban areas of the United States reported that women are more likely to be smokers than men.

**Gender, Stress, and Smoking**

The proportion of participants who reported moderate and high levels of stress (80%) is quite interesting given that few if any studies have documented this proportion of reported stress among people living in this area. However, the association between stress and smoking has been documented by others. While smoking itself has been shown to induce stress, the cross-sectional nature of this study makes it impossible to infer causality. However, it may be that the circumstances of people living in this area with their high rate of poverty may promote cigarette smoking to relieve stress.

Females who reported higher stress levels were more likely to be current cigarette smokers compared to males (Table 2). This finding suggests that while males are more likely to be smokers compared to females, under conditions of moderate to high levels of stress, females are more likely than males to smoke cigarettes. While few studies have reported this relationship, fewer still (if any) have reported this gender difference in relation to levels of stress. As mentioned previously, Black women in the South are exposed to a myriad of daily stressors. While a sub-analysis (not shown) of the women revealed that approximately 90% of them were 30 years and above, only 32% of them were currently married or living together as an unmarried couple. This shows the proportion of female-headed households who have to tackle stressors arising from poor education, lower wages, poor housing, poor access to health care, lack of social support, feelings of fatigue, exhaustion, depression, and stress. Some of these single women may also have to take care not only of their own children but also their grandchildren, who are often borne by teenage children, without the traditional support of a partner nor the life-skills necessary to uplift their households from perpetual poverty. These challenges are further compounded by perceived feelings of racial discrimination. Indeed, a study by Landrine and Klonoff showed that racial discrimination was the better predictor of smoking than even status variables. “Smoking prevalence rates for Blacks who experience frequent versus infrequent discrimination were 26.7% and 6.4%, respectively; and for those who experience racial discrimination as extremely versus mildly stressful, rates were 42.2% and 20.8%, respectively.” Studies also indicate that these females smoke as a coping mechanism against feelings of negative affect such as anger and anxiety generated as a result of frustrations with the immediate and remote perceived cause of the situation. While these results suggest that the rural setting and household demands on the women dictate this type of response, it is also possible that the female participants in this study showed less coping ability than the males. This may have precipitated either initiation of smoking or relapse after quitting.

The interaction term between gender and stress indicates a departure from additivity. To the best of our knowledge, no study has reported on this interaction among a sample of largely African American participants living in a rural area.

Manning and associates have characterized women who smoke as more likely to be middle-aged and of lower income in urban areas. In our rural study, women who were likely to smoke were found to be closer to the upper range of middle age (50-59 years), although the association only showed a trend toward statistical significance (OR, 1.65; 95% CI, 0.97-2.81).

**Sociodemographic Characteristics and Smoking**

The finding that Blacks were less likely to be smokers compared to Whites corroborates statistics released by the Centers for Disease Control and Prevention, which show that smoking was more prevalent among Whites than Blacks. Not surprisingly, we also found that education was a predictor of smoking status; smokers are less likely to have attained higher levels of educational status. This finding has been demonstrated in studies conducted in different settings. Marital status and household income were not associated with current smoking status. This is contrary to the finding of Mwenifumbo and colleagues, whose Canadian study among an urban population of Black African descent found that smokers were more likely to be divorced, separated or widowed. However, just as in this study, they also found no association between smoking and income. The latter is an uncommon finding since numerous studies provide evidence that income is a strong
predictor of smoking. Kiefe and associates showed in a longitudinal study that African Americans who were of low socioeconomic status had higher smoking rates.\textsuperscript{53} Given the poverty rate among our study population, we expected our study to corroborate this finding. It may be possible that the common thread of poverty that participants share blunted any real differences between smokers and nonsmokers in socioeconomic terms. Interestingly, we found smoking to be strongly associated with not being able to work (due to disability, illness, etc.) or retirement. While we found no study in the literature that replicated this finding, a study by Falba and colleagues showed that older workmen who involuntarily lost their jobs were more likely to become heavier smokers or relapse after quitting.\textsuperscript{29} Our finding may reflect that the additional stress of being challenged by disability, illness, or social changes that come with retirement may predispose these individuals to smoke or make them relapse. It is also possible that some of the participants may be out of work but not searching for new job opportunities, hence they would not be as stressed as those participants who are out of work and looking for employment.

In spite of these observations, one is cognizant of the fact that other environmental factors such as peer influence and a high level of advertising \textsuperscript{52} may also play an important role in the prevalence of smoking in this region. Besides, our study did not ask questions relating to the psychological characteristics of the respondents. This makes us unable to assess the impact of these traits on the reported stress levels. The interplay of these factors makes it necessary to interpret findings with caution.

**Limitations and Conclusion**

Our findings should be interpreted in the light of some potential drawbacks, the most apparent of which may be the fact that a cross-sectional survey does not provide a causal relationship between stress and smoking but it does at least provide a framework to theorize on relationships between these variables. While we restricted our investigation to cigarette smoking, other forms of tobacco use such as tobacco chewing may have been underreported. However, tobacco chewing is not a widely reported practice in this population. Moreover, we did not validate responses obtained from the participants using biochemical tests. However, self-reported population-based data on current smoking status have been shown to have high validity when compared with measured serum cotinine levels.\textsuperscript{53} A further limitation of this study is that a predominant proportion of the respondents were African Americans. While the study design did not intend this, it provided too few numbers of other racial groups in analyses to be able to assess the effect of race. This has implications for the generalizability of our results across states in the South, given that up to one-half or more of the residents in these communities are either White or of other racial composition.

While our findings contribute to the literature and support findings from other studies despite the rural setting, the subtle differences identified (eg, gender, race, and stress) signal the need to modify known interventions to fit the sociodemographic uniqueness of this area.

The implications of our findings for practice relate to the concerted efforts by public health workers and other stakeholders to reduce the high prevalence of cardiovascular, respiratory, and other diseases in the Alabama Black Belt of the USA.

**References**


