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Socioeconomic Disparities in Metabolic Syndrome: The Role of Gender, Neighborhood, and Psychosocial Variables in the Multi-Ethnic Study of Atherosclerosis (MESA)

Author
Pavlovich, Ryan Nicholas

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Socioeconomic Disparities in Metabolic Syndrome: The Role of Gender, Neighborhood, and Psychosocial Variables in the Multi-Ethnic Study of Atherosclerosis (MESA)

A thesis submitted in partial satisfaction of the requirements for the Master's degree

of

Public Health

by

Ryan Pavlovich

Committee in charge:

Professor Britta Larsen, Chair
Professor Richard Garfein
Professor Cheryl Anderson

2024

The thesis of Ryan Pavlovich is approved, and it is
acceptable in quality and form for publication on microfilm and electronically.

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ABSTRACT OF THE THESIS

Socioeconomic Disparities in Metabolic Syndrome: The Role of Gender, Neighborhood, and Psychosocial Variables in the Multi-Ethnic Study of Atherosclerosis (MESA)

by

Ryan Pavlovich

Master of Public Health

University of California, San Diego, 2024

Professor Britta Larsen, Chair

Metabolic Syndrome (MetS) affects one in three adults in the US and is characterized by abdominal obesity, high blood pressure, high blood sugar, high triglycerides, and low HDL cholesterol, increasing the risk of cardiovascular diseases and diabetes. We explored differences in neighborhood conditions and psychosocial factors between men and women across low and high socioeconomic status (SES) groups, and how these differences contribute to the higher risk of MetS in low SES individuals. Our sample included 4,191 individuals aged 45-84 from diverse racial and ethnic backgrounds; 3,005 of them were classified as low or high SES for further analyses. We examined the association of MetS with SES for women and men separately using separate Cox proportional hazards models for each group. The mean age was 61 years, 49.2% were women, 43% were White, 9.4% had no health insurance, and 15.2% had less than a high school education. The overall incidence of MetS was 33% for both low and high SES individuals. After adjusting for confounders, low SES women had a 66% higher risk of developing MetS compared to high SES women (HR 1.66, 95% CI 1.38 to 2.00). Similarly, low SES men had a 66% higher risk of developing MetS compared to high SES men (HR 1.66, 95% CI 1.36 to 2.02). Contrary to expectations, adjusting for these variables did not attenuate the risk, and significant disparities were observed for both men and women across SES groups. More research is needed to understand the mechanisms linking low SES with MetS incidence to address these SES disparities.

INTRODUCTION

Metabolic syndrome (MetS), also known as insulin resistance syndrome, affects approximately 1 in every 3 adults in the United States, highlighting a significant public health challenge due to its association with an increased risk of coronary heart disease, stroke, diabetes, and other serious conditions. MetS is diagnosed when an individual has three or more risk factors including abdominal obesity, high blood pressure, high blood sugar levels, high triglycerides, and low HDL cholesterol, which collectively increase the risk of developing cardiovascular diseases and diabetes.[1]

Previous studies have found that there is a higher risk of MetS development in individuals with low socioeconomic status (SES). A study from the National Health and Nutrition Examination Survey (NHANES) indicated that low SES is associated with a significantly higher prevalence of MetS compared to individuals with higher SES, emphasizing the significant impact of socioeconomic factors on health disparities.[2] This aligns with global trends where lower socioeconomic groups face a higher risk of developing MetS, highlighting the need for targeted interventions that consider the socio-economic disparities in health outcomes.[3]

While the association between low SES and incident MetS is a robust finding, more recent analyses have shown that this is primarily driven by a disparity in women. The aforementioned study mentioned from NHANES showed that women with a low poverty income ratio experienced an 80% increased risk of MetS, while risk in men was no different across SES categories.[2] This has been replicated in other studies as well, including the Isfahan Healthy Heart Program (IHHP).[4] The SES disparity in the prevalence of MetS among women has been consistently observed, yet the underlying causes of this disparity and why it is not seen in men are not fully understood.

It is possible that women of low SES are more impacted than low SES men by other social determinants of health related to SES, such as neighborhood safety, neighborhood cohesion, access to healthy food near their home, and psychosocial factors.[5–7] These factors have been associated with MetS, yet the interplay between social determinants, SES, and gender-specific differences in MetS remains incompletely understood.[4,8] Research has demonstrated that factors like neighborhood safety and access to healthy food significantly influence the risk of MetS. These factors may be more salient for women, particularly if women spend more time caring for children within the home and local neighborhood environment. Likewise, poor neighborhood safety can reduce physical activity and increase stress, but safety concerns may be more limiting for women than for men. Additionally, psychosocial stressors, more prevalent in lower socioeconomic settings, are also strongly linked to MetS, particularly impacting women.[9]

This study used longitudinal data from the Multi-Ethnic Study of Atherosclerosis (MESA) to evaluate neighborhood conditions and psychosocial variables across SES groups within each gender category in a diverse United States cohort of adults. We also aim to examine the extent to which neighborhood conditions and psychosocial variables contribute to the greater risk of MetS in low SES women compared to high SES women.

METHODS

Study Design and Participants

This analysis uses a prospective cohort study design using data from the MESA, a longitudinal, population-based study which started in July 2000. The MESA study focuses on understanding the prevalence and progression of subclinical cardiovascular disease across various races and ethnicities, including White, African-American, Hispanic, and Chinese-American populations. The MESA cohort comprises 6,814 men (47.2%) and women (52.8%) aged 45-84, recruited from six different U.S. communities: Baltimore City and Baltimore County, MD; Chicago, IL; Forsyth County, NC; Los Angeles County, CA; Northern Manhattan and the Bronx, NY; and St. Paul, MN. The inclusion criteria and recruitment strategies were designed to create a representative sample across different racial and ethnic groups, considering factors like age, gender, and socioeconomic status. The cohort was selected to be free of clinically apparent cardiovascular disease at the time of enrollment, offering a unique opportunity to study the early indicators and risk factors associated with cardiovascular health. The details of recruitment and eligibility have been published previously in the MESA study protocol paper.[10] Baseline visits started in July 2000, and follow-up visits were conducted every 18-24 months thereafter. Because the primary endpoint was incident MetS, participants were excluded if they were classified as meeting criteria for MetS at the baseline visit.

Measures

Primary Outcome

Data on incident MetS were taken from follow-up visits between 2002 and 2016. MetS was assessed using the criteria outlined by the NCEP ATP III and the IDF, and was treated as a binary outcome, present or absent.[11] Participants were classified as having metabolic syndrome if they met at least three of the following criteria: waist circumference exceeding 102 cm for men and 88 cm for women; triglyceride levels of 150 mg/dl or higher; HDL cholesterol levels below 40 mg/dl for men and 50 mg/dl for women; fasting glucose levels of 110 mg/dl or above or current treatment for diabetes; and blood pressure of 130/85 mmHg or higher or current treatment for hypertension.

Lipid values were assessed from fasting venous blood draws with the cholesterol oxidase approach (Roche Diagnostics, Indianapolis, Indiana), and the calculation of low-density lipoprotein (LDL) cholesterol was performed using the Friedewald equation.[12,13] Blood pressure was measured at rest three times on the right arm, following a five-minute seated period, and the average of the final two measurements was utilized for the analysis. The Vitros

950 analyzer was used to measure fasting blood glucose levels (Johnson & Johnson, Rochester, NY).[14] The waist measurement was taken at the level of the belly button with a steel tape measurer to a precision of 0.1 cm.

Main Exposures

Income was collected by using a uniform survey method through self-reported measures asking for participants' income in the past 12 months, which included 13 categories starting from less than $5,000 to over $100,000. For the current analysis, participants were classified as low SES if they reported a gross annual family income of <$25,000, which is approximately 150% of the poverty rate for a family of four for the baseline year. Participants were classified as middle or high income if they reported a gross annual family income of ≥$50,000. All other participants that did not fall into either of these two categories were grouped into a middle SES category or into a category named "missing" if this data was not available, and were excluded from analyses. Participants reporting income of $25,000-$49,999 were intentionally excluded to better differentiate between the low and middle/high income groups.

Social determinants included neighborhood social cohesion, neighborhood problems, emotional social support, and depression. The Neighborhood Social Cohesion Score was measured based on participants' self-reported perceptions of their neighborhoods. Social cohesion was assessed based on the following items: 1) 'People around here are willing to help their neighbors'; 2) 'People in my neighborhood generally get along with each other'; 3) 'People in my neighborhood can be trusted'; 4) 'People in my neighborhood share the same values'. Consistent with previous research, responses were combined to create a total score for neighborhood social cohesion. This is a five-item scale that evaluates the following aspects of neighborhood cohesion: close-knit community, willingness to help, interpersonal harmony, trust, and shared values. Higher scores indicating greater social cohesion.[13,15] Retest reliability of the social cohesion score is high (0.90).[16,17]

The evaluation of neighborhood problems involved soliciting ratings from participants on various aspects through a 4-point Likert scale. The aspects queried included issues like noise pollution, traffic congestion or fast-moving vehicles, insufficient options for grocery shopping, a scarcity of green spaces or playgrounds, litter problems, inadequate or unmaintained sidewalks, and local crime rates. Following previous research, the collective scores from these items were then tallied to derive an overall index score, with higher scores indicating more problems. Similar to neighborhood cohesion, reliability for neighborhood problems over a two-week interval was high (0.91).[16,17]

The availability of emotional social support was measured using an index comprising six items, with scores ranging from 6 to 30. Examples of the items that were scored consist of six 5-point likert-scored items (e.g., *Is there someone available to you whom you can count on to listen to you when you need to talk? 1 = None of the time, 2 = A little of the time, 3 = Some of the time, 4 = Most of the time, 5 = All of the time*).[18,19]

Depressive symptoms were quantified using the Center for Epidemiologic Studies Depression Scale (CES-D).[20] This tool comprises 20 items designed to measure symptoms of depression, with each item rated on a scale ranging from 0 to 3, where 0 denotes 'rarely' and 3 indicates 'most of the time'. The CES-D evaluates a variety of symptoms including depressed mood, feelings of worthlessness, hopelessness, concentration difficulties, loss of appetite, and sleep disturbances. Higher scores on the CES-D indicate more severe depressive symptoms. For the purpose of this research, the CES-D scores were treated as a continuous variable, demonstrating high internal consistency with a Cronbach's alpha of .88.

Covariates

Demographics, such as gender, race, level of education, were measured via self-report questionnaire. Smoking status was also collected by self-report and included the categories of never, former, and current smoker. Height and weight were measured in light clothing without shoes. Height was measured with a stadiometer and recorded to an accuracy of 0.1 cm, and weight was measured with a precision of 0.5 kg. The BMI was then determined using the formula of weight in kilograms divided by the square of height in meters. To report physical activity (PA), MESA used the Typical Week Physical Activity Survey (TWPAS) to collect data on self-reported PA from participants at each visit. This survey, which was modified from the Cross-Cultural Activity Participation Study, aims to document PA habits over a typical week in the previous month.[21] Responses were converted into metabolic equivalent (MET) minutes per week by multiplying by the MET levels for each activity type.[22]

Statistical Analysis

Data were first checked for outliers and assessed for normality of distribution. Of the 6,814 participants in the MESA baseline exam, 2,468 were excluded due to having MetS at baseline. Baseline descriptives were calculated for the cohort as a whole and stratified by low vs. high SES. Differences between SES groups were assessed using chi square for categorical variables and t-tests for continuous variables.

To examine differences in social determinants and MetS risk factors by gender and SES, participants were divided into four categories: low SES Women, high SES Women, low SES Men, and high SES Men. Paired comparisons were conducted between income groups within each gender group, and likewise between genders within each income group, using chi square and t-tests, as appropriate. Differences across categories were assessed using univariate ANOVA for continuous variables and chi square for categorical variables.

We subsequently evaluated the association between baseline SES and incident MetS for women and men by having the data stratified by gender and having separate Cox proportional hazards models run on each group. Our analyses were run by including incident MetS as the dependent variable and SES as the independent variable. In addition, incident MetS was evaluated over the study period, while MetS status was recorded over each study visit.

Stage models were included to first adjust for demographics and possible confounders, and finally to adjust for modifiable social determinants and psychosocial variables to assess whether adjusting for these factors attenuated the association between SES and MetS**.** Model 1 adjusted for age and race. Model 2 adjusted for these in addition to risk factors for MetS, including BMI, smoking status, and physical activity. To investigate the potential role of different categories of modifiable social determinants and psychosocial variables, these were entered into separate models. Model 3a included variables in Model 2 along with psychosocial variables (emotional support and depression). Model 3b included variables in Model 2 with the addition of neighborhood environment variables (Neighborhood Problems and Neighborhood Cohesion). Finally, complete models incorporating all covariates were analyzed (Model 4).

All statistical analyses were conducted using two-tailed tests, where a p-value below 0.05 was considered to denote statistical significance. The statistical package R (version 4.1.0, available at http://www.r-project.org) was employed for these analyses.

RESULTS

Table 1 presents the characteristics of the study population, stratified by socioeconomic status. After removing individuals who presented with MetS at baseline, the study sample comprised 4,191 individuals; 3,005 of those individuals fell under the classification of low or high SES, while the remaining 1,186 individuals fell under middle SES and were excluded from analyses, which was then classified as the study sample for the current analysis. From the total study sample, 49.2% identified as female and 50.8% as male. The mean age was 61 ± 10 years, while 43.0% of participants were White, 38.5% were considered low SES, 15.2% had less than a high school education, and 9.4% had no health insurance.

In the study sample, 1,158 participants were categorized under low SES, while 1,847 were classified under high SES. (Table 1). Compared to the high SES group, low SES participants were more likely to be female, Black, Chinese, or Hispanic/Latino, have no health insurance, have less than a high school education (for all $p < 0.01$). Across SES categories, only diastolic blood pressure was found to show no significant difference across groups, with all differences favoring better health in the higher SES individuals.

Table 2 shows risk factors for MetS stratified by gender and SES categories. Compared to high SES women, low SES women were more likely to be Black, Chinese, or Hispanic/Latina. As expected, low SES women were more likely to have less than a high school education (33.6% vs. 3%), and have no health insurance (18.4% vs. 2.4%). However, high SES women were more likely to smoke. There were statistically significant differences between low and high SES women across all psychosocial and neighborhood environment measures. Low SES women had lower neighborhood cohesion scores and higher neighborhood problem scores, and reported lower levels of social support. However, lower SES women reported lower depression symptoms than high SES women. For women, BMI, DBP, and physical activity did not differ significantly across income categories (all $p > 0.05$).

Similarly, low SES men differed significantly from high SES men in several aspects shown in Table 2. They had a larger representation among Black and Hispanic/Latino ethnicities compared to high SES men, with low SES men also more likely to have less than a high school education (36.3% vs. 3%) and less likely to have health insurance (23.7% vs. 2.2%). Low SES men, much like low SES women, had lower neighborhood social cohesion scores than high SES men, however, there were no differences in neighborhood problems scores compared to high SES men. Similar to low SES women, low SES men reported lower levels of depression ($p < 0.001$). The men in the low SES group were also more likely to smoke (63.3% vs. 55.1%) and completed less physical activity compared to high SES men. Despite these behavioral risk factors, they had a lower BMI than their high SES counterparts (25.6 kg/m² vs. 27.0 kg/m², $p < 0.001$).

Among participants in the low SES group, there were no significant differences by gender in neighborhood cohesion or neighborhood problems. However, low SES women reported significantly lower levels of emotional support than low SES men (22.9 vs. 23.9), and low SES men reported significantly higher depression symptoms than low SES women (0.80 vs. 0.53). Low SES men were also more likely to smoke (63.3% vs. 33.0%) and less likely to have health insurance (23.7% vs. 18.4%), but had lower BMI than low SES women (25.6 kg/m² vs. 26.9 kg/m²).

Comparing high SES men and high SES women, there were no significant differences in race, education, health insurance access, neighborhood social cohesion score, and neighborhood problems score. Consistent with low income comparisons, there were significant differences between high SES men and high SES women in emotional support and depression, with women reporting lower emotional support but men reporting higher depression symptoms. High SES men also engaged in more physical activity than women, but were more likely to smoke and had higher blood pressure.

Table 3 presents the risk of MetS in low SES women compared to high SES women (ref). The unadjusted analysis reveals that low SES women have a 91% higher risk of developing MetS (HR 1.91, 95% CI 1.60 to 2.28). When adjusting for age and race, the association between SES and MetS remains statistically significant, with a slightly lower but substantial risk (HR 1.72, 95% CI 1.44 to 2.06); further adjusting for MetS risk factors (BMI, smoking, PA) did not change the association. After further adjustment for emotional support and depression symptoms, the association is slightly attenuated, but still significant with HR 1.68 (95% CI 1.40 to 2.03), and HR 1.68 (95% CI 1.39 to 2.02) after adjusting for neighborhood social cohesion and problems score. In the fully adjusted model (Model 4), low SES women had a 66% higher risk of developing MetS than high SES women (HR 1.66, 95% CI 1.38 to 2.00).

Similarly, Table 3 also shows the risk of MetS in low SES men compared to high SES men (ref). In the unadjusted model, low SES men have an 87% increased risk of MetS (HR 1.87, 95% CI 1.54 to 2.26). This risk is slightly decreased after adjusting for age and race (HR 1.73, 95% CI 1.43 to 2.10), and changed little after adjusting for MetS risk factors. Accounting for psychosocial and neighborhood variables, the risk is slightly decreased (HR 1.65, 95% CI 1.36 to 2.02 for Model 3a and HR 1.68, 95% CI 1.38 to 2.05 for Model 3b). In the fully adjusted model (Model 4), low SES men had a 66% higher risk of developing MetS than high SES men (HR 1.66, 95% CI 1.36 to 2.02). Moreover, the overall incidence for MetS of the total study cohort was 33% for both low and high SES individuals.

DISCUSSION

The findings of our study show the influence of SES on the risk of developing MetS, with a disparity found between SES groups. Our analysis revealed that low SES men and women have a statistically significantly higher risk of MetS compared to high SES men and women, even after adjusting for confounding factors of age, race, and MetS risk factors such as body mass index, smoking habits, and physical activity levels. Interestingly, the risk remained elevated after adjusting for psychosocial and neighborhood variables, showing a consistent SES-related disparity. The consistent SES-related disparity in MetS risk between low and high SES groups, even after accounting for psychosocial and neighborhood factors, presents an important finding that was different from our hypothesis. While it was expected that factors such as neighborhood cohesion, social support, and access to healthy food would play a significant role in reducing the risk of MetS, the data show otherwise. This consistency indicates that despite these social determinants, the disparity between low and high SES persists, suggesting that there may be underlying mechanisms related directly to SES that contribute to this increased risk. This finding challenges the assumption that psychosocial and neighborhood variables can explain the disparity in women, showing the need for further investigation into SES-specific interventions and their long-term impacts. Moreover, the potential collinearity between SES and social determinants could complicate the impacts of each, suggesting that the strong effect of SES in the model could mask the influences of neighborhood and psychosocial factors.

We observed significant differences in incident MetS across SES groups among both men and women. Low SES women had lower education levels, higher proportions of ethnic minorities, and less access to health insurance compared to high SES women, potentially influencing their risk of MetS. Psychosocial measures showed that low SES women reported lower levels of emotional support but had lower depression symptoms than high SES women. This difference highlights potential coping mechanisms or cultural factors influencing emotional health.[2] For men, low SES individuals had higher smoking rates, lower levels of physical activity, and reduced neighborhood cohesion compared to high SES men. Notably, both low SES men and women had significantly higher risk of MetS compared to high SES groups, even after adjusting for neighborhood and psychosocial factors, emphasizing the complex interplay of SES and health outcomes. This analysis shows the need for interventions targeting both gender-specific factors and broader SES disparities to mitigate MetS risks.

Other research, including studies like the NHANES and the Isfahan Healthy Heart Program, provides additional insights into the relationship between SES and MetS. The NHANES study found an inverse relationship between SES and MetS prevalence, which aligns with our findings. Specifically, low SES individuals, particularly women, had a higher risk of developing MetS compared to those with higher SES.[2] This is similar to our study's findings, suggesting that gender disparities in MetS incidence are more pronounced among low SES individuals. However, compared to the NHANES study, our study did not observe a significant difference in MetS risk between genders when comparing low and high SES groups. The risk of MetS was found to be elevated for both low SES men and women compared to their higher SES counterparts, with no substantial variation between the genders. Additionally, the IHHP results support the inverse relationship we found between SES and MetS.[4]

Future studies could explore how different life experiences and stressors related to low SES impact men and women differently. Additionally, assessing the effectiveness of targeted interventions that address these unique challenges can provide information on how to reduce the risk of MetS among vulnerable populations. There's also a need for research that looks at how changes in other neighborhood conditions or improvements in social support factors can influence MetS outcomes. Finally, given the constant changing of socioeconomic challenges, longitudinal studies that analyze these factors over time will be important in finding long-term solutions to reduce the risk of MetS, especially among men and women of low SES.

Our study used data from a diverse participant pool, using the longitudinal data from MESA to show trends in MetS across different SES categories and genders. These data allowed for a comprehensive analysis, adjusting for various confounding factors to separate the impact of SES on MetS risk. However, our study does include some limitations, with the first being the reliance on self-reported income and health behaviors which could introduce reporting biases. Misclassification could occur if participants inaccurately report their income or health behaviors. Second, although we adjusted for various covariates, residual confounding might exist due to unmeasured or inaccurately measured variables. Moreover, it should be noted that the measures of neighborhood social cohesion and emotional social support, are subjective and based on self-reported data. This reliance on self-reported data may create bias and does not capture all components of the actual social and environmental contexts that participants experience. Additionally, while these determinants were included, our analysis may not fully encapsulate the complex interactions between these factors and other unmeasured variables that could influence metabolic syndrome outcomes. Future research could benefit from the use of more objective and diverse measures of social determinants to better understand their impact on health disparities. Lastly, our findings may lack external validity in populations outside the United States or to populations further differing in racial or socioeconomic compositions. Despite these limitations, our study contributes significant findings into the relationship between SES, gender, and MetS.

In conclusion, the findings of this paper calls attention to SES in the risk of developing MetS, with a significant disparity between SES groups for both men and women. The findings provide insight into the fact that low SES men and women experience a significantly higher risk of MetS compared to high SES men and women, indicating the need for targeted interventions that address the challenges faced by low SES individuals in preventing MetS. Future research should investigate additional factors such as chronic stress due to financial instability, limited access to quality healthcare, and educational opportunities that could contribute to risk of MetS in low SES individuals.

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APPENDIX

Table 1: Baseline Characteristics at Exam 1 including SES Stratified Groups

Characteristics	All (n = 3005)	Low SES (n = 1158)	High SES (n = 1847)	p-value
Age (years), mean (SD)	61 (10)	64.7 (10.7)	59.0 (9.3)	< 0.001
Gender: Female (%)	49.2%	55.5%	45.2%	< 0.001
Race:				< 0.001
- White (%)	43.0%	19.2%	58.0%	
- Black (%)	14.8%	23.6%	9.3%	
- Chinese (%)	24.5%	25.6%	23.8%	
- Hispanic/Latino (%)	17.7%	31.7%	9.0%	
Total Gross Family Income < $25,000 (%)	38.5%	100%	0%	< 0.001
Education Level < High School (%)	15.2%	34.8%	3.0%	< 0.001
No Health Insurance (%)	9.4%	20.7%	2.3%	< 0.001
BMI (kg/m^2), mean (SD)	26.8 (4.9)	26.3 (5.1)	26.7 (4.5)	< 0.001
SBP (mmHg), mean (SD)	122 (21)	125.9 (22.6)	119.1 (18.3)	< 0.001
DBP (mmHg), mean (SD)	71 (10)	70.8 (10.2)	71.4 (9.9)	0.07
Smoker: Current or Former (%)	49.6%	46.5%	51.6%	< 0.001
Physical Activity (min/week), mean (SD)	5994.0 (5888.1)	5280.1 (5683.0)	6072.5 (5803.0)	< 0.001
NSC Score, mean (SD)	17.6 (2.8)	16.9 (2.8)	18.0 (2.7)	< 0.001
Neighborhood Problems Score, mean (SD)	10.4 (3.3)	10.4 (3.7)	10.1 (3.0)	< 0.001
ESS Index, mean (SD)	24.2 (5.2)	23.4 (5.6)	25.1 (4.6)	< 0.001
Depression Scale, mean (SD)	0.73 (1.1)	0.65 (1.0)	0.80 (1.1)	< 0.001

Body Mass Index (BMI), Systolic Blood Pressure (SBP), Diastolic Blood Pressure (DBP), Neighborhood Social Cohesion Score (NSC Score), Emotional Social Support Index (ESS Index)

Table 2: Baseline Characteristics at Exam 1 Stratified by Gender and SES

Characteristics	Low SES Women (n = 643)	High SES Women (n = 834)	p-value	Low SES Men (n = 515)	High SES Men (n = 1013)	p-value	p-value *	p-value**
Age (years), mean (SD)	65 (11)	58 (9)	< 0.001	65 (11)	60 (10)	< 0.001	0.62	< 0.001
Race:			< 0.001			< 0.001	0.003	0.20
- White (%)	22.2%	60.0%		15.3%	56.4%			
- Black (%)	21.5%	9.0%		26.2%	9.5%			
- Chinese (%)	27.1%	23.5%		23.7%	24.0%			
- Hispanic/Latino (%)	29.2%	7.6%		34.8%	10.2%			
Education Level < High School (%)	33.6%	3.0%	< 0.001	36.3%	3.0%	< 0.001	0.37	1.0
No Health Insurance (%)	18.4%	2.4%	< 0.001	23.7%	2.2%	< 0.001	0.03	0.87
BMI (kg/m^2), mean (SD)	26.9 (5.6)	26.4 (5.3)	0.06	25.6 (4.1)	27.0 (5.6)	< 0.001	< 0.001	0.01
SBP (mmHg), mean (SD)	126 (24)	117 (20)	< 0.001	125 (21)	121 (17)	< 0.001	0.45	< 0.001
DBP (mmHg), mean (SD)	69 (10)	68 (10)	0.12	74 (9)	75 (9)	0.12	< 0.001	< 0.001
Smoker: Current or Former (%)	33.0%	47.4%	< 0.001	63.3%	55.1%	< 0.001	< 0.001	0.003
Physical Activity (min/week), mean (SD)	4992.7 (5101.8)	5373.2 (4615.7)	0.14	5638.9 (6321.1)	6647.6 (6568.4)	0.004	0.06	< 0.001
NSC Score, mean (SD)	17.0 (2.8)	18.1 (2.8)	< 0.001	16.8 (2.9)	18.0 (2.7)	< 0.001	0.16	0.60
Neighborhood Problems Score, mean (SD)	10.6 (3.7)	10.1 (2.9)	0.008	10.3 (3.6)	10.1 (3.0)	0.28	0.16	0.80
ESS Index, mean (SD)	22.9 (5.6)	24.9 (4.5)	< 0.001	23.9 (5.6)	25.3 (4.7)	< 0.001	0.003	0.04
Depression Scale, mean (SD)	0.53 (0.9)	0.72 (1.1)	< 0.001	0.80 (1.1)	0.87 (1.2)	0.26	< 0.001	0.005

p-value*: Low SES men vs. Low SES women
p-value**: High SES men vs. High SES women
Body Mass Index (BMI), Systolic Blood Pressure (SBP), Diastolic Blood Pressure (DBP), Neighborhood Social Cohesion Score (NSC Score), Emotional Social Support Index (ESS Index)

Table 3: Unadjusted Model + Models 1, 2, 3a, 3b, and 4 for MetS

	Unadjusted	Model 1 HR (95% CI)	Model 2 HR (95% CI)	Model 3a HR (95% CI)	Model 3b HR (95% CI)	Model 4 HR (95% CI)
Low SES Women	1.91 (1.60, 2.28)	1.72 (1.44, 2.06)	1.72 (1.43, 2.06)	1.68 (1.40, 2.03)	1.68 (1.39, 2.02)	1.66 (1.38, 2.00)
Low SES Men	1.87 (1.54, 2.26)	1.73 (1.43, 2.10)	1.69 (1.39, 2.05)	1.65 (1.36, 2.02)	1.68 (1.38, 2.05)	1.66 (1.36, 2.02)

Model 1: age and race
Model 2: Model 1 + bmi, smoking, physical activity
Model 3a: Model 2 + emotional social support index, depression scale
Model 3b: Model 2 + neighborhood social cohesion score, neighborhood problems score
Model 4: Model 3a + Model 3b
Hazards Ratio (HR), Confidence Interval (CI)

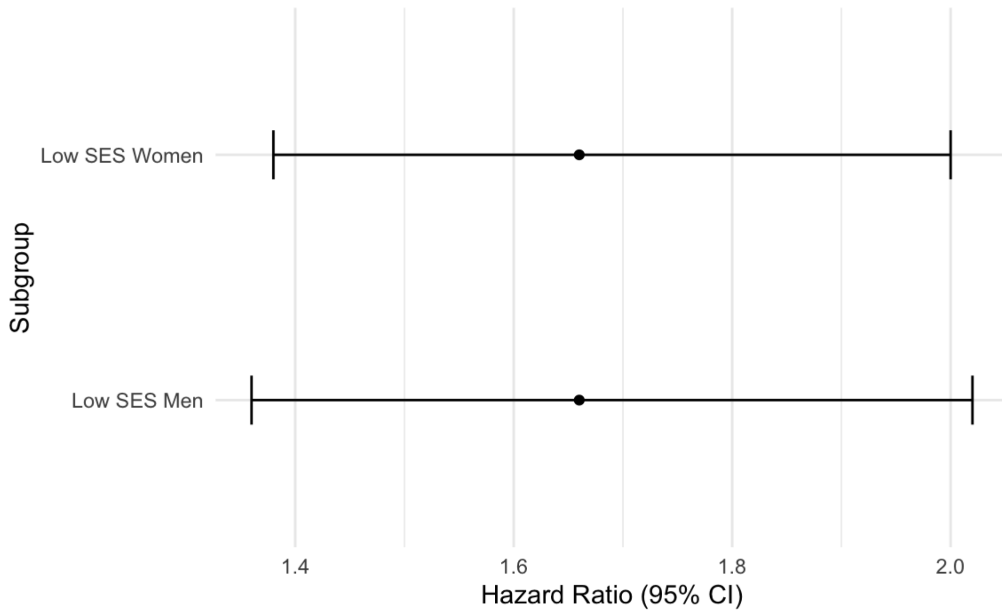

Figure 1: Forest Plot of Final Multivariable Models for Low SES Men and Women