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Ethnicity, Socioeconomic Status, and Health Disparities in a Mixed Rural-Urban Community of the United States (Olmsted County, Minnesota)

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Abstract

Objective—To characterize health disparities in common chronic diseases among adults with socioeconomic status (SES) and ethnicity in a mixed rural-urban community of the United States

Patients and Methods—This was a cross-sectional study to assess the association of prevalence of the five most burdensome chronic diseases in adults with SES and ethnicity and their interaction. The Rochester Epidemiology Project medical records linkage system was used to

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identify prevalence of coronary heart disease (CHD), asthma, diabetes, hypertension, and mood disorder using ICD-9 codes recorded between January 1, 2005, through December 31, 2009 among all adult residents of Olmsted County, Minnesota, on April 1, 2009. For SES measure, individual HOUSing-based SocioEconomic Status index (termed HOUSES) derived from real property data was used. Logistic regression models were used to examine the association of prevalence of chronic diseases with ethnicity and HOUSES and their interaction.

Results—There were 88,010 eligible adults with HOUSES available, of whom 55% were female, 92% Non-Hispanic White, and the median age (interquartile range) was 46 (30 – 58) years. Overall and in the subgroup of Non-Hispanic White subjects, SES measured by HOUSES was inversely associated with the prevalence of all of five chronic diseases independent of age, gender, and ethnicity (P-values < .001). While association of ethnicity with the prevalence was observed for all the chronic diseases, SES modified the effect of ethnicity for clinically less overt conditions (interaction P-value < .05 for each condition [diabetes, hypertension, and mood disorder]), but not for CHD, a clinically more overt condition.

Conclusion—In a mixed rural-urban setting with predominant Non-Hispanic White population, health disparities in chronic diseases still exist across different SES. The extent to which SES modifies the effect of ethnicity on the risk of chronic diseases may depend on nature of disease.

As health disparities across socioeconomic status (SES) and ethnicity have been well documented in the US and elsewhere, reduction of health disparities has been consistently one of the overarching goals of the Healthy People in the United States since 1990.^{1–9} The 2003 Institute of Medicine Report and the 2013 National Healthcare Disparities Report suggest prevailing disparities in health care access and health outcomes across income and ethnicity.^{10,11} The geographic and temporal trends of health disparities among people with different SES and ethnic backgrounds have persisted, and may have worsened over time.^{11–15} For example, the National Health and Nutrition Examination Survey, 1999 to 2006 showed that control of blood pressure and glucose and cholesterol levels has improved since 1999 for adults with cardiovascular disease and diabetes, but gaps in ethnic or socioeconomic disparities have not significantly declined.¹⁴ Another recent cross-sectional study among Medicare enrollees in 2006 and 2011 showed similar ethnic disparities in control of the same measures as well as significant regional variation.¹⁵

Despite the regional variation of health disparities across ethnicity categories in the US, little is known about the degree and nature of health disparities in a mixed rural-urban setting that mitigates factors known to contribute to health disparities, such as a relatively affluent community, a higher proportion of people working in the health care system (higher access to health care services), lower prevalence of environmental issues (air pollution, pest infestation, etc.), homogeneous distribution of people with different ethnicity in the community (lower dissimilarity index), and higher health insurance coverage.^{16–20} Given these potentially mitigating factors for health disparities at a community level, assessing health disparities in common chronic diseases in a community characterized by these attributes is likely to provide important insight into the degree and nature of health disparities in chronic diseases in a non-inner city setting. Using data from such a setting, we determined whether significant health disparities in chronic diseases among people with

different ethnicity and SES existed in our community given the mitigating factors at a community level.

In addressing this question, the literature is limited as few population-based studies using a well-defined cohort in a mixed rural-urban setting are available. Particularly, most previous studies were based on self-reported SES measures and health outcomes.^{3–9} One important barrier to large-scale health disparities research based on clinical or administrative datasets is the lack of SES measures even during the electronic medical record era. To overcome this barrier, we applied our recently developed individual housing-based SES index (termed HOUSES) to a population-based cohort including nearly all Olmsted County, Minnesota, residents, instead of relying on self-reported SES measures.^{21–26} Olmsted County, Minnesota, is a suitable study setting for conducting a population-based study such as this since the health care environment is self-contained and medical records for nearly all residents are available for clinical research. Using these unusual resources, we examined the degree and nature of health disparities in five common chronic diseases among adults with different SES and ethnicity.

PATIENTS AND METHODS

Study Setting and Population

Olmsted County, Minnesota, is a mixed rural-urban setting containing both urban and rural areas defined by the United States Census (16% of rural population and 91% of rural area) with low White/Black dissimilarity index of 29.5 in 2010 (versus 82.5 for Chicago, Illinois).^{20,27} According to the 2010 Census, the population of Olmsted County was 85.7% White, 4.7% African American, 5.4% Asian, and 4.2% Hispanic.¹⁶ Our community has a higher median family income (\$66,252 in 2009–2013) than the national average (\$53,046) and a larger proportion of Rochester residents working in the health care industry (22%).^{18,19,28} Accordingly, Olmsted County is not a Medically Underserved Area.²⁹ The level of poverty in Minnesota and the United States has steadily increased since 2008 (11.9% in Minnesota and 15.9% throughout the nation in 2011), but poverty levels in Olmsted County remain considerably below national and state levels hovering around 8% over the last five years. 95% of Olmsted County adults currently have health insurance (vs. 85% in the US) and 66% routinely seek medical care.³⁰

The Rochester Epidemiology Project (REP) links data on medical care delivered to the population of Olmsted County, Minnesota.^{31–33} The majority of medical care in this community is currently provided by the Mayo Clinic and its two affiliated hospitals, and the Olmsted Medical Center and its affiliated hospitals with limited care provided through the two clinicians of the Rochester Family Medicine Clinic which has recently closed. The health care records from these institutions are linked together through the REP records linkage system.^{32,33} Patients are categorized as residents or non-residents of Olmsted County at the time of each health care visit on the basis of their address. The population counts obtained by the REP census are similar to those obtained by the US Census, indicating that virtually the entire population of the county is captured by the system.^{32,33} For this study, we used the REP census to identify all individuals who resided in Olmsted

County on April 1, 2009, but we excluded those individuals who had refused medical record research authorization in at least one health care institution.³²

Study design

This was a cross-sectional study to assess the association of 5-year prevalence (i.e., January 1, 2005, through December 31, 2009) of the five most burdensome chronic diseases in adults with different socioeconomic status (SES) and ethnicity and their interaction.

The five most burdensome chronic diseases

We assessed the prevalence of the five most burdensome chronic diseases as identified by the Agency for Healthcare Research and Quality (AHRQ) among adults over 18 years of age identified by the REP dataset.³⁴ These diseases included coronary heart disease (CHD), asthma, diabetes, hypertension, and mood disorder. Detail identification algorithms for each disease were previously described.³⁵ In brief, the diagnostic indices of the REP were searched electronically to extract the *International Classification of Diseases, Ninth Revision (ICD-9)* codes of these five chronic diseases in the medical records of the Olmsted County population ever assigned by any health care institution from January 1, 2005, through December 31, 2009 (i.e., 5-year prevalence with a single ICD code). These ICD-9 codes were grouped into clinical classification codes (CCCs) proposed by the AHRQ-Healthcare Cost and Utilization Project.^{36,37}

Individual socioeconomic status measured by HOUSES

Socioeconomic status of our study population was measured by individual housing-based SES index (HOUSES).^{21–26} Development and initial testing of the index were completed in both Olmsted County, Minnesota, and Jackson County, Missouri, and the index was applied to a study, which was conducted in Sioux Falls, South Dakota. Briefly, in formulating HOUSES, addresses of the eligible subjects in April 2009 were geocoded. Geocoding allowed us to match the study subject's address to geographic reference data and real property data from the Assessor's Office of the county government. Our original research work for development and validation of HOUSES (principal components factor analysis) identified four real property feature variables including housing value, square footage of housing unit, number of bedrooms, and number of bathrooms in a same factor sharing the underlying construct (SES). We then formulated a standardized HOUSES index score by summing their z-scores for each variable (i.e., standardized index). The higher the HOUSES (z-score), the higher the SES. Our prior work has demonstrated that HOUSES is associated with health outcomes in children and adults such as the risk of low birth weight, obesity, smoking exposure at home, asthma control status, risk of pneumococcal diseases, post-MI mortality, and risk of rheumatoid arthritis (RA) and post-RA mortality.^{21–26}

Other variables

Both Olmsted County and Minnesota's minority populations accounted for 14.7% of the population in 2010.³⁸ For this study, we grouped the self-reported ethnicity into 4 groups, which include non-Hispanic White, African American, Asian, and Hispanic according to the suggested racial and ethnic categories by the NIH.^{15,39} As suggested by a previous study, we

grouped the other/unknown category with the non-Hispanic White category because we presumed that most of the patients in the other/unknown category were non-Hispanic White (85.7% of the Olmsted County's population self-reported White in the 2010 census).³⁵

Statistical Analysis

Descriptive statistics were used to summarize demographic characteristics of the study population. Association between demographic variables and HOUSES in quartiles (Q1 – Q4) was assessed by Chi-square tests. To assess the association of HOUSES with the prevalence of each chronic condition (CHD, asthma, diabetes, hypertension, and mood disorder), logistic regression models were used among subjects in the overall cohort, adjusting for age, gender, and ethnicity. Additional multivariate logistic models further adjusted for pertinent risk factors for CHD (diabetes, hypertension, hyperlipidemia, and obesity) and diabetes (hyperlipidemia and obesity). Similar analysis was carried out among non-Hispanic White subjects only. Stratified logistic regression models were used to assess associations of different ethnicity groups with each chronic disease. In addition, an interaction effect between ethnicity and HOUSES on prevalence of each disease was tested under the framework of logistic regression, by adding an interaction term between ethnicity group and HOUSES quartiles. Statistical analyses were performed using the SAS software package (SAS Institute, Cary, NC). All tests were two-sided and p-values <0.05 were considered statistically significant.

RESULTS

Characteristics of study subjects

Of the eligible REP cohort (n=130,078), we excluded 9,455 subjects due to institutionalized subjects (n=330), PO Box (n=1,186), unverifiable addresses (n=6,099), and unavailable real property data (n=1,840) leaving 120,623 (93%) subjects who were successfully geocoded. Of the 120,623 subjects, 88,010 were adults; 55% were female and the median age (interquartile range, IQR) was 46 (IQR 30 – 58) years (Table 1). The proportions of non-Hispanic White, African American, Asian, and Hispanic subjects were 91.7%, 3.0%, 3.5%, and 1.8%, respectively. The median (IQR) of HOUSES was -0.38 (-2.28 – 1.84).

SES as measured by HOUSES and demographic characteristics

Overall, higher SES was observed among subjects aged between 46 and 65 years and males (Table 2). In addition, Non-Hispanic White subjects had higher SES than their African American and Hispanic counterparts, whereas Asian subjects showed relatively similar SES as Non-Hispanic White subjects in this community (percent of subjects in the highest SES quartile (Q4) was 25.9% for Non-Hispanic White subjects, 7.5% for African American subjects, 10% among Hispanic subjects, and 24.3% for Asian subjects).

SES and the prevalence of common chronic diseases

Overall, lower SES was associated with higher prevalence of each of the five chronic conditions controlling for age, gender, ethnicity, and additional pertinent risk factors. The results are summarized in Table 3 (P-values < .001), and a similar pattern was found in the subgroup of Non-Hispanic White subjects. The impact of SES on prevalence tended to be

greater in diabetes, hypertension, and mood disorder, compared to CHD and asthma. For example, the adjusted odds ratio for the highest SES group, compared to the lowest SES group was 0.56 (95% CI 0.52 – 0.60) for diabetes, and 0.74 (95% CI 0.69 – 0.80) for CHD.

Ethnicity and the prevalence of chronic diseases

The association between ethnicity and prevalence of chronic diseases varied in magnitude but showed no consistent patterns for distinguishing clinically more versus less overt diseases. The results are summarized in Table 4. While mood disorder was more prevalent in Non-Hispanic White subjects than in minority groups, odds of diabetes were at least two-fold higher among minority groups compared with Non-Hispanic White subjects adjusting for age and gender (and obesity for comparison of diabetes). In comparison to Non-Hispanic White subjects, Hispanic subjects had a reduced rate of both hypertension and CHD while African American subjects had increased odds of both diseases adjusting for pertinent risk factors. Both Asian and Hispanic, but not African American subjects, showed lower rates of asthma compared to Non-Hispanic White subjects.

Interaction between SES and Ethnicity in relation to the prevalence of chronic diseases

SES modified the effect of ethnicity on the prevalence of chronic diseases, and the interaction between SES and ethnicity depended on the nature of the disease. The results are summarized in Figure 1 and Supplemental Table. Specifically, the patterns in which SES modified the effect of ethnicity observed among minority groups were comparatively different for diabetes, hypertension, and mood disorder from CHD. As shown in Figure 1 and Supplemental Table, odds of diabetes, hypertension, and mood disorder were generally increased with higher SES (above the median of HOUSES) in the minority subjects, especially African American subjects, relative to Non-Hispanic White subjects, controlling for age, gender, ethnicity, and additional pertinent risk factors for diabetes (i.e., obesity and hyperlipidemia). However, such patterns appeared to be reversed for CHD.

DISCUSSION

Significant health disparities still existed among Non-Hispanic White residents and overall adult population with different SES in a mixed rural-urban setting. Also, there were ethnic disparities in the prevalence of common chronic diseases. SES modified the effect of ethnicity on the prevalence of chronic diseases but such effect modification by SES depended on the nature of clinical disease (i.e., clinically overt diseases such as CHD versus clinically less overt diseases such as diabetes, hypertension, and mood disorder).

Despite the potential mitigating factors for health disparities (e.g., a relatively affluent community, a higher proportion of people working in the health care system, homogeneous distribution of people with different ethnicity in the community, and higher health insurance coverage),^{16–19,30,40} there were still significant disparities in the prevalence of chronic disease among different ethnic groups in this community. Also, health disparities existed in our study's majority, non-Hispanic White population with different SES in a dose-response manner across all chronic diseases examined. Furthermore, the ratios of prevalence of each chronic disease between the highest SES stratum (Q4) and the lowest (Q1) in our

community (Q4/Q1) (i.e., 0.70 (CHD), 0.80 (asthma), 0.55 (diabetes)), 0.78 (hypertension), and 0.72 (mood disorder), were not drastically different from estimates by multiple studies at a national level [i.e., 0.4–0.66 (CHD), 0.94–1.04 (asthma), 0.38–0.47 (diabetes), 0.59–0.70 (hypertension), and 0.87 (mood disorder)].^{41–44} Since our study results were based on ICD-9 codes for chronic diseases and HOUSES for SES measure, it is unlikely to be due to report biases caused by self-report. Literature has shown that Non-Hispanic Whites have a reduced risk of multiple chronic diseases.^{45–49} As the Non-Hispanic White population has been often used as a reference group for analysis, the literature examining health disparities among Non-Hispanic White populations across different SES groups is relatively limited.³ Overall, our study results suggest that Non-Hispanic White populations do not seem to be exempt from health disparities across different SES.

Our study results reveal noteworthy findings. As shown in Figure 1 and eTable 1, overall, a higher prevalence of clinically less overt diseases (diabetes, hypertension, and mood disorder) was found in the minority groups with higher SES (above the median of HOUSES when stratified by HOUSES), compared to those with lower SES. Such patterns or trends were not observed in clinically overt disease such as CHD. In this respect, the higher prevalence of chronic diseases may reflect identification of diseases (diagnosis or detection) not necessarily representing only a risk of disease per se. For example, clinically less overt chronic diseases might be much more dependent upon access to health care and health literacy for identification of such diseases whereas those clinically more overt diseases such as CHD often require emergency care (as it can be a life-threatening condition), and thus are less dependent upon one's ability to recognize the diseases and health care access. In this interpretation, we consider asthma as a disease with mixed features between clinically overt and less overt diseases and this is why asthma shows a different pattern from clinically overt disease and less overt diseases as shown in Figure 1. This suggests the extent to which SES modifies the effect of ethnicity on the risk of chronic diseases may depend on nature of disease. Therefore, one should bear in mind in interpreting our study results in terms of differentiating disease versus diagnosis as we used ICD-9 codes for defining chronic diseases. As Shippee et al pointed out, given the impact of SES on health care access and literacy, patients with lower SES may not seek timely care for appropriate diagnosis and treatment for clinically less overt disease until they develop clinically significant manifestations.⁵⁰

Our study results have a few important implications on health care policy concerning health disparities. First, ethnic disparities in health outcomes should be interpreted in the context of SES and the nature of the disease examined as shown in our study results. The complex interaction among ethnicity, SES and the disease nature might not be captured if one examines health disparities across different ethnicity and SES separately, especially without considering the clinical nature of the disease. Second, true health disparities (i.e., disease risk) across different SES might be more underestimated in clinically less overt diseases such as diabetes or hypertension regardless of ascertainment methods (i.e., lower identification of such diseases in a lower SES group and greater detection in higher SES group). Therefore, while the health care system makes an effort to prevent these chronic diseases, to reduce health disparities in outcomes of clinically less overt diseases, identification of such diseases through improving health literacy and health care access

should be a primary focus of intervention, especially among underserved populations including minorities or lower SES population. Finally, our study results highlight Non-Hispanic White populations with lower SES still represent underserved populations who are a target population for health promotion.

The main strength of our study is the population-based study design. Another strength is the prevalence of diseases was based on documented physician-diagnosis instead of self-report. In addition, we objectively measured SES based on real property data instead of self-reported conventional SES measures. Also, in this study, HOUSES index was available for nearly all eligible subjects (93%). Our findings need to be interpreted with caution. The main limitation of our study is the inability to verify ICD-9 codes.^{51,52} As we defined prevalence of each chronic condition with a single ICD-9 code as suggested by a previous study,³⁵ Prevalence of some conditions might have been overestimated. For example, prevalence of CHD might have been changed after diagnostic procedures (10.9% in this study vs. 6.0% in the US and 4.9% in Minnesota).⁴² However, systematic differential misclassification of CHD across different SES or ethnicity is unlikely given the life-threatening nature of CHD. Also, given the availability of specific diagnostic tests or procedures for hypertension, diabetes, and asthma, our study results are unlikely to be due to systemic (differential) misclassification of diseases. The cross-sectional nature of the analysis (i.e., prevalence study) is also a limitation of this study. While we took into account traditional risk factors for certain diseases (CHD and diabetes), we did not have all pertinent risk factors for certain diseases examined to adjust the main results. For this study, we grouped the other/unknown category with the Non-Hispanic White category, as suggested by previous studies, but by presuming this may be inaccurate. Lastly, unavailability of insurance data for the REP population limited our further data analysis for impact of insurance type on the association of SES with prevalence of chronic conditions.

Conclusions

In a mixed rural-urban setting with predominant Non-Hispanic White population, health disparities in chronic diseases still exist across different SES. The degree to which SES modifies the effect of ethnicity on the risk of chronic diseases may depend on nature of disease.

Supplementary Material

Refer to Web version on PubMed Central for supplementary material.

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Abbreviations

SES	Socioeconomic status
HOUSES	HOUsing-based SocioEconomic Status index
CHD	Coronary Heart Disease
ICD-9	The International Classification of Diseases, Ninth Revision
REP	The Rochester Epidemiology Project
RA	Rheumatoid Arthritis
IQR	Interquartile Range

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Figure 1. Comparison of odds ratios of each chronic condition by ethnicity between different SES group (reference: Non-Hispanic White subjects)

SES modified the effect of ethnicity on the prevalence of chronic diseases, and the interaction between SES and ethnicity depended on the nature of the disease. Specifically, the patterns in which SES modified the effect of ethnicity observed among minority groups were comparatively different for diabetes, hypertension, and mood disorder from CHD. In this Figure 1, odds of diabetes, hypertension, and mood disorder were generally increased with higher SES (above the median of HOUSES) in the minority subjects, especially African American subjects, relative to Non-Hispanic White subjects, controlling for age, gender and additional pertinent risk factors. However, such patterns appeared to be reversed for CHD.

Table 1

Sociodemographic characteristics and prevalence of the five most burdensome chronic diseases

Variables	(N=88,010)
Age, years	
Median (IQR)	45 (30, 58)
Age group (years), n (%)	
18–45	45,450 (51.6)
46–65	29,011 (33.0)
>65	13,549 (15.4)
Gender, n (%)	
Male	39,924 (45.4)
Female	48,086 (54.6)
Ethnicity, n (%)	
Non-Hispanic White	80,699 (91.7)
African American	2,650 (3.0)
Asian	3,065 (3.5)
Hispanic	1,596 (1.8)
HOUSES	
Median (IQR)	−0.38 (−2.28, 1.84)
Prevalence of five chronic diseases, n (%)	
Coronary Heart Disease (CHD)	9,585 (10.9)
Asthma	7,601 (8.6)
Diabetes	7,824 (8.9)
Hypertension	22,513 (25.6)
Mood Disorder	2,2263 (25.3)

Table 2
Association between demographic characteristics and HOUSES as both continuous scale and quartiles (Q1 – Q4)

HOUSES median (IQR)		HOUSES (quartile)			
		Q1 (lowest), n (%)	Q2, n (%)	Q3, n (%)	Q4 (highest), n (%)
Age, years					
18–45	−0.57 (−2.74, 1.65)	12,999 (28.6)	10,594 (23.3)	11,022 (24.3)	10,835 (23.8)
46–65	0.22 (−1.72, 2.57)	5,454 (18.8)	6,853 (23.6)	7,598 (26.2)	9,106 (31.4)
>65	−0.95 (−2.32, 0.75)	3,551 (26.2)	4,556 (33.6)	3,382 (25.0)	2,060 (15.2)
Gender					
Male	−0.17 (−2.12, 2.02)	9,283 (23.3)	9,862 (24.7)	10,274 (25.7)	10,505 (26.3)
Female	−0.54 (−2.40, 1.69)	12,721 (26.5)	12,141 (25.2)	11,728 (24.4)	11,496 (23.9)
Ethnicity					
Non-Hispanic					
White	−0.24 (−2.11, 1.96)	18,519 (22.9)	20,754 (25.7)	20,525 (25.4)	20,901 (25.9)
African					
American	−4.56 (−5.15, −0.44)	1,603 (60.5)	390 (14.7)	461 (17.4)	196 (7.5)
Asian	−0.41 (−3.21, 1.74)	956 (31.2)	586 (19.1)	778 (25.4)	745 (24.3)
Hispanic	−3.51 (−4.97, −0.43)	926 (58.0)	273 (17.1)	238 (14.9)	159 (10.0)

^a p-value from Chi-square test

Table 3

Association between HOUSES and prevalence of chronic diseases in overall cohort and among Non-Hispanic White

HOUSES (quartile)	Overall		Non-Hispanic White	
	(N=88,010), n (%)	adj. OR (95% CI)	(N=80,699), n (%)	adj. OR (95% CI)
CHD				
Q1 (lowest SES)	2,535 (11.5)	1.0 (Reference) [P <.001] ^a	2,357 (12.7)	1.0 (Reference) [P <.001] ^d
Q2	2,867 (13.0)	0.87 (0.81, 0.93)	2,784 (13.4)	0.84 (0.78, 0.90)
Q3	2,429 (11.0)	0.86 (0.80, 0.92)	2,331 (11.4)	0.87 (0.81, 0.94)
Q4 (highest SES)	1,754 (8.0)	0.74 (0.69, 0.80)	1,693 (8.1)	0.81 (0.75, 0.88)
Asthma				
Q1 (lowest SES)	2,112 (9.6)	1.0 (Reference) [P <.001] ^b	1,849 (10.0)	1.0 (Reference) [P <.001] ^e
Q2	1,950 (8.9)	0.90 (0.84, 0.96)	1,850 (8.9)	0.91 (0.85, 0.97)
Q3	1,840 (8.4)	0.85 (0.80, 0.91)	1,739 (8.5)	0.86 (0.80, 0.92)
Q4 (highest SES)	1,699 (7.7)	0.78 (0.73, 0.83)	1,627 (7.8)	0.78 (0.73, 0.84)
Diabetes				
Q1 (lowest SES)	2,330 (10.6)	1.0 (Reference) [P <.001] ^c	2,004 (10.8)	1.0 (Reference) [P <.001] ^f
Q2	2,303 (10.5)	0.84 (0.78, 0.89)	2,176 (10.5)	0.83 (0.78, 0.89)
Q3	1,905 (8.7)	0.75 (0.70, 0.80)	1,741 (8.5)	0.74 (0.69, 0.80)
Q4 (highest SES)	1,286 (5.8)	0.56 (0.52, 0.60)	1,178 (5.6)	0.56 (0.52, 0.61)
Hypertension				
Q1 (lowest SES)	5,672 (25.8)	1.0 (Reference) [P <.001] ^b	5,180 (28.0)	1.0 (Reference) [P <.001] ^e
Q2	6,789 (30.9)	0.96 (0.91, 1.01)	6,558 (31.6)	0.96 (0.90, 1.01)
Q3	5,651 (25.7)	0.80 (0.76, 0.85)	5,352 (26.1)	0.78 (0.74, 0.83)
Q4 (highest SES)	4,401 (20.0)	0.64 (0.61, 0.68)	4,209 (20.1)	0.64 (0.60, 0.67)
Mood disorder				
Q1 (lowest SES)	6,534 (29.7)	1.0 (Reference) [P <.001] ^b	5,872 (31.7)	1.0 (Reference) [P <.001] ^e
Q2	5,737 (26.1)	0.78 (0.75, 0.81)	5,520 (26.6)	0.79 (0.76, 0.83)
Q3	5,309 (24.1)	0.72 (0.69, 0.75)	5,057 (24.6)	0.72 (0.69, 0.75)
Q4 (highest SES)	4,683 (21.3)	0.61 (0.58, 0.63)	4,531 (21.7)	0.61 (0.59, 0.64)

^a adjusted for age, gender, ethnicity, hypertension, diabetes, hyperlipidemia, and obesity;

^b adjusted for age, gender and ethnicity;

^c adjusted for age, gender, ethnicity, hyperlipidemia, and obesity;

^d adjusted for age, gender, hypertension, diabetes, hyperlipidemia, and obesity;

^e adjusted for age and gender;

f adjusted for age, gender, hyperlipidemia, and obesity

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Table 4

Association between ethnicity and prevalence of chronic diseases (adj. OR (95% CI) [p-value]^a)

Ethnicity	CHD ^b	Asthma ^c	Diabetes ^d	Hypertension ^c	Mood Disorder ^c
	[P=.01]	[P<.001]	[P<.001]	[P<.001]	[P<.001]
African American	1.25 (1.04, 1.50)	1.04 (0.91, 1.19)	2.22 (1.94, 2.55)	1.38 (1.23, 1.55)	0.62 (0.56, 0.69)
Asian	1.00 (0.84, 1.18)	0.61 (0.52, 0.71)	2.09 (1.83, 2.39)	0.86 (0.77, 0.97)	0.44 (0.40, 0.49)
Hispanic	0.71 (0.53, 0.97)	0.61 (0.49, 0.75)	1.97 (1.64, 2.38)	0.86 (0.72, 1.01)	0.63 (0.56, 0.72)

^a All listed p-values are for comparisons among different ethnicity for risk of each chronic disease;

^b Adjusted for age, gender, hypertension, diabetes, hyperlipidemia, and obesity;

^c Adjusted for age and gender;

^d Adjusted for age, gender, hyperlipidemia, and obesity; all compared with non-Hispanic White.