Association of Socioeconomic Status and CKD Among African Americans: The Jackson Heart Study

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Background: Socioeconomic status (SES) is recognized as a key social environmental factor because it has implications for access to resources that help individuals care for themselves and others. Few studies have examined the association of SES with chronic kidney disease (CKD) in high-risk populations.

Study Design: Single-site longitudinal population-based cohort.

Setting & Participants: Data for this study were drawn from the baseline examination of the Jackson Heart Study. The analytic cohort consisted of 3,430 African American men and women living in the tricounty region of the Jackson, MS, metropolitan area with complete data to determine CKD status.

Predictor: High SES (defined as having a family income at least 3.5 times the poverty level or having at least 1 undergraduate degree).

Outcomes & Measurements: CKD (defined as the presence of albuminuria or decreased estimated glomerular filtration rate [$<$60 mL/min/1.73 m^2]). Associations were explored using bivariable analyses and multivariable logistic regression analyses adjusting for CKD and cardiovascular disease risk factors, as well as demographic factors.

Results: The prevalence of CKD in the Jackson Heart Study was 20% (865 of 3,430 participants). Proportions of the Jackson Heart Study cohort with albuminuria and decreased estimated glomerular filtration rate were 12.5% (429 of 3,430 participants) and 10.1% (347 of 3,430 participants), respectively. High SES was associated inversely with CKD. The odds of having CKD were 41% lower for affluent participants than their less affluent counterparts. There were no statistically significant interactions between sex and education or income, although subgroup analysis showed that high income was associated with CKD in men (OR, 0.47; 95% CI, 0.23-0.97), but not women (OR, 0.64; 95% CI, 0.40-1.03).

Limitations: Models were estimated using cross-sectional data.

Conclusion: CKD is associated with SES. Additional research is needed to elucidate the impact of wealth and social contexts in which individuals are embedded and the mediating effects of sociocultural factors.

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Editorial, p. 977

Kidney disease is one of the most pressing issues in health disparities research. African Americans require dialysis or transplant at younger ages and have greater incidence rates of end-stage renal disease at each decade of life compared with any other racial/ethnic group.[1,2] These disparities generally have been believed to be a function of disproportionately high levels of chronic kidney disease (CKD) risk factors (ie, diabetes, hypertension, and obesity). However, the presence of these comorbid conditions does not fully explain the excess risks of CKD in African Americans. The evolving science in CKD research indicates that novel nonbiomedical factors also can have implications for CKD progression and complications.[3-6] Social science and social epidemiologic research have established that social environments may have important consequences for health outcomes, especially in at-risk populations, such as African Americans. The accumulation of economic or social re-

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sources in an environment, referred to here as socioeconomic status (SES), is a key factor because it has implications for accessing resources that can help individuals care for themselves and others. An emerging body of research has begun to consider the relationship between SES and CKD-related outcomes. Results from this line of work suggest that economic factors at individual and community levels have implications for kidney disease.[5,7-11]

Deprivation and disadvantage often are part of the social landscape for African Americans. Little research has examined the social patterning of CKD within high-risk populations, such as African Americans. Analyses of the prevalence and awareness of CKD in the Jackson Heart Study suggested the social patterning of CKD.[12] The purpose of this study is to examine further the nuanced associations of individual SES and CKD in this cohort with high CKD prevalence composed of African Americans of all SES strata. High-SES participants are expected to be less likely to have CKD than their lower income and less educated counterparts. We further tested the hypothesis that the patterning of the association between high SES and CKD varies by sex.

METHODS

Study Population and Measurements

Data for this study were drawn from the baseline examination of the Jackson Heart Study, a single-site longitudinal population-based cohort study prospectively investigating the determinants of cardiovascular disease (CVD) in African Americans living in the tricounty region (Hinds, Madison, and Rankin counties) of the Jackson, MS, metropolitan area. Baseline data collection occurred between September 2000 and March 2004. Recruitment, sampling, and data collection methods have been described previously.[13-16] Recruitment limited the age range to 35-84 years, but allowed relatives younger than 35 and older than 84 years to enroll to increase the sample power of the family component of the study.[17] The total cohort consists of 5,301 African American men and women aged 21-94 years. The institutional review boards of the following participating institutions approved the study: the University of Mississippi Medical Center, Jackson State University, and Tougaloo College. All participants provided written informed consent.

The baseline examination had 3 components: a home interview, self-administered questionnaires, and a clinic visit. Individuals who had used any medications 2 weeks before the examination were asked to bring them to the clinic to be coded by a pharmacist using the Medispan dictionary with classification according to the Therapeutic Classification System.[18] Participants were asked to fast overnight before their clinic visit at which anthropometric and seated blood pressure measurements were to be obtained. Venipuncture/urine collections were performed according to the National Committee for Clinical Laboratory Standards.[13]

Study Variables

CKD was defined as the presence of albuminuria or estimated glomerular filtration rate (eGFR) <60 mL/min/1.73 m^2. The presence of albuminuria was determined using urine albumin-creatinine ratio based on spot or 24-hour urine values (albumin-creatinine ratio >30 mg/g). GFR was estimated using the 4-variable Modification of Diet in Renal Disease (MDRD) Study equation [GFR = 186.0 × (serum creatinine)$^{-1.154}$ × age$^{-0.203}$ × (0.742 if female) × (1.212 if African American)]. The definition of CKD in this study was broader than in other studies that defined CKD based solely on eGFR. Analyses published elsewhere indicate that characteristics of included participants were similar to those of participants in studies with eGFR alone.[12]

SES was represented by educational attainment and annual family income. These indicators tend to have nonlinear relationships with health indices for African Americans; therefore, each variable was represented by a series of dummy variables.[19] Educational attainment was represented by a 4-category variable: whether participants did or did not graduate from high school; attended or graduated from a community, technical, or junior college; or graduated from a 4-year undergraduate institution or attained a postbaccalaureate education. Participants who did not complete high school made up the reference category. Annual family income also was a 4-category variable classified into low (less than poverty level), lower-middle (1-1.6 times poverty level), upper-middle (1.6-3.5 times poverty level), and affluent income (at least 3.5 times poverty level). Classification was based on year of the visit, family size, and number of resident children younger than 18 years. Following Smith[20] and Massey and Eggers,[21] income category boundaries were established using US Census estimations. The low-income classification was the reference category.

Select demographic factors, including age, sex, and marital status (married/not married), were based on self-reporting during the baseline interview. Health care access was represented by a variable corresponding to a questionnaire item asking participants to rate the difficulty of getting health care services as "not difficult at all" (coded 1), "not too hard" (coded 2), "fairly hard" (coded 3), or "very hard" (coded 4). CVD-related risk factors (CVD, hypertension, diabetes, hypercholesterolemia, or body mass index also were accounted for in this analysis. CVD status was defined as the presence of coronary heart disease (electrocardiogram-determined myocardial infarction or self-reported history of myocardial infarction or angioplasty) or cerebrovascular disease (self-reported history of stroke, carotid endarterectomy, or angioplasty). Hypertension status was defined as measured blood pressure ≥140/90 mm Hg and/or use of antihypertensive medications.[22,23] The presence of type 2 diabetes mellitus (diabetes) was determined as a measured fasting glucose level ≥126 mg/dL or use of insulin and/or oral hypoglycemic agents. The presence of hypercholesterolemia was defined as an increase in measured fasting total (≥200 mg/dL) or low-density lipoprotein cholesterol level (≥160 mg/dL) and/or use of lipid-lowering medications.

Hypertriglyceridemia was defined as increased triglyceride levels (≥150 mg/dL) or/and treatment using fenofibrate or gemfibrozil, whereas sex-specific limits (<50 mg/dL for women and <40 mg/dL for men) were used to define low high-density lipoprotein cholesterol levels.[24] Body mass index was derived by dividing participant weight in kilograms by participant height in meters squared.

Statistical Analysis

Study population characteristics were described overall by education and income strata using mean ± standard deviation for continuous variables and proportions for categorical variables. One-way analysis of variance and χ^2 tests were used in descriptive analyses assessing how groups varied across key indicators. Multivariable logistic regression analysis was used to evaluate the relationship between high SES, comorbid conditions, demographic factors, and CKD. Education-only and income-only models also were estimated to explore how correlations between these components have implications for their respective relationships with CKD in the fully adjusted model. It also has been suggested that the social patterning of health outcomes for African American men and women can vary considerably.[25-27] Group-specific logistic regression models were estimated to determine whether the relationship between high SES and CKD varied by sex. All statistical analyses were conducted using StataSE, version 10 (www.stata.com).

RESULTS

As previously reported, 1,015 Jackson Heart Study participants completed 24-hour urine collections.[12] Spot urine collections were added later to the protocol (n = 2,225); however, a substantial segment of the study population did not have sufficient urine data to determine CKD status (n = 1,792). Other individuals were excluded if they did not have sufficient serum data to determine CKD status (n = 56) or had restricted consent (n = 23). Excluded participants were more likely to be older, not be married, report more difficulty with health care access, and have lower education and income levels (data not shown). However, the analytic sample closely resembled the overall study sample.[12]

Table 1 lists overall and SES-stratified characteristics of the sample. Most participants were women and married, and mean age was 54 years. There was a high prevalence of hypertension, diabetes, dyslipidemia, and obesity. Approximately one-third of Jackson Heart Study participants had at least college degrees and one-fourth were affluent.

Higher SES participants were younger, more likely to married, and had easier access to health care services than their less educated and less affluent counterparts. The higher SES groups had substantially lower proportions of individuals with CKD and CKD risk factors than the corresponding proportions of sample members at lower levels of education and income. Patterns for education and income were strikingly similar, with the notable exception of sex. The proportion of men was not statistically distinct across education levels. However, members of the higher SES groups were more likely to be men than their counterparts at lower levels of income.

Table 2 lists results from logistic models examining the association between independent variables and CKD. Age; marital status; presence of CVD, diabetes, or hypertension; and being obese were associated with the likelihood of having CKD in each equation reported. In the education-only and income-only models, being affluent and highly educated were associated inversely with the likelihood of having CKD. High income was the only statistically significant SES component in the fully adjusted model. The odds of having CKD were 41% lower for affluent participants than their poorer counterparts in the full model.

Our tests for interactions between sex and education ($P < 0.9$) or income ($P < 0.5$) did not yield statistically significant results. However, findings from sex-specific logistic models listed in Table 3 suggest that sex has implications for the association between SES and CKD. Being affluent and attending college was associated inversely with the likelihood of having CKD for women, as shown in the education-only and income-only models. However, in the full model for women, neither SES measure was statistically significant. In contrast, high income was the only SES-related factor associated with CKD in men. The likelihood of having CKD was approximately 53% lower for affluent men compared with their poor male counterparts.

DISCUSSION

This study extends our initial analyses of indicators of CKD prevalence and awareness[12] and prior research that focuses on economic deprivation and its implications for excess risks for outcomes such as CKD.[7-11,28] Our research suggests that affluence also has implications for kidney disease in African Americans. As expected, affluent or highly educated African Ameri-

Table 1. Characteristics of Jackson Heart Study Participants by SES Components

	Analysis Sample	Education					Income				
		1	2	3	4	P^a	1	2	3	4	P^a
Age (y)	54.3 ± 13.1	65.1 ± 10.9	56.2 ± 12.8	49.3 ± 12.1	52.5 ± 11.7	<0.001	55.1 ± 15.7	57.0 ± 13.8	52.4 ± 12.4	53.4 ± 11.1	<0.001
Men (%)	37.3	35.9	35.9	38.2	37.9	0.7	23.8	32.1	37.6	49.0	<0.001
Married (%)	54.8	42.6	49.4	56.0	62.8	<0.001	27.3	39.8	59.1	72.5	<0.001
Health care access[b]	1.4 ± 0.8	1.5 ± 0.9	1.5 ± 0.9	1.5 ± 0.9	1.3 ± 0.6	<0.001	1.9 ± 1.1	1.5 ± 0.9	1.3 ± 0.7	1.2 ± 0.5	<0.001
CVD (%)	10.4	21.8	12.2	7.9	6.1	<0.001	17.0	13.6	8.3	6.2	<0.001
Diabetes (%)	17.9	28.8	17.9	16.4	14.1	<0.001	24.1	20.3	18.1	11.6	<0.001
Hypertension (%)	62.6	79.2	67.2	57.1	56.9	<0.001	67.6	67.4	61.5	56.7	<0.001
Hypercholesterolemia (%)	30.5	36.4	33.0	28.4	28.2	0.001	30.0	30.1	31.5	30.4	0.9
Hypertriglyceridemia (%)	6.7	7.6	6.5	8.7	4.5	0.001	7.3	6.7	6.9	6.7	0.9
BMI (kg/m^2)	31.7 ± 7.1	31.6 ± 7.1	31.7 ± 6.9	32.3 ± 7.5	31.3 ± 6.9	0.006	32.8 ± 8.8	32.0 ± 7.4	31.9 ± 7.1	30.8 ± 6.2	<0.001
Education (%)											<0.001
<High school	16.1						34.1	27.0	9.0	2.8	
High school	19.9						27.7	27.5	18.3	9.9	
Some college	30.3						31.4	30.9	39.0	23.1	
College degree	33.5						6.8	14.7	33.8	64.2	
Income (%)						<0.001					
Low	12.0	32.9	20.8	14.5	2.9						
Lower middle	19.7	42.7	22.8	23.5	10.0						
Upper middle	25.7	18.5	29.4	38.8	30.0						
High	25.8	5.9	16.1	23.1	57.3						
eGFR distribution (mL/min/1.73 m^2)						<0.001					<0.001
>90 (%)	40.5 (1,384)	29.0	38.1	49.1	39.8		39.1	38.4	42.7	40.0	
>60 to <90 (%)	49.8 (1,699)	49.8	51.5	43.8	54.1		42.9	50.3	48.8	55.0	
>30 to <60 (%)	8.5 (291)	17.9	9.0	6.6	5.5		14.8	9.7	7.6	4.8	
<30 (%)	1.2 (41)	3.3	1.5	0.6	0.6		2.5	1.6	0.9	0.2	
Albuminuria[c] (%)	12.5 (429)	19.9	14.2	10.2	10.0	<0.001	13.4	15.9	12.3	8.8	<0.001
SCr (mg/dL)	1.1 ± 0.6	1.2 ± 0.9	1.1 ± 0.8	1.0 ± 0.5	1.1 ± 0.5	<0.001	1.2 ± 1.0	1.1± 0.7	1.1 ± 0.5	1.1 ± 0.4	0.02
CKD[d] (%)	20.0 (685)	34.8	22.9	16.1	14.6		28.2	24.5	18.4	12.7	

Note: N = 3,430. Values expressed as percentage, percentage (number of participants), or mean ± standard deviation. Education and income levels (1, 2, 3, and 4) are defined in the left column. Conversion factors for units: eGFR in mL/min/1.73 m^2 to mL/s/1.73 m^2, ×0.01667; SCr in mg/dL to μmol/L, ×88.4.

Abbreviations: BMI, body mass index; CKD, chronic kidney disease; CVD, cardiovascular disease; eGFR, estimated glomerular filtration rate; SCr, serum creatinine; SES, socioeconomic status.

[a] *P* trend.

[b] Health care access is an ordinal variable with values denoting difficulty of getting health care services (1 = not difficult at all, 2 = not too hard, 3 = fairly hard, and 4 = very hard).

[c] Albumin-creatinine ratio > 30 mg/g.

[d] eGFR <60 mL/min/1.73 m^2 or ACR >30 mg/g.

can participants in the Jackson Heart Study had lower risks of CKD relative to their poor or less educated counterparts. Results from this study also suggested that patterns of association between high SES and CKD may differ by sex. Similar to other epidemiologic research showing that lack of economic resources is associated with health outcomes, such as hypertension, diabetes, and CVD,[29-38] CKD is socially patterned. Importantly, findings from this study indicate that the relationship between SES and CKD may not be linear; although affluent and educated participants had lower risks of CKD, the likelihood of having CKD for middle-income participants was not significantly different from their poor counterparts. Similarly, high school and junior college graduates and college attendees did not have statistically distinct risks of CKD relative to study participants who did not graduate from high school. These results suggest that the relationship between SES and health outcomes may be complicated and require researchers to consider potential nonlinear relationships between economic factors and health conditions, such as CKD.

Sex-specific analyses suggested different patterns of CKD risk for men and women with varying SES. High income was associated with CKD in men, but not in women, although we found no statistically significant interaction between sex and SES. Although speculative, high incomes may provide African American men with access to facilities (eg, health clubs) or resources (eg, private medical care) that substan-

Table 2. Association of SES and CKD in the Jackson Heart Study

Variable	Education Only	Income Only	Full Model
Age (/1 y)	1.03 (1.02-1.04)	1.03 (1.02-1.04)	1.03 (1.01-1.04)
Men	0.96 (0.64-1.46)	1.24 (0.69-2.21)	1.10 (0.88-1.40)
Married	0.75 (0.62-0.91)	0.78 (0.62-0.97)	0.78 (0.63-0.98)
Health care access[a]	1.04 (0.93-1.16)	1.03 (0.91-1.17)	1.03 (0.91-1.17)
CVD	1.82 (1.41-2.35)	1.71 (1.28-2.27)	1.70 (1.28-2.26)
Diabetes	2.53 (2.05-3.11)	2.39 (1.90-3.02)	2.40 (1.91-3.03)
Hypertension	2.43 (1.88-3.15)	2.99 (2.23-4.02)	2.99 (2.23-4.01)
Hypercholesterolemia	1.16 (0.95-1.41)	1.27 (1.02-1.57)	1.27 (1.02-1.57)
Hypertriglyceridemia	1.28 (0.91-1.79)	1.31 (0.91-1.90)	1.33 (0.92-1.92)
BMI (/1 kg/m^2)	1.03 (1.01-1.04)	1.02 (1.01-1.04)	1.02 (1.01-1.04)
Education			
<High school	1.00 (ref)		1.00 (ref)
High school	0.88 (0.60-1.17)		0.93 (0.68-1.29)
Some college	0.77 (0.53-1.05)		0.84 (0.61-1.17)
College degree	0.68 (0.47-0.94)		0.94 (0.66-1.32)
P trend	0.05		0.8
Income			
Low		1.00 (ref)	1.00 (ref)
Lower middle		0.88 (0.63-1.30)	0.88 (0.65-1.20)
Upper middle		0.78 (0.52-1.08)	0.80 (0.57-1.11)
High		0.58 (0.41-0.83)	0.59 (0.40-0.87)
P trend		0.01	0.05
Education × male *P*	0.9		0.9
Income × male *P*		0.5	0.5

Note: All variables included in the analysis are listed in the table. Values shown are OR (95% CI).

Abbreviations: BMI, body mass index; CI, confidence interval; CKD, chronic kidney disease; CVD, cardiovascular disease; OR, odds ratio; SES, socioeconomic status; ref, reference

[a]Health care access is an ordinal variable with values denoting difficulty of getting health care services (1 = not difficult at all, 2 = not too hard, 3 = fairly hard, and 4 = very hard).

tially decrease their risk of CKD relative to low-income men. Additional research is required to determine how SES-related factors are associated with sex-related factors with regard to CKD.

The relationship between marital status and CKD was an unexpected finding worth noting. The likelihood of married participants having CKD was significantly lower than for their unmarried counterparts. Classic social science asserts that social relationships affect individual well-being.[39] The data are consistent with studies examining the impact of social relations on cardiovascular outcomes. For example, individuals who live alone or have minimal contact with friends, relatives, or acquaintances have higher rates of CVD and overall morbidity and mortality than persons who are integrated in social networks.[40-42] The relationship between social relations and kidney disease has not been pursued extensively.[43] Research has not determined the degree to which factors such as marriage have implications for the development and progression of CKD. It is not clear how social relationships combine with other environmental factors to impact on health and the development and progression of CKD in individuals at risk of CKD. Further research is needed to elucidate these patterns of association.

Despite its contributions to understanding SES patterning of CKD, this study is not without limitations. Our definition of CKD included both albuminuria and low eGFR. Sensitivity analysis was performed using IVEware software (Survey Methodology Program, University of Michigan Survey Research Center, Institute for Social Research, www.isr.umich.edu/src/smp/ive/).[44] For those missing urine values, albuminuria status was imputed using the sequential regression imputation method,[45] and CKD status then was determined based on both albuminuria and eGFR. The association of SES and CKD then was assessed using logistic regression models similar to the main analyses described in the report. Results were similar to results listed in Table 2. Analyses of the cohort using low eGFR only (Table S1; available as online supplementary material associated with this article at www.ajkd.org) also yielded results similar to those combining albuminuria and eGFR (Table 2). Higher income levels correlated significantly with higher eGFRs. All the usual limitations of cross-sectional studies apply.[12] The income and education measures used in analyses were crude measures of SES and analyses using more comprehensive measures of individual (eg, wealth-oriented measures, such as home ownership, investment income, or net worth) and neighborhood SES could produce more robust findings.

Some might consider analysis of an exclusively African American sample to be a limitation, arguing diminished usefulness without a comparison group. However, there is evidence that factors associated with African American

Table 3. Association of SES and CKD by Sex in the Jackson Heart Study

Variable	Education Only		Income Only		Full Model	
	Men	Women	Men	Women	Men	Women
Age (/1 y)	1.03 (1.02-1.06)	1.03 (1.02-1.04)	1.04 (1.02-1.06)	1.03 (1.02-1.04)	1.04 (1.02-1.05)	1.03 (1.01-1.04)
Married	0.71 (0.50-1.01)	0.77 (0.61-0.97)	0.70 (0.47-1.04)	0.81 (0.62-1.05)	0.70 (0.47-1.05)	0.81 (0.62-1.06)
Health care access[a]	1.14 (0.92-1.40)	1.00 (0.88-1.15)	1.08 (0.86-1.35)	1.00 (0.85-1.16)	1.09 (0.87-1.36)	1.00 (0.85-1.16)
CVD	1.84 (1.20-2.81)	1.81 (1.31-2.51)	1.70 (1.05-2.75)	1.67 (1.16-2.40)	1.71 (1.05-2.77)	1.66 (1.16-2.38)
Diabetes	4.37 (3.03-6.30)	1.95 (1.51-2.52)	4.41 (2.93-6.64)	1.78 (1.34-2.37)	4.40 (2.92-6.63)	1.78 (1.34-2.37)
Hypertension	2.06 (1.34-3.17)	2.65 (1.92-3.64)	2.51 (1.54-4.10)	3.28 (2.26-4.76)	2.49 (1.52-4.07)	3.29 (2.26-4.79)
Hypercholesterolemia	1.12 (0.79-1.59)	1.18 (0.93-1.50)	1.15 (0.78-1.70)	1.34 (1.03-1.74)	1.17 (0.79-1.73)	1.34 (1.03-1.75)
Hypertriglyceridemia	1.50 (0.92-2.45)	1.06 (0.65-1.72)	1.33 (0.78-2.26)	1.23 (0.73-2.08)	1.35 (0.79-2.32)	1.23 (0.73-2.08)
BMI (/1 kg/m^2)	1.06 (1.03-1.09)	1.02 (1.00-1.03)	1.06 (1.03-1.09)	1.01 (0.99-1.02)	1.06 (1.03-1.09)	1.01 (0.99-1.03)
Education						
<High school	1.00 (ref)	1.00 (ref)			1.00 (ref)	1.00 (ref)
High school	1.00 (0.60-1.67)	0.80 (0.57-1.12)			0.90 (0.51-1.61)	0.90 (0.61-1.33)
Some college	0.78 (.47-1.30)	0.73 (0.52-1.04)			0.81 (0.45-1.46)	0.85 (0.57-1.26)
College degree	0.78 (0.47-1.30)	0.62 (0.44-0.87)			1.01 (0.55-1.89)	0.85 (0.56-1.31)
P trend	0.6	0.05			0.8	0.9
Income						
Low			1.00 (ref)	1.00 (ref)	1.00 (ref)	1.00 (ref)
Lower middle			0.76 (0.39-1.46)	0.87 (0.61-1.24)	0.75 (0.39-1.45)	0.88 (0.62-1.27)
Upper middle			0.81 (0.42-1.55)	0.70 (0.49-1.02)	0.80 (0.41-1.56)	0.74 (0.50-1.09)
High			0.49 (0.25-0.96)	0.60 (0.40-0.92)	0.47 (0.23-0.97)	0.64 (0.40-1.03)
P trend			0.08	0.08	0.1	0.3

Note: All variables included in the analysis are listed in the table. Values shown are OR (95% CI).

Abbreviations: BMI, body mass index; CI, confidence interval; CKD, chronic kidney disease; CVD, cardiovascular disease; OR, odds ratio; SES, socioeconomic status; ref, reference

[a]Health care access is an ordinal variable with values denoting difficulty of getting health care services (1 = not difficult at all, 2 = not too hard, 3 = fairly hard, and 4 = very hard).

health outcomes can differ substantially from those for other groups.[25,46-49] Results from this study provide deeper insight into CKD in a heterogeneous group of African Americans often masked in comparative studies in which race or ethnic group membership is represented by a single variable.

High SES was associated with lower risks of CKD in African Americans in the Jackson Heart Study, although results were not linear. In addition, results suggested that there may be nuanced socioeconomic differences for men and women. Additional research incorporating measures of wealth and other social contextual factors may assist in developing culturally and context-specific interventions to help decrease disparities in CKD development and progression in the short term and eliminate them in the long term.

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SUPPLEMENTARY MATERIAL

Table S1: Association of SES and Low eGFR in the Jackson Heart Study.

Note: The supplementary material accompanying this article (doi:10.1053/j.ajkd.2010.01.016) is available at www.ajkd.org.

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