ARIC Manuscript Proposal # 1099

PC Reviewed: _09/20/05	**Status: __A__**	**Priority: __2_**
SC Reviewed: _09/21/05_	**Status: __A__**	**Priority: __2_**

1.a. Full Title:

b. Abbreviated Title (Length 26 characters):

SES across the Life Course and the Metabolic Syndrome

2. Writing Group:
Writing group members:

Kristal Raymond, Anna Diez Roux, Sherita Golden, Annie McNeill, Gerardo Heiss

I, the first author, confirm that all the coauthors have given their approval for this manuscript proposal. ___kr__ **[please confirm with your initials electronically or in writing]**

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3. Timeline:

Analyses to begin in Fall 2005. Draft of manuscript is expected during Summer 2006.

5. Rationale:

An inverse association between individual level SES and cardiovascular disease (CVD) is consistently reported in the US and other Western countries (1, 2). The presence and strength of this association varies by gender (3), race (4-6), age (3) and type of SES measure used (7). There is evidence that those living in a social environment with less favorable socioeconomic conditions or in areas of deprivation have higher rates of

adverse CVD-related outcomes than those living in environments with more favorable conditions (3-13).

While racial disparities in CVD outcomes are commonly reported (4, 14) and disproportionate numbers of minorities (e.g., African Americans) have less advantaged socioeconomic circumstances, it is often assumed that SES greatly contributes to racial disparities in CVD. Yet, studies empirically assessing this assumption are not common. Population-based studies that include both racial/ethnically and socioeconomically diverse populations are few and the limited literature is inconsistent (4, 14-16). An important limitation of such work is that individual-level SES measures may not be equally valid for different race-ethnicity groups (17). Several studies have suggested the importance of neighborhood characteristics in addressing disparities in the burden of CHD such as the report by Le Clere et al (16) showing that a pronounced excess risk of CHD in African American women was not explained by individual-level SES but rather by considering neighborhood level SES (16).

Although social gradients in some established CVD risk factors (e.g., hypertension, obesity) are well documented (1, 2, 11) and have been posited as explanatory of the social gradients in CVD, when included in multivariate models they typically account only a moderate portion of the social gradient in CVD (1, 13). It has recently been suggested that techniques typically employed in multivariate analyses do not take into account the complex interactions that occur between risk factors and thus, their contributions to variations in diseases may not be accurately estimated (18).

The study of racial disparities in cardiovascular risk and the degree to which SES factors play a role has not yet focused on the metabolic syndrome (MetS). The MetS has been identified as a constellation of disorders related to defects in insulin sensitivity (including dyslipidemia, hypertension, and central adiposity) (19, 20). Additional conditions have been proposed as potential components of this syndrome, including increased fibrinolysis, microalbuminuria, hyperuricemia, and most recently chronic inflammation (21, 22). The metabolic syndrome is associated with increased risk of atherosclerosis (23), CHD (23, 24), and cardiovascular disease morbidity and mortality (24-26). Data from the cross-sectional health survey of a nationally representative sample of the U.S. adult population show that the MetS is present in almost 25% of the U.S. population, increases steadily with age, and varies in occurrence by race and gender (27). Variations in its occurrence by race-ethnicity are more pronounced in women than men (23, 27). Among African Americans in the ARIC study, the prevalence of the ATP III-defined MetS was markedly higher among women (38%) than men (26%), while among whites, it was modestly higher among men (31%) than women (28%). Moreover, the prevalence of individual components varied considerably by race and gender (e.g., high blood pressure present in more than 60% of blacks vs. less than 40% of whites; large waist circumferences were markedly higher in women than men whereas high levels of fasting glucose were markedly lower in white women than in other groups) (23).

There is little literature on the association between SES and the MetS (e.g., 28-30). Of studies reviewed, one was limited to a small population of Black men (28) and the others

treated either SES or the metabolic syndrome as covariates (29, 30). Since differences in the frequency of occurrence of the metabolic syndrome by race/ethnicity have been documented, insights into the mechanisms that contribute to these disparities may be obtained by studying their hypothesized association with variations in socioeconomic conditions.

5. Main Hypothesis/Study Questions:

Adult SES:

1. The prevalence of the MetS at baseline is inversely associated with individual and neighborhood SES
2. Among those not classified with the MetS at baseline, the incidence of the MetS at Visit 4 varies inversely with individual and neighborhood SES
3. Disparities in individual and neighborhood SES contribute to explain racial disparities in the occurrence of the metabolic syndrome.

SES over the life course:

1. The prevalence of the MetS at baseline is inversely associated with individual and neighborhood SES during childhood and young adulthood
2. The association between individual and neighborhood SES over the life course and the MetS at baseline is independent of adulthood SES.
3. Disparities in life course SES experience contribute to explain racial disparities in the prevalence of the metabolic syndrome in adulthood.

6. Data (variables, time window, source, inclusions/exclusions):

Data:

Individual level SES measures obtained at the ARIC baseline examination will include education and family income. Neighborhood (1990 census tract) SES measures will be obtained from the LC-SES ARIC ancillary study (AS 1998.02). The choice of neighborhood SES measure (s) chosen will made based on empirical work currently in progress as part of ARIC ancillary study (AS 2004.05 – The Burden of CHD in Communities). The metabolic syndrome will be defined using the ATP III criteria of the presence of three or more of the following components: elevated blood pressure (Systolic BP ≥130 or diastolic BP ≥85 mm Hg or use of anti-hypertension medications); elevated TG (>=150 mg/dl); low HDL-C (M <40 mg/dl, W <50 mg/dl); impaired fasting glucose (110 – 125 mg/dl); and large waist circumference [M >102 cm (>40 in) ; W >88 cm (>35 in)]. For cross-sectional analyses, these component measures will be obtained from ARIC Visit 1 datasets. For analyses of incident events, measures will be obtained from ARIC Visit 4 datasets. Additionally the following covariates will be obtained from Visit 1 datasets: age, smoking status / cigarette years of smoking, alcohol intake, physical activity, heart rate, LDL-C, white blood cell count, center, gender, and race.

Exclusions:

Participants will be restricted to those without missing data that preclude classification by presence/absence of the metabolic syndrome. Those missing individual level SES

information or missing census tract level SES (due to addresses that did not geocode) will also be excluded. For analyses focused on incidence of the metabolic syndrome, those with MetS at baseline will also be excluded.

Analyses:

Given the high prevalence of the MetS (greater than 10% in all race gender groups), use of ORs obtained from logistic regression analyses would over estimate the relative risk. Thus, for cross-sectional analyses, we will use Poisson regression, as it has been demonstrated to produce valid estimates of the relative risk when the rare disease assumption is violated (31). When using Poisson regression, options will be used to prevent underestimation of standard errors due to over-dispersion (32). For analysis of the incidence of the MetS, logistic regression analyses will be used, unless the rare disease assumption is violated. For analyses that include neighborhood SES, hierarchical or multi-level modeling techniques will be used, as they take into account the dependence of persons from the same area in the calculation of the standard errors (33)

7.a. Will the data be used for non-CVD analysis in this manuscript? ____ Yes __x__ No

b. If Yes, is the author aware that the file ICTDER02 must be used to exclude persons with a value RES_OTH = "CVD Research" for non-DNA analysis, and for DNA analysis RES_DNA = "CVD Research" would be used? ____ Yes ____ No

(This file ICTDER02 has been distributed to ARIC PIs, and contains the responses to consent updates related to stored sample use for research.)

8.a. Will the DNA data be used in this manuscript? ____ Yes _x___ No

8.b. If yes, is the author aware that either DNA data distributed by the Coordinating Center must be used, or the file ICTDER02 must be used to exclude those with value RES_DNA = "No use/storage DNA"? n/a **____ Yes ____ No**

9.The lead author of this manuscript proposal has reviewed the list of existing ARIC Study manuscript proposals and has found no overlap between this proposal and previously approved manuscript proposals either published or still in active status. ARIC Investigators have access to the publications lists under the Study Members Area of the web site at: http://www.cscc.unc.edu/ARIC/search.php

__X____ Yes _____ No

10. What are the most related manuscript proposals in ARIC (authors are encouraged to contact lead authors of these proposals for comments on the new proposal or collaboration)?

MS 027a (Schmidt) MS 831 a,b (McNeil), MS 832 (McNeil), 981 (Diez Roux). Note McNeil and Diez Roux have been contacted and are participating in the manuscript writing group. With MS 981 there is the potential for some overlap (as its topic is SES and diabetes). However, we have discussed this with MS 981's lead (DIez Roux) – who is participating in the writing group – and with her input will work to assure that proposed work does not duplicate work done to date.

11. a. Is this manuscript proposal associated with any ARIC ancillary studies or use any ancillary study data? __x__ Yes ____ No

11.b. If yes, is the proposal

__X_ A. primarily the result of an ancillary study (list number*)

AS 1998.02 (primary), AS 2004.05 (secondary)

___ B. primiarly based on ARIC data with ancillary data playing a minor role (usually control variables; list number(s)* _____ _____ _____)

*ancillary studies are listed by number at http://www.cscc.unc.edu/aric/forms/

12. Manuscript preparation is expected to be completed in one to three years. If a manuscript is not submitted for ARIC review at the end of the 3-years from the date of the approval, the manuscript proposal will expire.

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