

**ARIC Manuscript Proposal # 1103**

**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):**

Socioeconomic Characteristics and Variation in Rates and Temporal Trends in the Use of Invasive Coronary Procedures in ARIC Community Surveillance

**2. Writing Group:**

Writing group members (in alphabetical order):

Gerardo Heiss, Kuo-Ping Li, Wayne Rosamond, C. Suchindran, Joy Wood, Others welcome

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. Abstract prepared in October 2005 for submission to AHA Epid Council Meeting. Draft of manuscript is expected during Summer 2006.

**5. Rationale:**

While socioeconomic disparities in coronary heart disease are well documented in cohort studies, [1-3] relatively few studies have focused on socioeconomic disparities in the use

of invasive coronary procedures. One study based on administrative discharge data from 231 hospitals in New York state reported that rates of use of cardiac catheterization, PTCA, and CABG varied with inversely and in a stepwise manner by quintile of neighborhood (zip code) level median household income. These differences were not explained by age, co-morbid conditions, type of hospital, or other covariates considered. [4] In a second study conducted in Canada, where access to health care coverage is universal, those living in a high SES area were more likely to undergo cardiac catheterization than were those from lower income hours, independent of age, year of MI, distance from facility with a catheterization laboratory, and co-morbidities. In contrast, among those referred for catheterization, rates of revascularization procedures performed did not vary by SES. [5]

Racial disparities in the use of invasive coronary procedures have been repeatedly documented, with most studies reporting higher rates of these procedures in whites as opposed to African-Americans or other racial groups.[6-14] Similarly, gender differences in the use of invasive coronary procedures have also been investigated, with reports of no differences by gender [6]and also higher rate of invasive procedures in men than in women. [4, 8, 10] Both African Americans and women are disproportionately represented in lower SES groups. Yet, the extent to which SES may contribute to observed racial and gender disparities in the use of invasive coronary procedures have not been adequately addressed in the literature to date.

In ARIC surveillance age, gender and racial differences in the use of invasive coronary procedures have been documented: rates are higher in whites than in African Americans and within race/ethnic groups higher among men than women (Rosamond, work in progress – ARIC MS # 395). However, socioeconomic discrepancies have not been investigated to date. With data being collected as part of ARIC ancillary study (AS) 2004.05 (The Neighborhood Burden of SES in Communities), address data from hospital records is being geocoded so that participants can be linked with census tract level SES characteristics. This will allow us to investigate the contribution of SES (neighborhood) to variations in levels of invasive coronary reperfusion procedures and to examine the contribution of SES to racial disparities in the use of these procedures.

## **5. Main Hypothesis/Study Questions:**

1. Neighborhood SES is positively associated with the use of invasive coronary diagnostic and reperfusion procedures (angiography, CABG, angioplasty, use of stents, thrombolytics).
  - a. Positive, graded associations between neighborhood SES and use of invasive coronary procedures exist within and across study communities
  - b. Neighborhood socioeconomic disparities persist over the time frame of ARIC surveillance, independent of trends in overall rates of these procedures.
2. Racial disparities in use of invasive coronary procedures (lower rates in blacks) are in part explained by neighborhood SES disparities



### **Data:**

Neighborhood (census tract) SES measures are available through ARIC ancillary study AS 2004.05. (The Burden of CHD in Communities). Empirical work currently in progress will be used to choose whether an index measure, which has been typically used in earlier work in the ARIC cohort, [1] or a single measure reflective of economic deprivation (e.g., % living in poverty, median family income) will be used to represent neighborhood SES in the current project.

Covariates considered will include race, gender, center, year of event (time), event severity (e.g., ECG evidence of Q wave vs. non Q wave and other indicators as used in ARIC MS # 963 which is currently in progress), age, and hospital type (teaching vs. non teaching).

### **Exclusions:**

Surveillance events included will be limiting to in hospital events (definite and probable MIs) occurring since January 1993. Earlier events are not included because addresses – which are needed to link participants to census tract level SES indicators – were not routinely and uniformly abstracted from medical records until this time. For analyses focusing on the period prevalence of these procedures we will focus on events occurring in 1999-2002. For analyses addressing trends across time, data from 1993 – 2002 will be used.

### **Analyses:**

Within each study community, race (Jackson and Forsyth only) and gender specific rates for invasive coronary procedures among those with a probable or definite MI will be calculated by category (quantile) of neighborhood SES. GIS techniques will be used to “map” or graphically display rates by category of neighborhood SES.

Multilevel, weighted logistic regression analyses will be used to model the association between use of invasive procedures (any vs. none, each type of procedures) by category of neighborhood SES for each race-gender group. Covariates considered will include: age and indicators of event severity (e.g., Q wave vs. non Q wave), hospital type (teaching vs. nonteaching). As an alternative way of evaluating the potential contribution of event severity to the SES-procedure associations, all analyses will be done with and without those who died within the 1<sup>st</sup> 24 hours of having their MI.

The logistic regression will be carried out using the SAS macro GLIMMIX or WINBUGS software, as they have been shown to be appropriate to fit models that take into account spatial clustering. [15] The models will include terms to represent both within tract variations and spatial clustering. The models will have both individual (such as age, race, gender, MI severity) and tract level characteristics (neighborhood SES) as independent variables. To examine whether SES effects vary over time, these models will be further extended to include time and time interactions.

7.a. Will the data be used for non-CVD analysis in this manuscript?  Yes  
 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  
 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.csc.unc.edu/ARIC/search.php>

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 085, MS 249 (Rosamond)

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

11.b. If yes, is the proposal  
 A. primarily the result of an ancillary study (list number\*)

AS 2004.05

B. primarily 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.csc.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.**

## References

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4. Philbin, E.F., et al., *Socioeconomic status is an important determinant of the use of invasive procedures after acute myocardial infarction in New York State*. Circulation, 2000. 102(19 Suppl 3): p. III107-15.
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14. Sedlis, S.P., et al., *Racial differences in performance of invasive cardiac procedures in a Department of Veterans Affairs Medical Center*. Journal of Clinical Epidemiology, 1997. 50(8): p. 899-901.
15. Rasmussen, S., *Modelling of discrete spatial variation in epidemiology with SAS using GLIMMIX*. Comput Methods Programs Biomed, 2004. 76: p. 83-89.