ARIC Manuscript Proposal # 1261

1.a. Full Title: Individual and neighborhood SES and health among persons with and without type 2 diabetes: the Atherosclerosis Risk in Communities Study

b. Abbreviated Title (Length 26 characters): SES & health according to DM

2. Writing Group:
   Writing group members: Rosemary Dray-Spira, MD, PhD
   Fred Brancati, MD, MHS
   Tiffany Gary, PhD, MHS
   Ana Diez-Roux, MD, PhD
   Gerardo Heiss, MD, PhD
   Others welcome

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

   First author: Rosemary Dray-Spira, MD, PhD
   Address: Welch Center for Prevention, Epidemiology & Clinical Research
   Johns Hopkins School of Public Health
   2024 E. Monument St
   Baltimore, MD 21287
   Phone: 410-502 2359   Fax: 410-955 0476
   E-mail: rdraysp1@jhmi.edu

   Corresponding/senior author (if different from first author correspondence will be sent to both the first author & the corresponding author): Rosemary Dray-Spira

3. Timeline: Begin immediately

4. Rationale:

Because type 2 diabetes is common in all populations in industrialized nations and affects persons at all levels of the society, it may serve as a model condition for evaluating the associations between socioeconomic status (SES) and health among persons with chronic disease. For someone with diabetes, SES may influence access to and quality of care. It may also influence diabetes-related knowledge, communication with providers, ability to
adhere to recommended medication, exercise and dietary regimens, and treatment choices. As a result, SES may have a profound impact on the morbidity and mortality associated with diabetes, and socioeconomic disparities in health are likely to be more marked in people with diabetes than among the non-diabetic population. This suggests that reducing social health inequalities among persons with diabetes may have a major public health impact.

Several studies have reported evidence for a socioeconomic gradient in morbidity and mortality among persons with type 2 diabetes in various European settings: the risk of diabetic complications, both micro- (Kelly 1993; Unwin 1996; Chaturvedi 1998; van der Meer and Mackenbach 1999; Weng 2000; Bachmann 2003; Bihan 2005) and macro-vascular (Kelly 1993; Chaturvedi 1998; Bachmann 2003; Larranaga 2005; Mielck 2005), and the risk of all-causes and/or cardiovascular mortality (Chaturvedi 1998; Nilsson 1998; Robinson 1998; Weng 2000; Roper 2001; Forssas 2003; Lawlor 2007) have been reported to be increased among diabetic persons of low SES (as measured by individuals’ educational level or occupational class or by the level of deprivation of their area of residence) compared to those more affluent. Furthermore, SES has been shown to be inversely associated with the risk of all-causes hospitalization in the UK (Caddick 1994) and positively associated with quality of life in Canada (Maddigan 2006). Such differences are independent of race/ethnicity, and may be more marked among women than among men (Forssas 2003). Comparisons of the magnitude of such a social health gradient between persons with and without diabetes have led to inconsistent results: a steeper social gradient in the prevalence of ischemic heart disease has been reported among diabetic men of the Whitehall study compared to those non diabetic (Chaturvedi 1998); though, social gradient in mortality has been reported to be non different (Chaturvedi 1998; Forssas 2003; Lawlor 2007) or even decreased (Koskinen 1996; Gnawi 2004) among persons with diabetes compared to non-diabetic populations. To date, the lack of information on the wide range of risk factors which may account for such a socioeconomic gradient has impeded any attempt to explain this discrepancy.

In the US, it has been suggested that while socioeconomic status plays a limited role in explaining racial and ethnic differences in the prevalence of chronic disease, SES likely accounts for much of the racial/ethnic differences in functional status among persons affected by a chronic condition (Kington and Smith 1997; Krop 1999). However, although reports have been published on racial/ethnic differences regarding mortality, morbidity and process of care among persons with type 2 diabetes, only few have focused on differences in terms of SES. A prospective study conducted among a community-based sample of patients with type 2 diabetes in Michigan has shown an increased risk of death among those who reported a high social impact of the disease (Davis 1988). Among Mexican-Americans with type 2 diabetes, SES as measured by occupation, income and education has been shown to be inversely associated with the risk of retinopathy (Haffner 1989; West 2002); among the Medicare population, low education has been shown to be associated with an increased frequency of limitations in activities of daily living and poor health perception (Chin 1998). Lastly, results of the TRIAD Study have suggested that education and income disparities in quality indicators and intermediate outcomes may be reduced in managed-care settings among persons with diabetes (Brown 2005); however, the study does not provide any information on the frequency of diabetic complications according to SES.
Individuals’ position in the society encompasses various dimensions (e.g., cultural, social, economic); each of these dimensions is likely to be associated with health on its own, suggesting that SES may not be summarized as a whole by a single measure. To date, international research on the relation between SES and health among persons with diabetes has mainly focused on some dimensions of SES including individuals’ educational level or occupational class, leaving unstudied the role of other potentially major aspects of SES. In particular, neighbourhoods or communities may play, beyond the role of individuals characteristics, an instrumental role in the health status of their residents through the availability of health care services, neighbourhood characteristics that promote health (e.g., access to stores that sell healthy foods and places to exercise) or disease (e.g., toxic environments), and the prevailing attitudes toward health and health behaviours in those communities. Thus, a fuller picture of the relation between SES and health among persons with diabetes requires studies that use different approaches to the measurement of SES.

5. **Main Hypothesis/Study Questions:**
- Among persons with diabetes, individual and neighborhood SES are both independently associated with health, as measured by “general” health indicators or indicators of diabetes complications
- Socioeconomic differences in health are more marked among persons with diabetes than among those without

6. **Design and analysis (study design, inclusion/exclusion, outcome and other variables of interest with specific reference to the time of their collection, summary of data analysis, and any anticipated methodologic limitations or challenges if present).**

**Outcomes**
We are interested in various types of health outcomes:
- “general” health indicators: all-cause mortality, all-cause hospitalizations, poor self-perceived health, functional limitations
- indicators of diabetes complications: CVD morbidity and mortality, stroke, peripheral vascular disease, renal disease, retinopathy

**Main exposure variables**
Indicators of individual and neighborhood SES will constitute the main exposure variables. They will be assessed using various indicators:
- individual educational attainment (at baseline), occupation (at visits 1, 2, 3, 4), and family income (at visits 1, 3, 4)
- neighborhood SES index (at baseline) derived from 1990 census variables (Diez Roux 2001)
- a SES score combining these various individual and neighborhood socioeconomic indicators will be constructed

**Other variables of interest**
Age, gender, race, ARIC center, duration of diabetes if appropriate
Cardiovascular risk factors: smoking status [at visits 1, 2, 3, 4], physical activity [at visits 1 and 3], diet [at visits 1 and 3], blood lipids [at visits 1, 2, 3, 4], hypertension [at visits 1, 2, 3, 4], BMI [at visits 1, 2, 3, 4], Comorbid conditions [at visits 1, 2, 3, 4 and reported on hospital discharge diagnoses]

Data analysis
All white and African-American participants with available information on individual and neighborhood SES will be included in the analysis. Longitudinal data analysis will be conducted to measure the associations between time-updated individual and neighborhood SES indicators and the risk of adverse health events over time, separately according to diabetes status. The magnitude of the association between SES and “general” health indicators on the one hand, CVD events on the other hand will be compared between the diabetic and the non-diabetic populations. Subjects will be considered with diabetes either from the time of ARIC baseline for prevalent cases or from the date of diagnosis of diabetes for incident cases. Analyses will be stratified by race and adjusted for age, diabetes duration (if appropriate), cardiovascular risk factors and comorbidity. The confounding/modifying role of gender will be systematically examined and accounted for. Multilevel models will be used to account for the clustering of subjects within neighbourhoods.

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”?
 ____ 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.csec.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 # 454 (Diez-Roux A et al. Neighborhood of residence and incidence of CHD)
MS # 864 (Borell LN et al. Neighborhood characteristics and mortality in ARIC)

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

11.b. If yes, is the proposal
____ A. primarily the result of an ancillary study (list number* _________)
____ B. primarily based on ARIC data with ancillary data playing a minor role (usually control variables; list number(s)* _________ _________ _________)

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


