ARIC MANUSCRIPT PROPOSAL FORM

Manuscript #455

1. a. Full Title: The relationship of neighborhood characteristics to trends over time in cardiovascular risk factors in the ARIC cohort
   b. Abbreviated Title: Neighborhoods and CVD risk factors

2. Writing Group:

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3. Timeline:

Submit proposal to Publications Committee	1-97
Complete preparation of data (neighborhood variables)	9-97
Complete Analysis	12-98
Submit draft to Publications Committee	3-99

4. Rationale:

Previous studies have found that neighborhood socioenvironmental characteristics may be related to the distribution of cardiovascular risk factors (Diehr et al. 1993; Kleinschmidt 1995). In the ARIC cohort, cross-sectional analyses have suggested that the distribution of the three main CHD risk factors (blood pressure, smoking, and serum cholesterol) may also vary with neighborhood socioeconomic characteristics independently of individual-level indicators (ARIC manuscript 180). The investigation of the association of neighborhood environments with cardiovascular risk factors is

important for two reasons: 1) it may help identify the types of neighborhoods that need to be targeted for intervention in strategies for the prevention of cardiovascular disease; and 2) it may identify potential neighborhood-level variables for intervention. The prospective follow up of the ARIC cohort provides a unique opportunity to build on preliminary cross-sectional analyses and investigate whether neighborhood environments are related to trends over time in established cardiovascular risk factors.

5. Main Hypothesis:

Time trends in levels of established cardiovascular risk factors (smoking, serum cholesterol, and body mass index) differ by participants' neighborhood characteristics. These associations are partly independent of individual-level variables. (Associations of neighborhood characteristics with hypertension will be dealt with in a separate proposal).

6. Data:

Neighborhood indicators will be obtained from the 1990 US Census. Strategies to improve neighborhood variables will be identical to those described for the accompanying proposal on neighborhoods and cardiovascular disease incidence. The cardiovascular risk factors to be explored will include:

  - total cholesterol
  - body mass index
  - percent current smokers

Information on risk factors will initially be obtained from the first three visits of the ARIC Study. Data from visit 4 will be added as it becomes available.

7. Analyses:

Simple exploratory analyses will initially be used to investigate trends over time by categories of neighborhood indicators, stratified by race and gender. Regression models will be used to investigate differences in trends over time by neighborhood characteristics after adjustment for relevant covariates.

For continuous dependent variables two different regression models will be fitted to assess trends over time and differences in trends over time (Anderssen et. al 1996):

Model 1:

$Y_{ij} = \beta_0 + \beta_1 time + \beta_2 ageb + \beta_3 Neigh + \beta_4 Neigh*Time + \alpha_{0i} + \epsilon_{ij}$ where Y_{ij} = jth measurement on ith person

ageb=age at baseline
time=time of follow-up at visit j
neigh=neighborhood variable for ith person

In model 1, 1 is an estimate of the total time related trend (this estimate reflects both the effects of aging of the cohort as well as the passage of calendar time).

Model 2:

$$Y_{ij} = \beta_0 + \beta_{1l} \text{time} + \beta_2 \text{agex} + \beta_3 \text{Neigh} + \beta \text{ where }_4 \text{Neigh} * \text{Time} + \alpha_{0i} + \epsilon_{ij}$$

agex=age for ith person at visitj

In model 2, 1 is an estimate of the time related trend, after accounting for aging of the cohort.

Both models assume that age effects are constant over time (in model 1, the effect of baseline age is constant, and in model 2 the effects of age at examination are constant), and that age effects are constant across the entire age range studied. The interaction terms (4) will serve to test the hypothesis that time trends differ by neighborhood categories. 0i represents a random person component (which will be used to account for the correlation between measurements within a person over time). If necessary, a random neighborhood component will be added to the random intercept in order to account for correlation between individuals within neighborhoods. Analogous logistic models will be used for binary dependent variables (i.e. smoking).

As in the case of the manuscript on incident events, neighborhood effects will be investigated before and after adjustment for individual-level variables. Neighborhood and individual-level variables will also be used to construct categories based on their combined distributions.

REFERENCES

Diehr P, Koepsell T, Cheadle A, Psaty BM, Wagner E, Curry S. Do communities differ in health behaviors? *J Clin Epidemiol* 1993;46:1141-1149.

Kleinschmidt I, Hills I, Elliott P. Smoking behavior can be predicted by neighborhood deprivation measures. *J Epidemiol Comm Health* 1995;49(Suppl 2):S72-S77.