ARIC Manuscript Proposal #3400

1.a. Full Title: 30 Years of ARIC Community Surveillance of Coronary Heart Disease Events

b. Abbreviated Title (Length 26 characters): 30 Year Trends

2. Writing Group:
   Wayne Rosamond, Matthew Loop, Aaron Folsom, Gerardo Heiss, Joseph Coresh, Thomas Mosley, Eric Whitsel, Lynne Wagenkecht, Jackie Wright (others welcome)

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

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ARIC author to be contacted if there are questions about the manuscript and the first author does not respond or cannot be located (this must be an ARIC investigator).
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3. Timeline: Writing to begin immediately. Submission of manuscript draft to ARIC publications July 2019.

4. Rationale:
The invited presentation titled “30 Years of ARIC Surveillance Data” given at the 2018 AHA Scientific Sessions symposium on the 40th anniversary of the Bethesda conference on the decline in CHD mortality forms the basis for this manuscript. It will include a discussion of the history behind ARIC Community Surveillance including its connection with the Proceedings of the Conference on the Decline in Coronary Heart Disease Mortality (1) and the methods initially developed and tested as part of the National Heart, Lung, and Blood Institute Community Cardiovascular Surveillance Program (CCSP) completed in 1984 (2). The data presented will focus around trends in CHD mortality, incidence of MI and case fatality among 35 to 74 year olds for event years 1987 through 2014 in ARIC Communities. This manuscript extends previously published trends in CHD from community surveillance for event years 1987 through 2008 (3). A recent paper by Sidney et al suggests that the decline in heart disease mortality has slowed dramatically in the period between 2011-2014 compared to the previous 10 years (4). We seek to explore if similar trends in mortality rates are observed in the ARIC communities and to what extent the incidence of myocardial infarction and case fatality are contributing to these trends.

5. Main Hypothesis/Study Questions:
1. What are the trends in CHD mortality (in-hospital, out-of-hospital, total) between 1987 and 2014?

2. What are the trends in MI incidence (STEMI, NSTEMI, total) between 1987 and 2014?

3. What are the trends in MI case fatality (STEMI, NSTEMI, total) between 1987 and 2014?

4. Has the rate of decline in mortality, MI incidence and case fatality slowing in recent years (2011-2014 compared to 1987-2010)?

5. Did the incidence of myocardial infarction or case fatality decline more between 1987 and 2014?

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).

ARIC community surveillance data for event years 1987 through 2014. Analysis, outcomes, variables and exclusion to be used will be similar to the NIH trends report. New analyses will explore methods to quantify the contribution of MI incidence and case fatality to overall CHD mortality trends. We will also use Poisson models with restricted cubic spline (3 knots) for 1987 – 2014 and investigate 4-way interactions (age group, race, gender, and year). All models will account for stratified probability sampling. We will use simulation-based inference and fan plots to represent uncertainty in the estimated rates of events per 10,000 persons per year in the 4 communities. This approach is detailed in (5). In brief, regression estimates from a log-linear regression model converge in distribution to a multivariate normal distribution, with mean equal to the maximum likelihood estimates and covariance equal to the estimated covariance matrix among the regression estimates. This theoretical results allows us to sample \( k \) new parameter estimates that are consistent with the data, then replot the trend lines for all \( k \) sets of parameter estimates. In these fan plots, each line plotted represents a trend consistent with the observed data and reflects uncertainty.

We will also estimate the probability that the decline in event rates we have noted before in earlier publications are slowing in recent years. We will estimate this probability by calculating the mean absolute reduction (MAR) per year of CHD mortality rate in 1987 - 2010 and during 2011 – 2014, for each of the \( k \) trends lines. We will assign an indicator variable for whether the MAR was lower in 2011-2014 compared to 1987-2010, then use the mean of this indicator variable across \( k \) trend lines to estimate the probability that the rate of decline has slowed.

Finally, we will use similar methods to determine whether the relative reduction in MI incidence or the relative reduction in case fatality was larger for each of the \( k \) trend lines for each outcome. Specifically, we will create an indicator variable for whether the relative reduction was greater for MI incidence. Therefore, we will be estimating the probability that the relative reduction in MI was greater than the relative reduction in case fatality, with a high probability favoring greater reduction in MI, a low probability favoring a greater reduction in case fatality, and a probability near 0.5 indicating equal relative reduction in MI incidence and case fatality.
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 ICTDER03 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? ___X__ Yes  _____ No
(This file ICTDER 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 ICTDER03 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.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)?


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)* __________ __________ __________)

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

12a. 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.

12b. The NIH instituted a Public Access Policy in April, 2008 which ensures that the public has access to the published results of NIH funded research. It is your responsibility to upload manuscripts to PubMed Central whenever the journal does not and be in compliance with this policy. Four files about the public access policy from http://publicaccess.nih.gov/ are posted in http://www.cscce.unc.edu/aric/index.php, under Publications, Policies & Forms. http://publicaccess.nih.gov/submit_process_journals.htm shows you which journals automatically upload articles to PubMed central.
References


