

ARIC Manuscript Proposal # 907

PC Reviewed: 09/10/02

Status: A

Priority: 2

SC Reviewed: 09/13/02

Status: A

Priority: 2

1.a. Full Title:

Effects of Ambient Air Pollution on Pulmonary Function Decline and Respiratory Conditions in Adults

b. Abbreviated Title (Length 26 characters):

Air Pollution and Pulmonary Function

2. Writing Group (list individual with lead responsibility first):

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3. Timeline:

Data preparation and analysis (3 month), Manuscript preparation (6 months)

4. Rationale:

Pulmonary function declines slowly throughout adult life. Published literature has reported that in non-smokers, forced expiratory volume in one second (FEV₁) starts to decline gradually by 20-30 mL/yr at 35 years of age⁽¹⁻⁵⁾. Two more progressive declines occur at 40-50 and 65-70 years of age⁶. Due to chronic air limitation, this change progresses slowly and does not exert its main effects until middle age. Many studies have reported that decreased pulmonary function is associated with mortality⁽⁷⁻¹³⁾. Clinically, pulmonary function decline is associated with respiratory symptoms, diseases, and mortality⁽¹⁴⁻¹⁹⁾. This accumulating evidence suggests that, in adults, longitudinal pulmonary function decline may be a more sensitive predictor of respiratory health, and may serve as a better end point than the cross-sectional measurements of pulmonary function in epidemiological studies of air pollution and pulmonary health⁽²⁰⁻²⁶⁾. However, few longitudinal studies exist^(23,27). Thus, we propose to examine the relationship between pulmonary function decline and longitudinal patterns of respiratory symptoms among ARIC participants between cohort examinations 1 and 2. Here, pulmonary function decline is defined as annual average loss in ventilatory capacity measured as FEV₁ or FVC (unit: ml/yr);

and the cross-sectional measurements of pulmonary function are expressed by the measured values of FEV₁ or FVC (unit: ml) at the Visit 1 (V1) and Visit 2 (V2).

Since pulmonary function decline is associated with respiratory symptoms, diseases, and mortality, whether ambient air pollution is associated with an accelerated rate of pulmonary function decline and/or decreased cross-sectional measurements of pulmonary function thus becomes an interesting and important issue. We expect that the results from this study to be used to explain air pollution health effects on respiratory morbidity and mortality⁽²⁸⁻³³⁾ because impaired pulmonary function is one of the suggested biological mechanisms. To our knowledge, however, few population-based studies have been published relating long-term ambient air pollutant exposure to longitudinal pulmonary function decline. We propose to investigate such a relationship using the available ARIC V1 and V2 data of pulmonary function and respiratory symptoms and diseases.

5. Main Hypothesis/Study Questions:

- (a) Are pulmonary function decline and cross-sectional pulmonary function measurements associated with baseline symptoms (e.g., cough, phlegm, and wheeze) and changes in reported symptoms over time?
- (b) Is long-term exposure (3 yr window) to ambient air pollutants (PM₁₀, SO₂, NO₂, CO, and O₃) associated with pulmonary function decline over an average of three years?
- (c) Is long-term exposure to ambient air pollutants associated with respiratory symptoms and diseases (e.g., cough, phlegm, wheeze, bronchitis, emphysema, and asthma)?

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

This study will use V1 and V2 data and include variables from the derived data set, pulmonary function and respiratory symptoms data sets. We will exclude subjects from the Washington county, MD field center since no air pollution data are available in this county from the AIRS during the study period of 1987-1992. We have already derived air pollution exposures between V1 and V2 for all ARIC study participants at an individual level from the US EPA Aerometric Information Retrieval System (AIRS).

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"? ☐ 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://bios.unc.edu/units/cscs/ARIC/stdy/studymem.html>**

☒ 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)?**

None.