ARIC Manuscript Proposal # 1133

PC Reviewed: _02_/_21_/06 **Status: _____** **Priority: ____**
SC Reviewed: _____ **Status: _____** **Priority: ____**

1.a. Full Title: Association between obesity and hospitalizations

b. Abbreviated Title (Length 26 characters): Obesity and hospitalizations

2. Writing Group:
Writing group members:
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Daniel Taber, MPH**,** is a Doctoral Student in the Department of Health Behavior/Health Education at the University of North Carolina at Chapel Hill. Dr. June Stevens is his mentor.

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Eric Finkelstein Ph.D., M.H.A., is an Associate Director of the Research Triangle Institute Center for Health Promotion Economics. His expertise includes economic causes and consequences of health behaviors related especially to obesity.

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

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3. Timeline: Dataset preparation and analysis will start immediately upon approval. We anticipate submitting the manuscript in about one year.

4. Rationale:

Given the association between obesity and numerous comorbidities (cardiovascular disease, hypertension, diabetes, several types of cancer[1]) it is reasonable to suspect that obese individuals would be at a greater risk for hospitalizations. This increased risk of hospitalization would be assumed to contribute to the costs of obesity. Given the current concern about both obesity and rising health care costs, it is surprising that very few studies have examined the association between obesity and hospitalization. Further, the available studies provide mixed results.

Among the few studies available, some found an increased risk for hospitalization among obese individuals[2 3], while others found no association[4 5] or even a negative association.[6] The two largest studies that found a positive association were limited to homogenous samples within single geographic regions—one was a cross-sectional study of 17,118 HMO members, 76% of whom were white, in Northern California[3]; the other was a cohort study of 17,643 adults, 87% of whom were white, in Chicago.[4] To our knowledge, no study has specifically looked at the effect of obesity on hospitalizations among African-Americans. Considering that this population has been found to have higher obesity prevalence[7], greater risk of hospitalization due to certain comorbidities[8 9], and more all-cause nights in a hospital[10], it is very possible that obesity is an even greater cause of hospitalizations among African-Americans.

We know of no studies conducted in the United States that have examined whether associations between obesity and total number of hospitalizations differ by gender. Women represent a greater percentage of hospitalized patients nationwide, but this is largely attributable to pregnancy-related conditions.[11] One study that looked at all-cause hospitalizations by gender found that women beyond childbearing years were less likely to be hospitalized than men.[11] In contrast, a paper coauthored by one of us (JS) showed that in North Carolina women were much more likely than men to seek surgery as a treatment for obesity.[12] It is obvious that more work is needed to understand how gender may impact obesity-related hospitalizations.

We know of only one study that has examined associations between obesity and specific causes of hospitalization. This study, by Luchsinger et al., was restricted to individuals ages 65-100. They found that obesity was associated with hospitalization for CVD, but they found no significant association for nine other causes examined (infectious disease, malignancy, endrocrinological disease, hematological disease, central nervous system disease, respiratory disease, gastrointestinal disease, genitourinary disease and musculoskeletal disease) examined.[13]. Studies conducted in Europe[14] and Australia[4] have examined associations between obesity, chronic disease and hospitalizations with mixed results. Of course these findings from European countries may not be generalizable to the United States.

The purpose of this study is to conduct a longitudinal analysis to determine if obesity is associated with increased hospitalizations. We will examine admissions for all-causes and cause-specific admissions. The major causes of hospitalizations that we will examine include, but are not limited to:

First listed diagnosis	ICD-9 codes
Heart disease	391-392.0, 393-398, 402, 404, 410-416
Cerebrovascular disease	430-438
Respiratory disease	460-519
Infectious and parasitic disease	001-139
Malignant neoplasms	140-208, 230-234
Endrocinological disease	240-279
Mental disorders	290-319
Digestive disease	520-579
Genitourinary disease	580-629
Musculoskeletal disease	710-739
Injury and poisoning	800-999

In addition, we will be able to examine whether these relationships differ between African-Americans and Whites, as well as between men and women. This will build upon previous studies by utilizing data from a longer time frame, representing a more diverse sample, and analyzing data by cause of hospitalization.

5. Main Hypothesis/Study Questions:

1. Determine the association between body mass index (BMI) and hospitalizations in middle-aged adults. We hypothesize that obesity will be associated with greater number of hospitalizations
2. Determine the association between body mass index (BMI) and major causes of hospitalizations. We hypothesize that obesity will be positively associated with hospitalizations for heart disease, cerebrovascular disease, and endocrinological disease; and may also be positively associated with other causes of admissions.
3. Determine if association between obesity and hospitalizations and major causes of hospitalizations differ by ethnicity and/or gender. We hypothesize that associations will differ by ethnicity and gender in that obesity will be associated with more admissions in African Americans and women than in whites and men.

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

We will use data from the ARIC visits 1-4 and annual follow-ups

Identification information
Patient ID
Date of visit
Field center

Anthropometrics
Weight
Weight at age 25
Height

Medical History
Ever been hospitalized
Self-rated health
Prevalent CHD

Demographics
Gender
Ethnicity
Age
Education
Employment
Insurance

Hospitalizations
ID number (link)
Discharge date
Primary Diagnosis code
Other diagnosis codes

Incident CHD
Prevalent cancer
Incident cancer
Prevalent stroke
Incident stroke
Prevalent diabetes
Incident diabetes

Other
Smoking status
Alcohol status
Physical activity
Medication usage

Exclusions:
Missing weight at baseline
Ethnicity other than White or African-American
African-Americans in Minnesota or Maryland

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.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)?

#1125: Diabetes, obesity and insulin resistance as risk factors for incident hospitalized heart failure

There is little overlap with this proposal that focuses on the association between obesity and one specific cause of hospitalization. No other proposals have examined any obesity-hospitalization association.

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

11.b. If yes, is the proposal

_x__ A. primarily the result of an ancillary study (list number* _2005.08_)

___ B. primiarly 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/

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.

[1] National Institutes of Health. Clinical guidelines on the identification, evaluation and treatment of overweight and obesity in adults: the evidence report. *Obes Res.* 1998;6(suppl 2):51S-209S.

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[3] Yan LL, Daviglus ML, Liu K, Stamler J, Wang R, Pirzada A, Garside DB, Dyer AR, Van Horn L, Liao Y, Fries JF, Greenland P. Midlife body mass index and hospitalization and mortality in older age. *JAMA.* 2006;295:190-198.

[4] Reidpath DD, Crawford D, Tilgner L, Gibbons C. Relationship between body mass index and the use of healthcare services in Australia. *Obes Res.* 2002;10:526-531.

[5] Guallar-Castillon P, Lopez Garcia E, Lozano Palacios L, Gutierrez-Fisac JL, Banegas Banegas JR, Lafuente Urdinguio PJ, Rodriguez Artalego F. The relationship of overweight and obesity with subjective health and use of health-care services among Spanish women. *Int J Obes Relat Metab Disord*. 2002;26:247-252.

[6] Trakas K, Lawrence K, Shear N. Utilization of health care resources by obese Canadians. *Can Med Assoc J.* 1999;160:1457-1462.

[7] Flegal KM, Carroll MD, Ogden CL, Johnson CL. Prevalence and trends in obesity among US adults, 1999-2000. *JAMA.* 2002;288:1723-1727.

[8] Klatsky AL, Armstrong MA, Friedman GD. Racial differences in cerebrovascular disease hospitalizations. *Stroke*. 1991;22:299-304.

[9] Brown DW, Haldeman GA, Croft JB, Giles WH, Mensah GA. Racial or ethnic differences in hospitalization for heart failure among elderly adults: Medicare, 1990 to 2000. *Am Heart J.* 2005;150:448-454.

[10] Johnson-Lans S, Bellemore F. Gender and race as factors in health care utilization. *Int Advances Econ Res.* 1997;3:193-205.

[11] Merrill CT, Elixhauser A. *Hospitalization in the United States, 2002*. Rockville, MD: Agency for Healthcare Research and Quality, 2005. HCUP Fact Book No. 6. AHRQ Publication No. 05-0056. ISBN 1-58763-217-9.

[12] Zizza CA, Herring AH, Stevens J, Carey TS. Bariatric surgeries in North Carolina, 1990 to 2001: a gender comparison. *Obes Res.* 2003;11:1519-25.

[13] Luchsinger JA, Lee WN, Carrasquillo O, Rabinowitz D, Shea S. Body mass index and hospitalization in the elderly. *J Am Geriatr Soc.* 2003;51:1615-1620.

[14] Frost GS, Lyons GF, Counterweight Project Team. Obesity impacts on general practice appointments. *Obes Res.* 2005;13:1442-1449.