

ARIC Manuscript Proposal #4307 (Revised)

PC Reviewed: 2/13/24
SC Reviewed: _____

Status: _____
Status: _____

Priority: 2
Priority: _____

1.a. Full Title: Characteristics and prognosis of providing care in older age

b. Abbreviated Title (Length 26 characters): Caregiving in older age

2. Writing Group [please provide a middle name if available; EX: Adam Lee Williams]:

Writing group members:

Shoshana H Ballew
Martha Abshire Saylor
Danielle S Powell
Wuyang Zhang
Anna Kucharska-Newton
Silvia Koton
[others welcome]
Joe Coresh
Katherine Ornstein
Erin Kent

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

First author [please provide a middle name if available; EX: Adam Lee Williams]:

Name: **Shoshana H Ballew**
Address: 2024 E. Monument Street, Rm 2-609
Baltimore, MD 21205
Phone: 410-955-9917 Fax:
E-mail: sballew1@jhmi.edu

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).

Name: **Shoshana H Ballew**
Address: 2024 E. Monument Street, Rm 2-609
Baltimore, MD 21205
Phone: 410-955-9917 Fax:
E-mail: sballew1@jhmi.edu

3. Timeline:

Data analysis can start immediately. A manuscript is expected to be prepared within 6 – 9 months. Amendment included for prior submission.

4. Rationale:

Nearly 15 million unpaid caregivers provide financial and social support, engage in healthcare decision making, and assist older adults with daily activities related to health and function.¹ The majority of which are family members providing highly complex, physically demanding care critical for the care recipient's health and well-being.

Understanding and supporting the needs of caregivers is a national priority. President Biden's recent Executive Order, "Increasing Access to High-Quality Care and Supporting Caregivers" has brought increased attention to this critical population that contributes so much to healthcare. The National Academy of Medicine report, "Families Caring for an Aging America" in 2016 and the "National Strategy to Support Family Caregivers" developed in 2022 by the RAISE Act Family Caregiving Advisory Council called for programs that understand and promote the well-being of caregivers of persons with serious illness.^{2,3} Despite their significant contributions to care delivery, caregivers' strengths and challenges are not routinely assessed as part of clinical care, often resulting in inadequate attention or prioritization of caregiver preventive health behaviors or overall health. This may place caregivers at higher risk for poor health outcomes, such as cardiovascular disease, chronic kidney disease, and mortality. These negative health outcomes may be amplified when caring for an individual at end-of-life, especially without adequate support, and may differ across health disparities or subgroups of caregivers.⁴ Overall, caregiving is highly gendered, with women often providing care. Far less is known about the experience of Black caregivers despite the large racial disparities in care recipient outcomes. Health disparities disproportionately impact Black families with high financial strain. Increased financial strain often occurs as caregivers take on out-of-pocket costs related to caregiving, and these costs may disproportionately affect older adults, women, and underrepresented groups already at higher risk for financial insecurity.

Literature on the link between caregiving and mortality risk has been mixed, with more recent evidence that individuals providing care are at lower risk.⁵⁻⁷ Few studies have comprehensively examined health behaviors, psychosocial factors, and biomarkers of risk in older caregivers. This is important given the strong evidence for the link between preventive health behaviors (such as physical activity), emotional outcomes (such as depression and quality of life [QOL]), and overall health promotion to reduce chronic diseases.⁸ There are also few studies on health changes for individuals transitioning into the caregiving role.⁹ ARIC provides a unique opportunity to characterize older adults who identify as caregivers, with a subset of data for people newly taking on a caregiving role. Given the expansive data in ARIC including surveys and biomarkers, ARIC could provide new insights into the health of caregivers while also allowing examination in important subgroups of sex, race, social determinants of health, key caregiver characteristics, and comorbidities. ARIC data includes a wealth of follow-up for multiple clinical outcomes beyond mortality to examine long-term prognosis for caregivers. We

propose to use the caregiving characteristics currently available in ARIC to provide an in-depth understanding of the health of caregivers. This manuscript will provide formative data for a future program of study within ARIC focused on the health and well-being of those involved in caregiving, with a special focus on cardiovascular and dementia caregiving.

5. Main Hypothesis/Study Questions:

Aim 1: To describe sociodemographic and caregiving characteristics, lifestyle and behavioral or psychosocial factors among individuals who identify as caregivers vs. those who do not identify as caregivers (non-caregivers) in ARIC.

Aim 1.1: To examine characteristics of caregivers and non-caregivers by subgroups of age, sex, race, socioeconomic status, caregiving characteristics (for caregivers only), comorbidities (e.g., depression, pain, chronic conditions).

Aim 2: To evaluate associations of caregiving with clinical outcomes including cardiovascular disease, kidney disease, cognitive trajectory, and mortality.

Aim 2.1: To examine associations with clinical outcomes by subgroups of age, sex, race, caregiving characteristics, comorbidities (e.g., depression, pain, chronic conditions).

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).

Study population:

ARIC participants responding to the caregiving questions on the annual follow-up (AFU) questionnaires for 2014 (GNC) and 2015 (GND) and who attended visit 5 or 6.

Caregivers will be defined as participants who respond “yes” to the question, “Are you currently providing care on an ongoing basis to a family member or friend with a chronic illness or disability?” on either the 2014 or 2015 AFU. Non-caregivers are individuals who answered no to this question. We will examine the overlap from 2014 and 2015 and individuals who answered yes to only one (potentially able to examine “incident” caregivers and the trajectories of health before and after the start of caregiving, although we anticipate small numbers, and this may be difficult to ascertain). Given further questions on caregiving in the 2015 AFU, we may focus on just those individuals in the main analyses.

Exposures/Covariates at visit 5/6 (or AFU where indicated):

- Demographics
 - o Age, sex
- Social determinants of health (SDOH) metrics and indices
 - o Race, ethnicity, income, education
 - o Social deprivation index (SDI)¹⁰
- Comorbidities
 - o Cholesterol levels (total, HDL, LDL, triglycerides)

- Hypertension, systolic blood pressure, diastolic blood pressure
- Diabetes, HbA1c, fasting glucose
- Kidney disease; serum creatinine and cystatin C for use in 2021 CKD-EPI equations (eGFRcr, eGFRcys, eGFRcr-cys)^{11,12} and albuminuria (urinary albumin-to-creatinine ratio).
- BMI (height, weight)
- Medications for hypertension, dyslipidemia, and diabetes; fasting status
- Physical function
- Frailty
- Clinical dementia diagnosis
- Pain (from AFU)
- Recent falls (from AFU)
- Lifestyle variables
 - Smoking (current, former, never)
 - Alcohol use
 - Physical activity
- Psychological/Mental Health variables
 - Depressive symptoms (CES-D)
 - Mini-Mental State Exam (MMSE)
 - Neurocognitive testing
- Caregiving specific questions from AFU:
 - 2015 questions: Relationship to care recipient, hours of care, care recipient has memory difficulties, care recipient needs help with tasks, strain (mental, physical, financial), duration of care
 - 2014 questions: Relationship to care recipient, do you live with this person, strain (mental/emotional), are you receiving care, relationship to caregiver, do they live with this person

Outcome variables (for the caregiver over time since 2015):

- Incident coronary heart disease (CHD) including a hospitalized myocardial infarction (MI), fatal CHD, or cardiac procedure
- Incident fatal and non-fatal stroke
- Incident heart failure (HF)
- Cardiovascular mortality
- Kidney failure with replacement therapy (KFRT)
- Incident dementia
- Mild cognitive impairment
- Cognitive trajectory
 - Evaluate global and domain specific (i.e., executive function, memory, language) factor scores. Scores will be standardized to Visit 5 baseline.
- All-cause mortality

Brief analysis plan and methods:

We will use descriptive statistics, including means, medians, and proportions to compare caregivers and non-caregivers. Secondary analyses to stratify by age (<75 vs 75+), sex, race, and comorbidities (e.g., hypertension, diabetes).

We will analyze the longitudinal associations of caregiving status (in 2015) with outcomes, adding demographics, SDOH, comorbidities, lifestyle variables, psychosocial health, and other caregiving specific characteristics variables to regression models.

Secondary analyses to examine only “incident” caregivers, those responding no in 2014 but yes in 2015. These individuals we could examine health before and after the beginning of caregiving, but these numbers may be small.

Limitations: We acknowledge that our proposed study has a few limitations. First, we only have two AFU time points in which we ask about caregiver status, so we will not be able to look at change in this status over time. We also acknowledge that we will not necessarily have detail on the actual level of care provided or any support services used for the caregiver and/or care recipient.

7.a. Will the data be used for non-ARIC analysis or by a for-profit organization in this manuscript? ____ Yes __X__ No

b. If Yes, is the author aware that the current derived consent file ICTDER05 must be used to exclude persons with a value RES_OTH and/or RES_DNA = “ARIC only” and/or “Not for Profit” ? ____ Yes ____ No

(The 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 current derived consent file ICTDER05 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.csc.unc.edu/aric/mantrack/maintain/search/dtSearch.html>

__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)?

There are no other proposals using these caregiving questions from the annual follow-up questionnaires.

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 <https://sites.csc.unc.edu/aric/approved-ancillary-studies>

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.csc.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

1. Wolff JL, Spillman BC, Freedman VA, Kasper JD. A National Profile of Family and Unpaid Caregivers Who Assist Older Adults With Health Care Activities. *JAMA Intern Med.* Mar 2016;176(3):372-379.
2. National Academies of Sciences Engineering and Medicine. *Families Caring for an Aging America*. Washington (DC): The National Academies Press; 2016.
3. The RAISE Act Family Caregiving Advisory Council & The Advisory Council to Support Grandparents Raising Grandchildren. 2022 National Strategy to Support Family Caregivers. 2022; https://acl.gov/sites/default/files/RAISE_SGRG/NatlStrategyToSupportFamilyCaregivers.pdf. Accessed July 28, 2023.
4. Ornstein KA, Wolff JL, Bollens-Lund E, Rahman OK, Kelley AS. Spousal Caregivers Are Caregiving Alone In The Last Years Of Life. *Health Aff (Millwood)*. Jun 2019;38(6):964-972.
5. Schulz R, Beach SR. Caregiving as a risk factor for mortality: the Caregiver Health Effects Study. *JAMA*. Dec 15 1999;282(23):2215-2219.
6. Roth DL, Fredman L, Haley WE. Informal caregiving and its impact on health: a reappraisal from population-based studies. *Gerontologist*. Apr 2015;55(2):309-319.
7. O'Reilly D, Rosato M, Maguire A. Caregiving reduces mortality risk for most caregivers: a census-based record linkage study. *Int J Epidemiol.* Dec 2015;44(6):1959-1969.
8. Lloyd-Jones DM, Hong Y, Labarthe D, et al. Defining and setting national goals for cardiovascular health promotion and disease reduction: the American Heart Association's strategic Impact Goal through 2020 and beyond. *Circulation*. Feb 2 2010;121(4):586-613.

9. Roth DL, Haley WE, David Rhodes J, et al. Transitions to family caregiving: enrolling incident caregivers and matched non-caregiving controls from a population-based study. *Aging Clin Exp Res*. Sep 2020;32(9):1829-1838.
10. Trinidad S, Brokamp C, Mor Huertas A, et al. Use Of Area-Based Socioeconomic Deprivation Indices: A Scoping Review And Qualitative Analysis. *Health Aff (Millwood)*. Dec 2022;41(12):1804-1811.
11. Levey AS, Stevens LA, Schmid CH, et al. A new equation to estimate glomerular filtration rate. *Ann Intern Med*. May 5 2009;150(9):604-612.
12. Inker LA, Schmid CH, Tighiouart H, et al. Estimating glomerular filtration rate from serum creatinine and cystatin C. *N Engl J Med*. Jul 5 2012;367(1):20-29.