Racial Differences in Life Expectancy With Cognitive Impairment Among the Elderly in the United States[1]

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Extended Abstract for PAA 2014

Cognitive impairment and dementia are major health problems confronting older persons. In 2002, approximately 13.9% of people in the United States aged 71 and older had dementia, and 22.2% had cognitive impairment without dementia. Blacks appeared to be particularly hard hit by these conditions. For example, latest estimates showed that among Americans aged 65 and older, 8.8% whites had cognitive impairment compared to 23.9% for blacks (Alzhermer's Association, 2010). Among those aged 71 years and older blacks were approximately two times more likely to have dementia than whites in the United States. Moreover, a few studies suggested that Blacks may survive longer with cognitive impairment. One study showed that black Alzheimer disease (AD) patients have longer survival compared with white AD patients (Mehta et al., 2008). Despite growing interests in racial disparities in cognitive health, less in known about racial differences in life with and without cognitive impairment in later life. Because cognitive impairment is strongly associated with the use of home and institutional care, our estimates will provide useful information for families and policymakers.

In this study, we address three questions: 1) Are older blacks more likely to suffer from cognitive impairment than whites? 2) Once cognitively impaired, are older blacks less likely to die than whites? 3) Do older blacks spend longer years and great proportion of their lives with cognitive impairment than whites?

Using data from 7 waves of the Health and Retirement Study (1998-2010), we analyze racial differences in the transition probabilities among three states: cognitively normal, cognitively impaired, and death among 9,044 non-Hispanic whites and blacks aged 65 and older. The SPACE program (Stochastic Population Analysis for Complex Events) is used to estimate life expectancies with and without cognitive impairment for four groups: white men, black men, white women, and black women.

Data and Methods

Data

We used data from 7 waves of HRS (1998-2010) to estimate racial differences in life expectancy with and without cognitive impairment in later life. The 1998 wave of HRS is a nationally representative sample of noninstitutionalized adults older than 50 and includes information from 21,384 respondents. It also oversamples blacks and Hispanics. HRS collects detailed information on health, work, and family conditions every 2 years, either by telephone or in-person. About 10% of the interviews are done with proxies (spouses or children) for sample members who cannot complete the survey (Langa et al, 2005).). At baseline, there are 1,226 blacks and 7,818 whites aged 65 and over who lived in the community.

Measures

Our major dependent variable is cognitive impairment. The measurement of cognitive status in the HRS differs for self- and proxy respondents. The cognitive tests were administered in all 7 waves of HRS for self-respondents and can be used to track the cognitive transitions among respondents over time. We used the summary measure of cognitive function, which is based on the modified version of Telephone Interview for Cognitive Status (TICS), to classify respondent's cognitive status. The modified version of TICS includes date identification, object naming, naming of the President and Vice President, a serial 7s subtraction, and the tests of immediate and delayed verbal of a list of 10 words. The summary score ranges from 0 (severely impaired) to 35 (highly functioning). A small percentage of respondents refused to participate in tests of immediate and delayed recall and Serial 7s at each wave, and because these data were not missing on random, the HRS has developed a multiple imputation strategy that imputed cognitive variables for all waves (Ofstedal, Fisher, and Herzog 2005). We used the imputed cognitive variables released by HRS in the analysis. Following previous research (Herzog & Wallace, 1997; Lièvre, Alley, & Crimmins 2008; Suthers, Kim, & Crimmins, 2003), we classified respondents as having moderate or severe cognitive impairment if they scored an 8 or less out of 35 at baseline. For follow-up surveys (2000-2010), we classified those who scored 9 or less as cognitively impaired because previous research suggested a higher cut-off point for cognitive impairment in HRS follow-up surveys due to practice effects (Lièvre, Alley, and Crimmins, 2008; Reuser &Willekens, 2011).

For respondents who were unable to participate in the cognitive tests, proxies were asked to report on a list of symptoms of cognitive impairment. Five symptoms were consistently asked from 1998 to 2010: got lost in a familiar environment; wandered off and not returned by himself/herself; could not be left alone for an hour; had hallucinations; and had poor memory. In a recent paper, Crimmins et al. (2011) found that difficulty with eating and difficulty with managing money were significantly associated with clinical diagnosis of dementia in the Aging, Demographics, and Memory Study (ADAMS). We thus constructed a summary score of the respondent's cognition ranging from 0 (no symptoms of cognitive impairment) to 7 (severely impaired) based on five symptoms of cognitive impairment and difficulties with two daily activities of living in eating and managing money. Respondents who had two or more symptoms were identified as cognitively impaired.

Mortality information came from HRS tracking file. Independent variables include age, gender (female=1) and race (black=1).

In this paper, we propose a model consisting of three transitions (Figure 1).
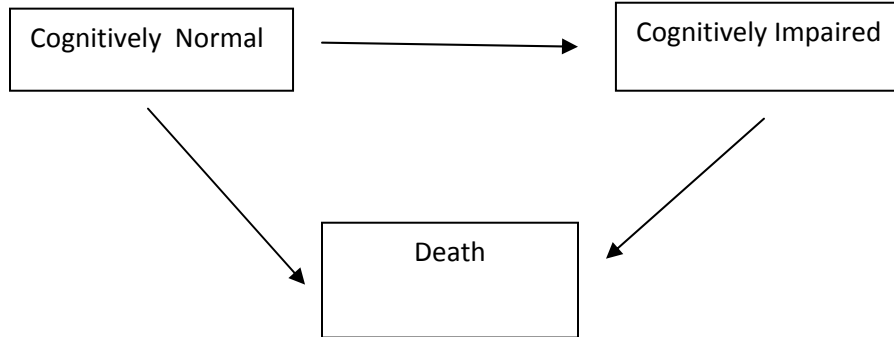

Figure 1. Multi-state Life table of Cognitive Impairment and Mortality

In our study, we specify two states of origin: cognitively normal and cognitively impaired and two states of destinations: cognitively impaired and death. We do not allow transition from cognitive impairment to normal cognition. We use the SPACE program (Stochastic Population Analysis for Complex Events) to estimate MSLT functions and their sampling variability (Cai et al., 2010). The space program uses a micro-simulation method to estimate multistate life stable (MSLT) functions. Micro-simulation is a computational tool that "expresses the transition probability estimates by generating detailed life paths for each member of the target population" (Cai et al., 2010, p. 131). Another strength of the SPACE program is its use of rescaling bootstrapping to obtain standard errors for the life table functions (for details, see Cai et al. 2010). This procedure generates repeated estimates of the life table functions by randomly drawing a series of bootstrap samples from the analytic sample. The transition probabilities are estimated using the following equation (Cai et al., 2010):

$$Log\ (p_{ij}(age_x)/p_{ii}(age_x)) = a_{ij} + b_{ij}age_x + c_{ij}gender + d_{ij}race,$$

Where p_{ij} is the transition probability from state i to state j (i,j=1,2,3,...,n, i≠j) over the annual interval at age_x, a_{ij} is the intercept, b_{ij} is the coefficient for age_x, c_{ij} is the coefficient for gender, and d_{ij} is the coefficient for race.

Preliminary Results

Our preliminary results show that older blacks are more likely to suffer from cognitive impairment than whites in 1998 and they are also significantly more likely to experience cognitive impairment during the 12 years of follow-up. Our paper will be the first attempt to produce important statistics about life expectancy with and without cognitive impairment by race and gender in the United States.

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