

# **Race Differences in Life Expectancy With and Without Cognitive Impairment in the United States**

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# Introduction

- 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.
- It is estimated that among those aged 71 years and older Blacks were approximately two times more likely to have dementia than Whites .
- However, less is known about race differences in life expectancy with and without cognitive impairment. Do Blacks spend longer years and great proportion of their lives with cognitive impairment than Whites?

# Race differences in prevalence and incidence of cognitive impairment and dementia

## Prevalence

- Among Americans aged 65 and older in 2006, 8.8% Whites had cognitive impairment compared to 23.9% for African–Americans (Data from Alzheimer's Association) .
- Among Americans aged 71 and older, 11.2% Whites have dementia compared to 21.3% of African Americans.

# Incidence

- One of the largest population-based longitudinal studies of older adults conducted in New York City found that the standardized incidence rate of Alzheimer's disease for non-Hispanic black elders was significantly higher than that of the non-Hispanic Whites after adjusting for years of education (Tang et al., 2001).
- Some regional studies found racial differences in dementia to be of borderline significance, with control of age and education (Fitzpatrick et al., 2004).

# Racial differences in survival following cognitive impairment and dementia

- African American Alzheimer disease (AD) patients have longer survival compared with White AD patients (Mehta et al., 2008). Reasons unknown.
- Other studies found that highly educated individuals with cognitive impairment tend to have higher mortality risk than those lower educated with cognitive impairment (Reuser et al. 2011).
- Overall, current literature suggests that Blacks may have higher prevalence and incidence rate of cognitive impairment and also longer survival with cognitive impairment.

# Research questions

- Are Blacks more likely to suffer from cognitive impairment than Whites?
- Once cognitively impaired, are Blacks less likely to die than Whites?
- Are Blacks have shorter life expectancies, and live more years with cognitive impairment?

# Data

- The Health and Retirement Study (HRS).
- HRS uses a national area probability sample of U.S. households and oversamples of Blacks, Hispanics and residents of the state of Florida. Its target population are older adults and their spouses.
- 7 waves (1998, 2000, 2002, 2004, 2006, 2008, 2010)
- Analytic sample: 9,044 non-Hispanic Whites and Blacks aged 65 and older at baseline who lived in the community. There are 1,226 Blacks at baseline.

# Measures (1)

- **Cognitive Impairment:**

- 1) For self-respondents, we used the summary measure of cognitive function, which is based on the modified version of TICS, to classify respondent's cognitive status. The summary score ranges from 0 (severely impaired) to 35 (highly functioning).
- 2) Based on our validation study, we used different cut-points for cognitive impairments for Blacks and Whites. Among Blacks, those who scored between **0 and 12** were classified as cognitively impaired, and 13 to 35 as normal. For Whites, those who scored between **0 and 14** were classified as cognitively impaired, and 15 to 35 as normal.

# Measures (2)

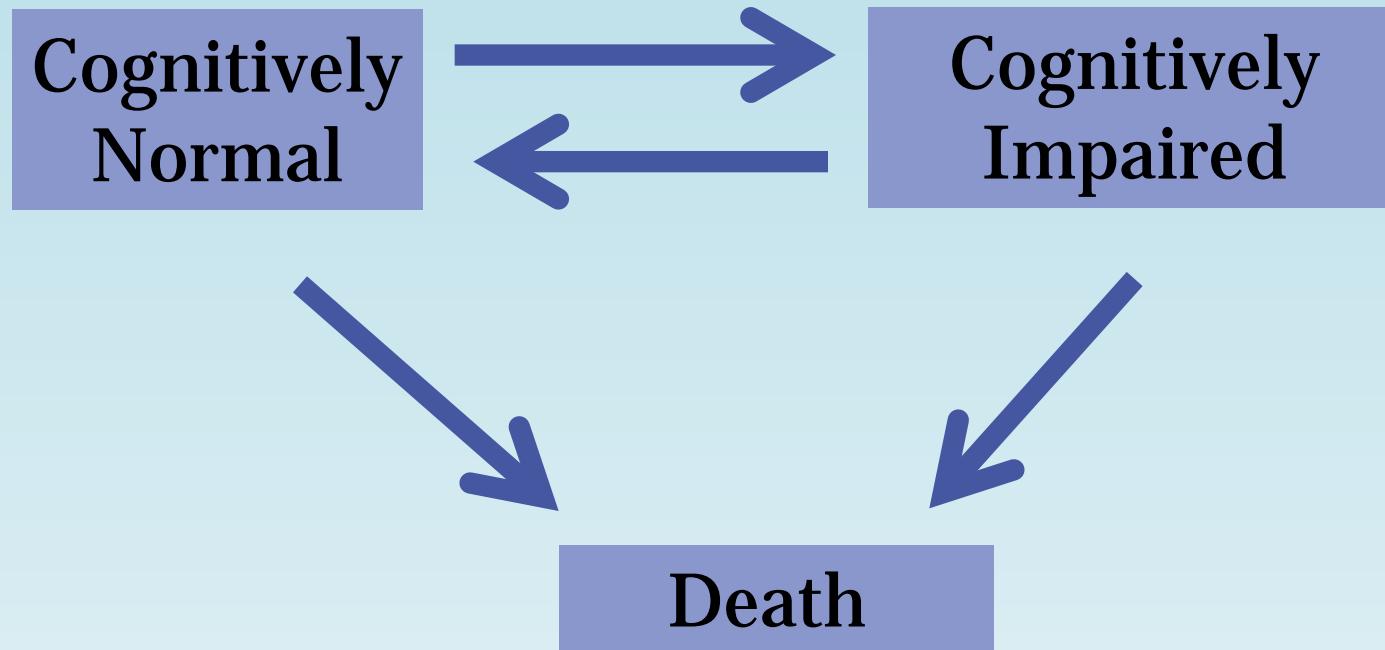
## Cognitive Impairment :

- For persons who were unable to participate in the cognitive tests due to health issues, we constructed a summary score of the respondent's cognition ranging from 0 (no symptoms of cognitive impairment) to 7 (severely impaired) based on proxy reports of five symptoms of cognitive impairment and two difficulties with daily activities of living:
  - 1) got lost in a familiar environment;
  - 2) wandered off and not returned by himself/herself;
  - 3) could not be left alone for an hour;
  - 4) had hallucinations;
  - 5) had poor memory;
  - 6) difficulties with eating;
  - 7) difficulties with managing money.
- Respondents who had **two or more symptoms** were classified as cognitively impaired.

# Covariates

- Age
- Gender
- Race

# Methods: Multistate life table (MSLT)



## Methods

- We used the SPACE program (Stochastic Population Analysis for Complex Events) to estimate MSLT functions and their sampling variability (Cai et al., 2010)
  - a) uses a micro-simulation method to estimate multistate life stable (MSLT) functions.
  - b) uses rescaling bootstrapping to obtain standard errors for life table functions.
- Sampling cohort: 100,000.
- Bootstrap N=100.

# Results

- Logistic regression results on transition probabilities
- Population-based estimates by gender and race, at age 70
- SPACE estimates of the 75<sup>th</sup> percentiles of years expected to live and spend with and without cognitive impairment at age 70, by gender and race
- Status-based estimates (initial state: cognition normal), at age 70 ,by gender and race
- Status-based estimates (initial state: cognition impaired), at age 70, by gender and race

# Table 1. Logistic regression results (odds ratio)

SPACE (Annual Interval)				
Current State	Destination State	Age	Black	Female
Cognitively Normal	Cognitively Impaired	1.10	2.31	1.15
Cognitively Normal	Death	1.11	1.27	0.66
Cognitively Impaired	Cognitively Normal	0.94	1.11	0.94
Cognitively Impaired	Death	1.07	0.85	0.77

Table 2. Population-based estimates, at age 70, by gender and race

<b>Age</b>	<b>Total Life Expectancy (SE)</b>	<b>Cognitively Intact Life Expectancy (SE)</b>	<b>Life Expectancy With Cognitive Impairment (SE)</b>	<b>% of Life With Cognitive Impairment</b>
White men	14.22 (0.11)	12.57 (0.14)	1.65 (0.07)	11.3
Black men	12.80 (0.23)	10.00 (0.16)	2.80 (0.11)	21.9
White women	16.62 (0.17)	13.99 (0.19)	2.63 (0.11)	15.7
Black women	15.08 (0.27)	10.78 (0.20)	4.30 (0.19)	28.5

**Figure 1. SPACE estimates of the 75<sup>th</sup> percentiles of years expected to live , years with and without cognitive impairment at age 70, by gender and race**



**Table 3. Status-based estimates (initial state: cognition normal), at age 70 , by gender and race**

<b>Age</b>	<b>Total Life Expectancy (SE)</b>	<b>Cognitively Intact Life Expectancy (SE)</b>	<b>Life Expectancy With Cognitive Impairment (SE)</b>	<b>% of Life With Cognitive Impairment</b>
White men	14.30 (0.11)	12.75 (0.13)	1.54 (0.08)	10.8
Black men	12.94 (0.25)	10.38 (0.17)	2.56 (0.11)	19.8
White women	16.74 (0.17)	14.22 (0.18)	2.52 (0.11)	15.1
Black women	15.22 (0.27)	11.27 (0.18)	3.96 (0.18)	26.0

**Table 4. Status-based estimates (initial state: cognition impaired), at age 70, by gender and race**

<b>Age</b>	<b>Total Life Expectancy (SE)</b>	<b>Cognitively Intact Life Expectancy (SE)</b>	<b>Life Expectancy With Cognitive Impairment (SE)</b>	<b>% of Life With Cognitive Impairment</b>
White men	11.92 (0.54)	7.09 (0.44)	4.82 (0.31)	40.4
Black men	11.39 (0.37)	6.14 (0.32)	5.25 (0.20)	46.1
White women	13.49 (0.50)	7.85 (0.65)	5.64 (0.34)	41.8
Black women	13.88 (0.45)	6.73 (0.28)	7.15 (0.40)	51.5

# Conclusion (1)

- Blacks are about 2 times more likely than Whites to experience the onset of cognitive impairment.
- Once cognitively impaired, Blacks are significantly less likely to die than Whites and more likely to recover.
- Among men at age 70, Blacks have shorter life expectancy than Whites but lived more years with cognitive impairment (**2.80 vs. 1.65**). They spend a greater proportion of their lives (**21.9% vs. 11.3%**) with cognitive impairment.
- Among women at age 70, Blacks also have shorter life expectancy than Whites, lived more years with cognitive impairment (**4.30 vs. 2.63**) and spend a greater proportion of their lives (**28.5% vs. 15.7%**) with cognitive impairment.

# Conclusion (2)

- **For those without cognitive impairment at age 70:**

Race difference in life expectancy with cognitive impairment is similar to the pattern observed for population-based estimates.

- **For those without cognitive impairment at age 70:**

- Among men, race difference in total life expectancy and life expectancy with cognitive impairment **is not statistically significant**.
- Among women, Blacks tend to have shorter life expectancy without cognitive impairment but longer life expectancy with cognitive impairment.

# Limitations and future work

- We imputed some respondents' year of death due to missing data. For some respondents who died in the same year when they finished the HRS interview, we imputed their year of death as the year after the interview year because SPACE cannot handle two events in a single year. We will explore better ways to deal with such cases.
- Our classification of cognitive impairment is not based on clinical diagnosis .
- We plan to add **childhood poverty status** as a covariate and explore the contribution of early life conditions to racial differences in life expectancies with and without cognitive impairment.
- We will increase bootstrap samples and improve the estimates of SEs.

# Thanks!

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