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Short Report

Change in cognitively healthy and cognitively impaired life expectancy in the United States: 2000–2010

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ABSTRACT

Objective: To determine how cognitively healthy and cognitively impaired life expectancy have changed from 2000 to 2010 among American men and women 65 years of age and over.
Methods: The prevalence of dementia, cognitive impairment without dementia (CIND), and normal cognition is determined from nationally representative data from the U.S. Health and Retirement Study (HRS). Mortality rates are from U.S. Decennial Life Table for 2000 and the U.S. annual life table for 2010. Life expectancy by cognitive status is estimated using the Sullivan method.
Results: Most of the increase in life expectancy has been concentrated in cognitively healthy years in this 10 year period. The increase in expected years cognitively intact at age 65, which exceeded that in total life expectancy, was 1.8 for men and 1.6 for women.
Conclusion: This study provides evidence suggesting that there has been a compression of cognitive morbidity.

1. Introduction

In recent years a question posed by those interested in health trends has been "Are we living longer healthy lives as well as longer lives?" If we prolong life after the onset of disease or disability, life with disease and disability can be lengthened which is not really an improvement in population health. Because decreases in mortality are increasingly concentrated at older ages, and because dementia is normally a disease with onset in old age, change in mortality and change in dementia prevalence interact to affect the length of cognitively intact and cognitively impaired life expectancy. Length of life with dementia or with cognitive loss provides a good assessment of the burden of dementia and the potential value of interventions to prevent and delay cognitive loss.

Recent reports from England have shown increases in the length of cognitively healthy life expectancy at age 65 that are almost as great as the increase in life expectancy for men and greater than the increase in life expectancy for women (Jagger et al., 2015). In addition, there have been a number of reports of reductions in the prevalence of dementia both in the United States and in other countries (De Rotrou et al., 2013; Gerstorf et al., 2015; Larson, Yaffe, & Langa, 2013; Langa et al., 2008; Satizabal et al., 2016; Wu et al., 2016). These lead us to expect increases in cognitively healthy life.

On the other hand, life expectancy increase in the U.S. has been relatively slow compared to that of other countries, particularly for women, which could affect relative change in the length of life with cognitive impairment (Glei, Meslé, & Vallin, 2010). An examination of life expectancy with and without impaired cognitive functioning for men and women in the U.S. in the 1990s indicated that women had longer life expectancy with cognitive impairment than men primarily because of their longer total life expectancy (Suthers, Kim, & Crimmins, 2003). The age-specific differences between men and women in the prevalence of cognitive impairment were not significant. A new look at gender differences in new cohorts with more education and using newly derived measures of dementia and cognitive impairment without dementia (CIND) is warranted.

In this analysis, we examine changes from 2000 to 2010 in the length of life with good cognition, with dementia and with cognitive impairment but without dementia (CIND). Data from the nationally representative survey of older Americans, the Health and Retirement Study (HRS), are used to estimate the prevalence of cognitive states among those 65 and older at the two dates. This is the first study to provide national estimates of life expectancy with dementia and CIND for the United States.

Abbreviations: CIND, cognitive impairment without dementia; HRS, Health and Retirement Study

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2. Data and methods

2.1. Data resources

Estimates of cognitive life expectancy require information on mortality and cognitive state at each date. Mortality data for this analysis are from the U.S. National Vital Statistics, the decennial life table for 2000 and the annual life table for 2010.

Data from the 2000 and 2010 Health and Retirement Study (HRS) for those 65+ were used to obtain the prevalence of cognitive states ten years apart. These data included 10,374 participants in 2000 and 9,995 in 2010 who were age 65 or older. These samples consist of both community-dwelling and nursing home residents, and both self- and proxy respondents. At each wave from 2000 to 2010, 88% or 89% of those scheduled for interview in the HRS were actually interviewed (Health and Retirement Study, 2011, for 2000 to 2008; Personal communication from HRS for 2010). Survey procedures and sample characteristics were consistent at the two dates. In 2000, 11.9% of the responses were provided by proxies; in 2010, this was true for 9.3% of responses. In 2000, 3.8% and in 2010, 4.3% of those in the samples assessed for cognition were in nursing homes. The average age of the sample at both dates was about 75 years, of whom about 58% were females.

Cognitive status of the 65+ population is determined through responses to a series of tests for those who are self-respondents. Responses to a set of questions to proxies and interviewer observations are the basis of ascertainment for those who are not self-respondents. Because poor cognitive functioning is one of the reasons people do not respond for themselves, it is particularly important to include these people in assessment of the national prevalence of cognitive loss. Categorizing people as having good cognition, dementia, or CIND is based on the concordance of HRS cognitive functioning scores and diagnosis of dementia and CIND in a subset of HRS respondents who had neuropsychological assessment in the Aging, Demographics, and Memory Study (ADAMS) (Crimmins, Kim, Langa, & Weir, 2011; Langa et al., 2005). Results from a detailed neuropsychological diagnostic approach on a limited subsample of the HRS were used to develop methods for classifying people as having dementia and CIND in the larger population sample. The overall prevalence in the larger population sample is the same as would be obtained if all sample members had the neuropsychological diagnostic approach. The approach developed on this subsample of respondents for use in the larger sample was used at all the HRS waves from 2000 through 2010. In order to test the appropriateness of using the 10 year period to look at change in cognitive life expectancy, we first examine the percent with dementia and with CIND at each wave of the HRS from 2000 to 2010 to see whether the change over time looks fairly consistent.

Self-respondents' cognitive scores can range from 0 to 27 and are based on tests of immediate recall of 10 words, delayed recall of the same 10 words, 5 trials of Serial 7s, and Backward counting (score 0–2). If a respondent does not complete all the tests, the missing measures are imputed by HRS. A detailed description of the procedures and the number of imputations over time is provided in Fisher, Hassan, Faul, Rodgers, and Weir (2015). Respondents with scores from 12 to 27 are classified as having good cognitive functioning; 0–6 is dementia; and 7–11 is CIND.

For individuals whose information is provided by proxies, the classification is based on an direct assessment of memory (0 excellent, 1 very good, 2 good, 3 fair, 4 poor); an assessment of limitations in 5 instrumental activities of daily living (IADLs) (managing money, taking medication, preparing hot meals, using phones and doing groceries) (0–5); and the interviewer assessment of difficulty completing the interview because of cognitive limitation (score 0–2 indicating none, some, prevents completion). These scores are summed and those with a score of 0–2 are classified as cognitively healthy; 3–5 as CIND; and 6–11 as having dementia. In 2000, 49.1% of those with dementia had proxy respondents; this was true for 51.6% of those with dementia in 2010. Among those who answer for themselves, most have been in the study for many waves and most of those in the 2010 sample were also in the 2000 sample. In 2000, 86% of those who answer the cognitive questions have been in the survey four or five times; in 2010, 77% have been in the survey nine or ten times.

2.2. Methods

Healthy life expectancy measures combine indicators of morbidity and mortality so that life expectancy can be divided into healthy and unhealthy expected life (Saito, Robine, & Crimmins, 2014). Here, we define healthy as life expectancy with good cognitive functioning and unhealthy as life expectancy with dementia or CIND. Cognitively healthy life expectancy reflects the average number of years at a specified age a person can expect to live with good cognitive skills given current mortality and prevalence of cognitive problems. We use the Sullivan method for computing the length of healthy and unhealthy life expectancy (Jagger et al., 2007; Saito et al., 2014).

Computation of cognitively healthy life expectancy and life expectancy with dementia or CIND is based on dividing the lifetable years lived in each age group into these three states using the prevalence of the cognitive states at each age. Years lived with dementia or CIND are summed at all ages after the specified age and divided by the number of people alive at that age to obtain life expectancy with dementia or CIND. Cognitively healthy life expectancy is determined by subtracting these two states from total life expectancy. Standard errors for the estimated values were computed using the approach provided by Jagger et al. (2007).

3. Results

3.1. Trends in prevalence of good cognitive functioning, dementia and CIND

We begin with an examination of cognitive status over six points in time from 2000 to 2010 to see whether there is a somewhat consistent trend over the period before we use the endpoints in our analysis of 10 year change in cognitive life expectancy. While the trend is not linear, there does appear to be a drop over the ten years in the percent with dementia and with CIND; we believe that this provides evidence that it is worth looking further at the age-sex-specific change and combining those with changes in life expectancy (Fig. 1).

When we examine the change over ten years by gender, we find a significant increase in the prevalence of good cognitive functioning among both men (4.45 percentage points) and women (3.41 percentage points) in the 65+ population (Table 1); there was also a decrease of 2.60 percentage points in dementia prevalence among men and 1.99 percentage points among women. In addition, there was a decrease in the prevalence of CIND among both men and women, but it is not statistically significant.

All age groups within the 65+ group of both men and women experienced an increase in the prevalence of good cognition. Among women, the increase was significant in all but the youngest (65–69)

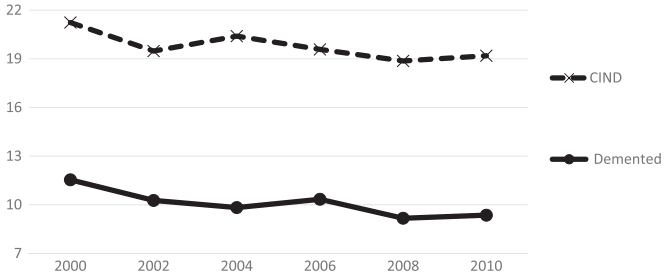

Fig. 1. Percent with dementia and CIND among those 65+ HRS: 2000–2010.