Journals of Gerontology: Social Sciences
cite as: *J Gerontol B Psychol Sci Soc Sci*, 2018, Vol. 73, No. S1, S48–S56
doi:10.1093/geronb/gbx144

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OXFORD

Supplement Article

Short-Term Changes in the Prevalence of Probable Dementia: An Analysis of the 2011–2015 National Health and Aging Trends Study

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Received: July 25, 2017; Editorial Decision Date: September 25, 2017

Decision Editor: Robert Schoeni, PhD

Abstract

Objectives: Studies have reported decreasing dementia prevalence in recent decades in the United States. We explore with a new national data source whether declines have occurred since 2011, whether trends are attributable to shifts in dementia incidence or mortality, and whether trends are related to shifts in population composition or subgroup prevalence.
Methods: We use the 2011–2015 National Health and Aging Trends Study (*N* = 27,547) to examine prevalence of probable dementia among the 70 and older population. To minimize the influence of potential learning effects on prevalence rates, we require individuals to meet probable dementia criteria at two consecutive rounds.
Results: Prevalence of probable dementia declines over this period by 1.4% to 2.6% per year. Declines are concentrated among women, non-Hispanic white and black groups, and those with no vascular conditions or risk factors. The latter group also has experienced declines in dementia incidence. Declines in prevalence are largely attributable to age- and education-related shifts in population composition.
Discussion: Given the role of age and educational composition in short-term declines, the United States is likely to continue to experience short-term declines in dementia prevalence. However, persistently high rates among minority groups, especially of Hispanic origin, are concerning, and, barring new treatments, long-run trends may reverse course.

Keywords: Alzheimer's disease, demography, epidemiology, population aging

Several national studies have suggested that the prevalence of dementia in the United States has decreased over the last few decades (Langa et al., 2008; Langa, Larson, & Crimmins, 2017; Manton, Gu, & Ukraintseva, 2005; Spillman 2011). For instance, using the Health and Retirement Study (HRS), Langa and colleagues (2008) found that in 1993, 12.2% of those aged 70 or older had cognitive impairment compared with 8.7% in 2002 (~3% per year). Using more recent waves from the HRS and a slightly different scale, Langa and colleagues (2017) found dementia prevalence among those aged 65 and older declined from 11.6% in 2000 to 8.8% in 2012 (~2% per year). Using a measure of cognitive impairment from the National Long Term Care survey, Spillman (2011) showed similarly sized declines in any cognitive impairment among those aged 70 or older from 13.3% in 1994 to 9.7% in 2004. However, epidemiological studies in more geographically limited areas of the United States have not shown declines in prevalence (Hall et al., 2009).

Prevalence trends are influenced by both disease incidence and shifts in mortality. Even if incidence was stable, dementia prevalence could be declining if mortality was falling among those without dementia or increasing among those with dementia. Relatively long intervals between data collection rounds have made the assessment of national incidence trends in the United States difficult. The longer the interval, the more likely under-detection of dementia will occur for persons who die between assessments. Nevertheless, a few epidemiologic studies have shown a decline in incidence of dementia in the United States for select areas (e.g., Rocca et al., 2011 for Rochester, MN) or for select groups (Satizabal et al., 2016) while others have not (Hebert et al., 2010).

Among the proposed explanations for declining prevalence or incidence of dementia is overall increasing quality and levels of education in older adults, contributing to better overall cognitive performance and/or greater cognitive reserve (Glymour et al., 2008). Another suggested explanation is improvement in the prevention or treatment of cerebrovascular conditions and risk factors such as stroke, hypertension, diabetes, and obesity (Langa et al., 2017). However, the association between these factors and decline in the frequency of dementia is complex and not well understood. Some studies have noted the prevalence of hypertension and, for men, obesity increased significantly between the earlier and more recent cohorts being studied (Egan, Zhao, & Axon, 2010; Flegal, Carroll, Kit, & Ogden, 2012). These shifts have been paralleled by a sizable increase in use of antithrombotics, anti-hypertensive, and lipid-lowering drugs, leading some to suggest that medications or aggressive treatment of these conditions may have led to declines in dementia prevalence. To date, studies have not attempted to formally decompose changes in dementia prevalence rates into contributions of shifting composition of the population (increasing levels of education, decreasing prevalence of vascular conditions, and risk factors thought to be related to dementia) versus shifting rates of dementia among particular subgroups (e.g., due to differential shifts in the quality of education or treatment of vascular conditions and risk factors).

In this article, we examine both the prevalence and incidence of probable dementia using the 2011–2015 waves of the National Health and Aging Trends Study (NHATS). Although the analysis is limited to a relatively short period, NHATS' annual design facilitates investigation of both prevalence and incidence and use of multi-round dementia criteria. We also decompose changes in dementia prevalence into changes in population composition and changes in dementia rates for particular population subgroups.

Background: Key Measurement Issues

One source of inconsistency across studies is the varied approaches to dementia assessment (Brookmeyer et al., 2011; Wilson et al., 2011). In-depth clinical evaluations, with more extensive cognitive testing, are often used in geographically restricted epidemiologic studies, whereas shorter cognitive screening instruments are typically used in national surveys. Often the screening instruments capture several domains of cognition such as working memory, executive functioning, and/or orientation.

Classification of dementia is most stable if based on cognitive decline over time or the requirement that the individual meets the threshold for dementia at multiple consecutive time points. Although comparison of tests/screener items with neuropsychological assessments suggest that survey-based tests can accurately predict a clinical diagnosis in a high proportion of cases (Crimmins, Kim, Langa, & Weir, 2011; Kasper, Freedman, & Spillman, 2013), current national survey-based estimates do not typically require an individual to meet the threshold at successive interview assessments. Multiple-wave criteria in survey-based measures are important for at least two reasons. First, instruments may be sensitive to practice effects (improvement upon repeat assessment), previously shown to be a particular issue between the first and second assessment (Vivot et al., 2016). Second, because cognitive performance may exhibit natural fluctuations that are not clinically meaningful, requiring individuals to meet multi-wave criteria reduces false positives. Trends may be biased if the size of these errors fluctuates from wave to wave.

Also important is choice of criteria (or "cutoff") to identify the population with dementia. Clinical researchers often use age- and education-specific norms to identify cases with dementia. The logic for norm-based criteria is that instruments for detecting dementia may differentially misclassify individuals in different age and education groups. More educated and younger individuals who perform well below their peers, even if above those with less education or those who are much older, may be misclassified as not having dementia if a uniform threshold is used. Likewise, too many individuals who are less educated or at very old ages may be erroneously identified with a uniform classification scheme. Survey-based studies of dementia trends to date, however, have generally used a uniform threshold across age and education groups in line with Berkman's (1986, p. 171) objection: "[I]f there is a possibility that some part of the association between educational level and mental status score is the result of the influence of this factor on a disease process ultimately resulting in senile dementia and subsequent mental deterioration, it would clearly be a mistake to 'adjust' for such a factor in the screening process for the disease." Investigation of bias, by examining sensitivity and specificity separately for more- and less-educated individuals, has been mixed (Anthony, LeResche, Niaz, von Korff, & Folstein, 1982; Jorm, Scott, Henderson, & Kay, 1988). Perspectives differ in part based on whether the objective is diagnosis or understanding of factors contributing to population-based estimates of disease prevalence and incidence.

For survey-based studies, methods also vary in use of proxy reports indicating dementia. For example, in Langa and colleagues (2008), researchers relied on proxy responses to: "How would you rate [the respondent's] memory at the present time?" and those rated as having fair or poor memory were considered to have cognitive impairment. In Langa and colleagues (2017), an 11-point scale was developed using the proxy's assessment of the respondent's memory, the proxy's assessment of whether the respondent had limitations in five instrumental activities of daily living (IADLs), and the interviewer's assessment of whether the respondent had difficulty completing the interview because of a cognitive limitation. Respondents with high scores (6–11) were classified as having dementia. Because older adults with dementia often are unable to participate in surveys and therefore have a proxy respond on their behalf, having a validated informant-based measure of dementia is critical for assessing national U.S. trends.

Unlike prior dementia trend studies using survey-based measures, in this study, we require that individuals meet the definition of probable dementia at two consecutive interviews. Our definition draws upon reports of a dementia diagnosis, a previously validated informant-based report (the AD8; Galvin et al., 2005), and for those who complete cognitive tests, scoring below a uniform threshold in two out of three domains. We also explore the sensitivity of findings to varying criteria for tests across age and education groups.

Data and Methods

We use the NHATS to examine short-term trends in the prevalence and incidence of probable dementia among persons aged 70 and older for the 5 years spanning 2011–2015.

Sample

The NHATS was designed to follow nationally representative cohorts of persons aged 65 and older, with periodic cohort replenishment. Individuals are interviewed annually in person. The baseline sample was initially interviewed in 2011 (N = 8,245), and the first replenishment sample was initially interviewed in 2015 (N = 8,334; approximately half of whom were continuing and the other half interviewed for the first time in 2015). NHATS samples were drawn from the Medicare enrollment file, which includes approximately 96%–97% of all adults aged 65 and older living in the United States. The small percentage of older adults who are not enrolled in Medicare includes those who never qualified for Social Security benefits and those who defer Medicare enrollment because of continued health insurance coverage through an employer. Response rates were 71% in 2011 and 77% in 2015, response rates for intervening years ranged from 86% to 91%.

Our analysis is limited to individuals aged 70 and older who completed a sample person interview (n = 25,843 observations; 6,201 in 2011; 5,093 in 2012; 4,338 in 2013; 3,748 in 2014; and 6,454 in 2015). We also produced estimates including nursing home residents to examine the sensitivity of our analyses to their omission (with nursing home participant n = 27,547 observations across all years added). In each year, sample weights are used so that the cross section represents the population aged 70 and older.

Measure of Probable Dementia

Individuals were classified as having probable dementia if they met the following criteria:

- the NHATS participant or a proxy respondent reported that a doctor had told the sample person that he/she had dementia or Alzheimer's disease (in the current or prior round);
- a proxy respondent gave answers to the AD8 that met criteria for likely dementia (a score of 2 or higher; Galvin et al., 2005; Galvin, Roe, Xiong, & Morris, 2006); or
- an individual scored at or below 1.5 *SD*s from the mean in at least two cognitive domains based on test items that evaluate the sample person's memory (immediate and delayed 10-word recall), orientation (date, month, year, and day of the week; naming the President and Vice President), and executive function (clock drawing test). Tests were administered to all self-respondents and to about half the cases that had a proxy respondent. We used the test scores for self-respondents if they did not report having a diagnosis of dementia. We also used the test scores for cases with proxy responses if there was no diagnosis, the proxy did not indicate behavior change consistent with dementia on the AD8, and the sampled person agreed to complete the tests. Uniform cutoffs were as follows: ≤3 (scale from 0 to 8) for orientation, ≤1 (scale from 0 to 5) for executive functioning, and ≤3 (scale from 0 to 20) for memory.

The NHATS definition shows good sensitivity and specificity against a dementia diagnosis in the Health and Retirement Study's ADAMS (see Kasper et al., 2013 for details). Across the five rounds, more than half (54%) of the cases with dementia were identified through reported diagnosis, 13% with the AD8 criteria, and the remaining 33% of cases by the test criteria.

Imposing two-round criteria

In exploratory analysis, we found that a small percentage of cases transitioned from being classified as having dementia to not having dementia in the follow-up round (mainly based on the tests) and that the percentage was higher from the first to second year (2%) compared with subsequent time periods (1%). Because this pattern suggested potentially different learning effects over time, we attempted to minimize these effects on trends by developing two-round criteria for prevalent and incident probable dementia. For prevalent dementia, we required individuals who had probable dementia in one round to also meet one of the three criteria (diagnosis, proxy reported, or score based) in the subsequent round. That is, the individual must either have probable dementia two rounds in a row or have probable dementia in one round followed by death or loss to follow-up. For incident dementia, we required individuals who did not have dementia in one round to be identified as having probable dementia in the next two rounds, or to have probable dementia in the next round followed by death or loss to follow-up.

Sensitivity to omission of nursing home population

We focus on individuals residing in settings other than nursing homes, in part because most covariates are not available for those initially residing in a nursing home (N = 460 in 2011 and 163 in 2015). Because the percentage of adults aged 70 and older living in nursing homes declined from 4.0% in 2011 to 3.1% in 2015, and dementia estimates in these settings are over 50% (Thomas, Dosa, Wysocki, & Mor, 2015), trends may be biased if this population is omitted. We explored the sensitivity of our descriptive results to omission of the nursing home population by assuming dementia prevalence for individuals living in these settings in the year they entered NHATS was in a range previously published for a long-stay cohort: 50% with moderate or severe cognitive impairment to 72% with mild, moderate, or severe cognitive impairment (Thomas et al., 2015). For this group, we explored three alternate prevalence assumptions: stable, increasing by 2% per year, and decreasing by 2% per year.

Sensitivity to age- and education-specific thresholds

In additional sensitivity analyses, we used differential cutoffs for test criteria by broad age and education groups. We selected these alternative cutoffs after examining the mean and standard deviations by age group (65–74, 75–84, and 85+) and education (less than high school, high school, some college, college graduate, or higher). For this analysis, we raised the thresholds for all three domains by one point for younger and more highly educated groups (aged 70–74 with some college, aged 70–74 with a college degree, and aged 75–84 with a college degree) and lowered the threshold for orientation and word recall by one point for older and less educated groups (aged 75–84 with less than high school, aged 85+ with less than high school, and aged 85+ with a high school degree). We did not lower the threshold for the executive functioning domain because the clock score ranged from 0 to 5 and the initial cutoff was set at ≤1.

Covariates

We estimated the prevalence of probable dementia by 10-year age groups, sex, race (white, non-Hispanic; Black, non-Hispanic; and other), completed education level (<12 years, high school, some college, college graduate, or higher), whether the individual reported ever having one or more cardiovascular or cerebrovascular conditions or risk factors (heart attack, hypertension, heart disease, diabetes, stroke, and obesity at age 50, measured by body mass index of 30 or higher, constructed from retrospectively reported height and weight), and by the number of such conditions (0, 1, 2, 3, or more).

Statistical Approach

For both prevalence and incidence trends, estimates are weighted using analytic weights appropriate to each trend, and all statistical tests adjust for the complex sample design of NHATS.

Prevalence

Tests of prevalence trends are from unadjusted linear regression models, with round entered into models as a linear variable with values 1 (indicating 2011/2012) through 5 (indicating 2015/2016). For prevalence analysis, we use current round analytic weights, which account for differential probabilities of selection and nonresponse (Montaquila, Freedman, Spillman, & Kasper, 2012). Round 5 estimates use the full replenishment sample and the corresponding analytic weight for the fully replenished cross-section.

Incidence and mortality

Incidence and mortality rates are adjusted for modest differences in person-months of exposure across waves, by dividing the percentage with onset (or dying) in each round by the average number of months between interviews. Tests of incidence trends are from multinomial logistic regression models estimated among the subgroup of individuals who were not identified as having probable dementia using the two-round dementia prevalence indicator and controlling for months of exposure. Models have three outcomes: (a) those who remain classified as not having probable dementia (omitted outcome); (b) those who are identified with probable dementia in the first follow-up round and in the following year they have probable dementia, die, or are lost to follow-up (incident dementia), and (c) those who die in the follow-up year (mortality). We also model mortality at follow-up among those with dementia controlling for months of exposure. Round is entered into models as a linear variable with values 1 (2011–2013) to 4 (2014–2016). Incidence and mortality estimates are weighted using the follow-up round analytic weight, which adjusts for loss to follow-up. Round 4 estimates use the 2011 cohort sample and corresponding analytic weight for the follow-up round.

Decomposition analysis

We also undertook a decomposition analysis to determine how much of the change in dementia prevalence is due to shifts in the composition of the population versus declines in the rate of dementia among particular subgroups (Kitagawa, 1955). Generally, the contribution of a change in the prevalence of a risk factor—say, having a high school education—to aggregate changes in dementia is the product of the change in the proportion of people in that educational group from the beginning to end years (denoted $X_{\text{end year}} - X_{\text{beginning year}}$) and the probability of having dementia given a high school education averaged over the beginning and end years (denoted $(\beta_{\text{end year}} + \beta_{\text{beginning year}}) / 2$). The contribution of a change in the probability of having dementia given a particular education level is a multiple of the difference in that level of education's effect on dementia over time ($\beta_{\text{end year}} - \beta_{\text{beginning year}}$)and the average proportion having that level of education ($(X_{\text{end year}} + X_{\text{beginning year}})/2$). The total high school effect is the sum of the two components and the total education effect is the sum of the pieces for all levels of education (except the omitted level). We use the procedure developed for regression models as described in Sinning, Hahn, and Bauer (2008). Standard errors for the total composition and coefficient effects were generated using a bootstrap methodology.

Results

Population Composition

Even over this relatively short time frame, the age distribution of the population aged 70 and older (excluding nursing home residents) shifted toward the 70–79 year old group (see left side of Table 1). In addition, the population became more racially/ethnically diverse, the percentage with less than 12 years of education fell from 23.9% in 2011 to 18.5% in 2015, and the proportion with three or more vascular risk factors or conditions also shifted upward over time.

Prevalence

The prevalence of probable dementia declined over this 5-year period from 10.6% in 2011 to 9.9% in 2015, or on average 1.7% per year (p = .087; Table 2). Declines were statistically significant at or below the conventional .05 level for women, for White and Black older adults (but not for Hispanic/other racial groups), and for those with no vascular conditions or risk factors (see right side of Table 1).

Table 1. Distribution of Characteristics of U.S. Adults Aged 70 and Older and Prevalence of Probable Dementia, 2011–2015

	Distribution of Characteristics						Prevalence of Probable Dementia					
	2011	2012	2013	2014	2015	*p*-Value[a]	2011	2012	2013	2014	2015	*p*-Value[b]
Age						.000						
70–79	61.1	60.7	62.2	62.4	64.2		5.3	5.2	5.4	4.7	4.9	.377
80–89	33.0	32.9	31.4	31.1	29.4		16.3	16.7	16.3	15.6	16.1	.605
90+	5.9	6.4	6.5	6.5	6.5		32.7	31.7	30.8	31.9	30.6	.598
Sex						.338						
Men	42.0	42.0	43.1	42.9	43.3		9.2	9.6	9.6	8.8	9.6	.993
Women	58.0	42.6	56.9	57.1	56.7		11.5	11.5	11.1	10.7	10.1	.027
Race/ethnicity						.000						
White, non-Hispanic	80.9	81.2	80.8	81.2	78.6		9.4	9.5	9.2	8.5	8.4	.025
Black, non-Hispanic	7.9	8.1	8.2	7.9	8.0		15.9	14.9	13.6	12.2	12.7	.006
Hispanic/other	11.2	10.7	11.0	10.8	13.4		15.2	16.3	17.2	18.0	17.0	.303
Education						.000						
< 12 years	23.9	23.2	21.5	19.3	18.5		18.3	19.5	20.5	18.9	18.9	.834
High school	29.6	29.4	28.2	28.3	30.1		11.4	10.5	9.4	10.3	11.0	.778
Some college	24.7	24.1	24.9	25.2	25.3		6.3	7.3	7.4	6.6	6.2	.647
College graduate	21.8	23.3	25.5	27.2	26.1		5.7	5.7	5.9	6.0	5.6	.944
Any vascular conditions/risk factors						.000						
No	19.9	19.1	18.3	16.9	19.6		8.2	7.3	7.1	5.9	5.4	.012
Yes	80.1	80.9	81.7	83.1	80.4		11.1	11.5	11.2	10.7	11.0	.367
Any vascular conditions/risk factors						.000						
0	19.9	19.1	18.3	16.9	19.6		8.2	7.3	7.4	5.9	5.4	.012
1	34.9	33.5	32.3	31.7	31.9		8.6	8.2	7.9	7.9	7.8	.334
2	24.2	24.9	25.5	26.3	26.4		11.6	10.9	11.1	10.4	10.4	.312
3+	21.0	22.5	23.9	25.1	22.1		14.9	17.1	15.7	14.4	16.1	.890

Note. Excludes residents of nursing homes.

[a]*p*-Value for chi-square test.

[b]*p*-Value for trend from regression model adjusted for survey design with continuous measure for year.

Table 2. Prevalence of Probable Dementia With and Without Nursing Home Residents, US Adults Aged 70 and Older, 2011–2015

	2011	2012	2013	2014	2015	p-Value[a]
Nursing home residents excluded	10.6	10.7	10.4	9.9	9.9	.087
Nursing home residents included						
Prevalence in nursing homes (long stay) 50%						
Stable	12.1	12.4	12.1	11.8	11.3	.057
Decreases by 2% per year	12.1	12.4	12.0	11.7	11.2	.038
Increases by 2% per year	12.1	12.4	12.1	11.8	11.4	.102
Prevalence in nursing homes (long stay) 72%						
Stable	13.0	13.1	12.5	12.1	11.8	.010
Decreases by 2% per year	13.0	13.0	12.4	12.0	11.7	.006
Increases by 2% per year	13.0	13.1	12.5	12.1	11.9	.018

[a]p-Value for trend from regression model adjusted for survey design with continuous measure for year.

Table 3. Annual Incidence of Dementia and Mortality by Dementia Status Among US Adults Aged 70 and Older, 2011–2104

	Among those Without Dementia					Among those With Dementia				
	2011	2012	2013	2014	p-Value[a]	2011	2012	2013	2014	p-Value[a]
All										
Dementia incidence	3.9	3.4	3.1	3.4	.368	NA				
Mortality	3.1	3.8	3.1	2.9	.888	16.3	19.0	17.1	19.3	.309
Women										
Dementia incidence	3.7	4.0	3.1	3.4	.643	NA				
Mortality	2.7	3.1	2.8	2.8	.641	13.4	20.8	15.6	19.1	.889
Non-Hispanic white										
Dementia incidence	3.5	3.0	2.8	2.8	.382	NA				
Mortality	3.2	4.0	3.0	3.0	.803	16.4	19.9	16.5	20.5	.502
Non-Hispanic black										
Dementia incidence	4.9	3.5	3.6	3.7	.579	NA				
Mortality	1.9	3.5	4.6	4.0	.003	15.3	20.3	22.2	13.4	.543
No vascular conditions/risk factors										
Dementia incidence	3.3	3.0	2.5	1.5	.079	NA				
Mortality	1.7	2.0	1.4	1.1	.418	13.1	20.8	22.2	22.3	.630

[a]p-Value for trend from multinomial logistic regression, controlling for months between rounds. See text for details.

Sensitivity to Nursing Home Population

Including the nursing home population increases the estimates and strengthens the declines, which are significant at or below the conventional .05 level for all but two sets of assumptions (prevalence among long-stayers 50% and stable or increasing; Table 2).

Incidence of Dementia and Mortality

Among those without dementia, annual dementia and mortality incidence did not change significantly over the period (Table 3). Annual mortality among those with dementia ranged from 16.3% to 19.3%, but did not follow a regular pattern (p = .309 for linear trend). Among subgroups with significant prevalence trends, dementia incidence declined for those with no vascular conditions or risk factors (from 3.3% to 1.5%; p = .079) and mortality increased for the non-Hispanic Black group without dementia.

Decomposition of Prevalence Trends

The change in prevalence between 2011 and 2015 was 0.7 percentage points (Table 4). Of this decline, 67% was attributable to shifts in the composition of the older population (p = .010), and the most important factors were the decline in the share of the older population between the ages of 80 and 89 years and the increase in the proportion of college graduates. The remainder of the decline was attributed to shifts in the prevalence of dementia among subgroups of the population, primarily the decrease in prevalence for older women (33%; p = .716). However, prevalence increased among those with vascular conditions and risk factors. Findings are robust when individual conditions/risk factors are used in place of a count (Supplementary Table 1).

Table 4. Decomposition of Trends in Probable Dementia Prevalence, US Adults Aged 70 and Older, 2011-2015

	Prevalence		Coefficient		Decomposition		
	2011	2015	2011	2015	Composition effect	Coefficient effect	Total
Age 80–89 (vs. 70–79)	0.330	0.294	0.105	0.104	−0.004	0.000	−0.004
Age 90+ (vs. 70–79)	0.059	0.065	0.266	0.250	0.001	−0.001	0.001
Female	0.580	0.567	0.008	−0.003	0.000	−0.006	−0.006
Black, non-Hispanic (vs. white)	0.079	0.080	0.047	0.019	0.000	−0.002	−0.002
Hispanic/Other	0.112	0.134	0.040	0.065	0.001	0.003	0.004
High school	0.296	0.301	−0.050	−0.054	0.000	−0.001	−0.002
Some college	0.247	0.253	−0.092	−0.087	−0.001	0.001	0.001
College graduate	0.218	0.261	−0.092	−0.085	−0.004	0.002	−0.002
1 vs. 0 risk factors	0.349	0.319	−0.010	0.008	0.000	0.006	0.006
2 vs. 0	0.242	0.264	0.013	0.028	0.000	0.004	0.004
3+ vs. 0	0.210	0.221	0.042	0.079	0.001	0.008	0.009
Constant	1.000	1.000	0.092	0.076	0.000	−0.015	−0.015
Total					−0.005	−0.002	−0.007
% of change					66.7%	33.3%	
p-value					0.010	0.716	

Sensitivity to Age- and Education-Specific Thresholds

Conclusions about trends are robust to the use of age- and education-variable thresholds (Supplementary Tables 2–5). Prevalence is lower and trends are slightly dampened with variable thresholds, but subgroups experiencing declines using a uniform definition also do so using the variable threshold approach. Annual incidence and mortality findings are also robust with one exception: dementia incidence appears to decline among the non-Hispanic black group (from 5.5% to 3.2%, p = .064). The decomposition of prevalence is also robust: 73% is attributable to shifts in the composition of the older population and 27% to declines in rates among subgroups.

Discussion

This article investigated short-term changes from 2011 to 2015 in the prevalence and incidence of probable dementia among adults aged 70 and older in the United States using the NHATS. We developed conservative criteria for probable dementia that drew upon two rounds of information and therefore was more resistant to bias from learning effects (especially between the first and second administration). The samples were weighted to represent the older Medicare beneficiary population living in the community in each year.

We found small, statistically significant declines in prevalence of probable dementia over this relatively short period of 1.4%–2.6% per year. Declines in prevalence were concentrated among women, non-Hispanic white and non-Hispanic black groups, and those with no history of heart attack, heart disease, hypertension, diabetes, stroke, or midlife obesity. Only those with no history of vascular conditions and risk factors experienced declines in dementia incidence. We found that declines in dementia prevalence were largely attributable to compositional shifts with respect to age and education. Declines in the debilitating effects of vascular conditions and risk factors did not contribute to declines in prevalence. Findings were robust to alternative definitions of dementia using age- and education-specific thresholds.

Our study has several limitations. The number of rounds currently available is limited and the study does not include the more comprehensive detailed clinical evaluations to assess dementia that are more typical in epidemiologic studies. More than half of the cases are classified as having probable dementia based on reports of a diagnosis; the remaining cases were identified through reports from a proxy respondent based on the AD8 or through below average performance on two of three domains. Cognitive performance is based on a relatively small number of tests, and although validated for their sensitivity and specificity relative to clinical measures, they are subject to error. However, in order for measurement errors to result in biased trends, the errors must differ across rounds. For instance, it is possible that for the subset of persons classified as probable dementia in one round who die by the next round, the measures are picking up some end-of-life terminal decline that would not meet clinical criteria for a dementia diagnosis, but unless such errors are larger, for example, at Round 2 than Round 5, they are unlikely to account for trends. Moreover, for most individuals, we minimized differences in error over time, for instance, because of initial learning effects, by requiring subjects to meet probable dementia criteria at two consecutive rounds.

A second limitation is that given the relatively small number of cognitive tests administered we were not able to fully address whether differential cutoffs by age and education group would lead to different conclusions. However, we found that our conclusions about trends were robust in sensitivity analyses that used different cutoffs for three such groups. More generally, we did not attempt to address the related issue of whether instruments designed many years ago, as is the case for many widely used cognitive screening instruments, are appropriately normed for use over time. Some have cautioned that because IQ scores have been improving in the population (the "Flynn effect"), neuropsychological assessments may need to be re-normed (Dickinson & Hiscock, 2011). Because tests are used for less than one-third of those identified with dementia and the time period is relatively short, in this analysis this particular effect is unlikely to be biasing conclusions about trends.

Third, our finding of no significant trend in dementia prevalence among those with vascular conditions and risk factors was based on a count of broad condition groups that were self-reported (e.g., heart attack, hypertension, heart disease, diabetes, stroke, obesity at age 50). Although we explored each factor separately and found our conclusions were robust, it may be that reliance on self-reports, which are known to be error prone, masks these effects. In addition, we did not have direct information about treatments or specific vascular-related events. Nor were we were able to consider cholesterol, although at least one study has found having high LDL cholesterol has a particularly strong association with cognitive decline (Helzner et al. 2009).

Despite these limitations, our findings add to the literature on dementia trends in the United States. Consistent with Langa and colleagues, we find over a shorter and more recent time frame that dementia has declined by about 1.4%–2.6% per year. Given our conclusion that dementia prevalence is declining, in part due to the shifting age and educational composition of the population, the United States is likely to continue to experience declines in the very near future, as the Baby Boom enters their 70s (beginning in 2016). However, the longer term is more difficult to predict. Although others have suggested treatments for vascular-related conditions and risk factors may have had positive spillover effects for dementia prevalence, our finding that dementia rates were stable among those with such risk factors may signal that this effect is leveling off as a contribution to population-level trends. The persistently high rates of probable dementia among minority groups, especially those of Hispanic origin, are also of concern, given that such groups are a growing segment of the older population. Once the Baby Boom generation reaches the ages for which the risk of dementia is highest, barring new treatments, the numbers living with dementia will almost certainly increase and the declines in dementia prevalence could very well reverse. Given impending population shifts, continued monitoring of this trend at the national level, along with its causes and consequences, is needed.

Supplementary Material

Supplementary data are available at *The Journals of Gerontology, Series B: Psychological Sciences and Social Sciences* online.

Funding

This work was supported by the National Institute on Aging of the National Institutes of Health (U01 AG032947 and P30 AG012846).

Acknowledgments

An earlier version of this article was presented at the 2017 Disability TRENDS Network meeting on population level trends in dementia. The views expressed are those of the authors alone and do not represent those of their employers or the funding agency.

Conflict of Interest

None declared.

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