Projections of the Prevalence and Incidence of Dementias
Including Alzheimer's Disease
for the Total Veteran, Enrolled and Patient Populations
Age 65 and Older
September 2013

Introduction

The Department of Veterans Affairs (VA) Central Office Geriatrics and Extend Care (GEC) Services Program Office determined that projections of the numbers of Veterans with Dementia which were established in 2004 (Office of the Assistant Deputy Under Secretary for Health (ADUSH)) needed to be updated to reflect the most recent changes in the Veteran population projections. The GEC Services Program Office requested assistance in obtaining these updated projections and Dementia estimates. This paper, prepared by the Office of the Assistant Deputy Under Secretary for Health for Policy and Planning (ADUSH/PP), serves to describe the methodology used to develop a series of estimates of incidence and prevalence of Dementia in the identified Veteran populations.

Purpose

This analysis provides projected estimates of the number of Veterans with Dementia including Alzheimer's disease for FY14 through FY33, within each of the following segments of the Veteran population: 1) the general Veteran population (i.e. VetPop); 2) the Enrolled population (i.e. those Veterans enrolled in the VA health care system); and 3) the Patient population (i.e. those Veterans enrolled and receiving care within the VA health care system).

Background

Dementia is a general designation for mental deterioration characterized by a loss of intellectual abilities, such as memory, judgment, and abstract thinking, of sufficient degree to interfere with social or occupational functioning. Dementia is one of the major health problems in our aging society. As the Veteran population ages, it is important that the Veterans Health Administration (VHA) assess the potential need for health care services and plan for those services. For internal planning purposes, the VA has relied upon the projection estimates created in 2004 by the VHA Office of the ADUSH for Policy and Planning.

To further assist with VHA's internal planning efforts, the Office of the ADUSH for Policy and Planning has performed a new study to provide up to date current and projected estimates of the number of Veterans with dementia including Alzheimer's Disease, within each of the following segments of the Veteran population: 1) the general Veteran population (i.e. VetPop); 2) the enrolled population (i.e. those enrolled in the VA health care system); and 3) the patient population (i.e. those enrolled and receiving care within the VA health care system).

General Methodology

Dementia includes significant impairment in social or occupational functioning that represents a decline from a previous level of functioning. Common clinical signs of dementia include cognitive, emotional and behavioral disturbances. Alzheimer's Disease (AD) is a specific kind of dementia which along with Vascular Dementia (VaD), represent the vast majority of cases of dementia.[1]

AD is differentiated from other dementias on the basis of its cause, but that cause is not, in fact, well understood. AD is accepted as a distinct disease entity because AD patients manifest specific kinds of abnormalities in the brain differing from the abnormalities found in other dementias. The study rates selected for inclusion into the analysis are all from studies of living subjects.

Additionally, the studies employed in this analysis utilized various criteria to screen and diagnose dementia. Based upon the diverse and various criteria of these studies and the fact that all studies were of living subjects, we believe that the analysis of incidence and prevalence projections accurately represents all dementias, especially at the high level of the estimation.

To complete the updated analysis, it was necessary to establish disease prevalence rates (i.e. how many people have a disease at a given time) and the incidence rates (i.e. the number of new cases). At the guidance of an advisory oversight committee of dementia experts internal and external to the VA, several studies were selected as best sources for these rates. These studies included:

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[1] Plassman, B. ., & Langa, K. M., et. al. (2007). Prevalence of Dementia in the United States: The Aging, Demographics and Memory Study. *Neuroepidemiology*, *29*, 125–132.

- Breitner, 1999
  The study screened for dementia with a brief cognitive test and structured telephone Dementia Questionnaire, then examined all individuals with apparent cognitive symptoms and a sample of others. Study estimated age-specific prevalence of AD and other dementias and used multiple logistic regression models to describe relation of AD prevalence to age, sex, education, and Apo lipoprotein E (ApoE) genotype.

- Canadian Study of Health and Aging (CSHA), 2000
  A 5-year cohort study of 10,263 seniors was undertaken, including community and institutional samples. The baseline study in 1991 identified 1,132 prevalent cases of dementia through screening and clinical examination. The remaining 9,131 cases formed the incidence study sample and were rescreened and selectively reexamined in 1996. Incident cases were diagnosed using established criteria. Incidence was estimated based on the 1991 population, and included data on those who died between the first and second phases of the study.

- Miech, 2002
  Using a multistage screening process in 1998 and 1999, and reexamining 122 individuals who had been identified 3 years earlier as cognitively compromised but not demented, the authors found 185 individuals with incident dementia (123 with AD) among 3,308 participants who contributed 10,541 person-years of observation. Adjusting for non-response and screening sensitivity, the authors estimated the incidence of dementia and of AD for men and women in 3-year age intervals. Multivariate discrete time survival analysis was used to examine influences of age, sex, education, and ApoE genotype, as well as interactions of these factors.

- Plassman, 2007
  The study sample was composed of 856 individuals aged 71 years and older from the nationally representative Health and Retirement Study (HRS) who were evaluated for dementia using a comprehensive in home assessment. An expert consensus panel used this information to assign a diagnosis of normal cognition, cognitive impairment but not demented (CIND), or demented (and dementia subtype). Using sampling weights derived from the HRS, the study estimated the national prevalence of dementia, AD, and vascular dementia by age and gender.

- Plassman, 2011
  Participants in the Aging, Demographic, and Memory Study (ADAMS) were evaluated for cognitive impairment using a comprehensive in-home assessment.

A total of 456 individuals aged 72 years and older, who were not demented at baseline, were followed longitudinally from August 2001 to December 2009. An expert consensus panel assigned a diagnosis of normal cognition, cognitive impairment but not demented (CIND), or dementia and its subtypes. Using a population weighted sample, the authors estimated the incidence of dementia, Alzheimer disease (AD), vascular dementia (VaD), and CIND by age. The study also estimated the incidence of progression from CIND to dementia.

The selected study rates were then applied to the current and projected number of Veterans within the general Veteran population, the enrolled population and the patient population to calculate estimated numbers of cases of disease and estimated new cases of disease within each of the forecasted years. See Figure 1.

Figure 1 - Overview of the process for calculating yearly estimates of Incidence and Prevalence of Dementias for a given population, age band and gender category.

The analysis started with FY13 as its beginning year and first projected year was FY14, with subsequent yearly projections through FY33. Read the figure below from top to bottom.

Step 1: Calculate the starting or prior year population without Dementia by applying the age/gender specific prevalence rate to the total starting or prior year population.
Step 2: Apply the age/gender specific incidence rate to prior year's population without Dementia to estimate new cases of Dementias in the projected year. (I)
Step 3: Apply age/gender specific prevalence rate to the Projected Year Population to estimate the Population with Dementia in the projected year. (P)
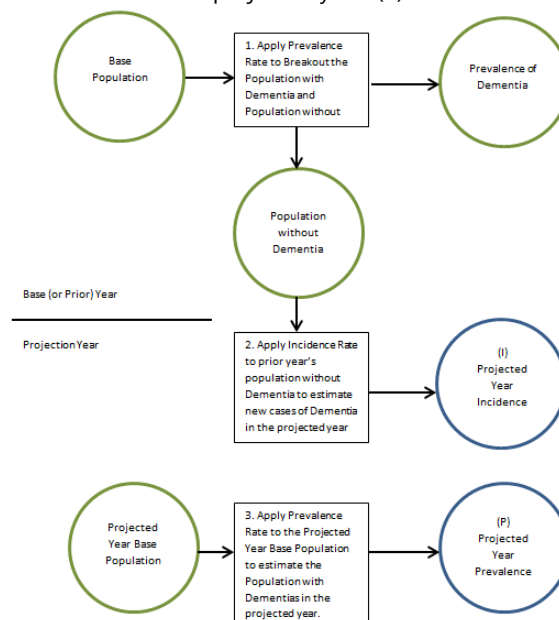
Specific Methodology

Segments of the Veteran population: 1) the general Veteran population; 2) the enrolled population; and 3) the patient population were determined using the Base Year 2012 Enrollee Health Care Projection Model (EHCPM) provided by the ADUSH/PP Office of Policy Analysis and Forecasting (PA&F).

Veteran Populations– Defined

Total General Veteran Population (Fiscal Years ending 2014-2033) – "Veterans"

The Veteran Population is an estimate of all living Veterans in the United States from which a subset choose to enroll in the Veterans Health Benefits program (Enrollees 8.5 million in FY12) from which a subset choose to seek health care services (Patients 5.9 million in FY12).

Veteran Population projections (22.8 million in FY12) were taken from VetPop Proxy. VetPop Proxy is derived from VA's VetPop2011, which is VA's official estimate and projection of the number and demographic characteristics of the Veteran population. VetPop Proxy shows Veteran projections at a greater level of detail than VA's VetPop 2011, including age, gender and Veteran geography. This level of detail was necessary for making the 19-year case estimates. The 19-year case estimates were established by applying the prevalence and incidence rates of selected studies to the population projections from VetPop Proxy. It should be noted that even though a population may be decreasing in total size, a larger proportion at the highest age levels can explain an increasing number of occurrences of dementia.

VA Enrolled Population (Fiscal Years ending 2014-2033) – "Enrollees"

Estimates of the enrollee population were taken from Base Year 2012 EHCPM. It should be noted that enrollees in this population are both institutional and non-institutional. Case estimates are the result of applying the selected study rates to the model projections for the years 2014-2033.

VA Patient Population (Fiscal Years ending 2014-2033) – "Patients"

Projections of the patient population were taken from the Base Year 2012 EHCPM. Case estimates are the result of applying the selected study rates to the model projections for the years 2014-2033.**Prevalent Cases (Total Cases)**

Prevalence rates for both "All Dementia" and "Alzheimer's" were applied to the number of Veterans, enrollees, and patients by geography, age band, and gender at fiscal year-end. This resulted in the total number of "All Dementia" and "Alzheimer's" cases at fiscal year-end.

The Analysis used the following Study Rates by Age Band and Gender for Prevalence of <u>All Dementia</u> from the following Studies:

65-69	Breitner, 1999
71-79	Plassman, 2007
80-89	Plassman, 2007
90+	Plassman, 2007

The Analysis used the following Study Rates by Age Band and Gender for Prevalence of <u>Alzheimer's Disease</u> from the following Studies:

65-69	Breitner, 1999
71-79	Plassman, 2007
80-89	Plassman, 2007
90+	Plassman, 2007

As shown in the sample tables and graphs below, a range of rates is provided at the low, middle and high levels. Middle represents the average rate reported in the various research studies, with Low and High set at the lower and upper bound of the 95% confidence interval respectively.

Table 1. Dementia Prevalence Rates Used in the Analysis - by Age and Gender

	Female			Male		
Age Band	**Low**	**Middle**	**High**	**Low**	**Middle**	**High**
65-69	0.23%	1.29%	2.35%	0.46%	1.58%	2.70%
71-79	1.82%	4.76%	7.70%	1.25%	5.25%	9.25%
80-89	20.41%	27.84%	35.28%	11.66%	17.68%	23.70%
90+	23.36%	34.69%	46.02%	21.70%	44.59%	67.47%

Dementia Prevalence Rates
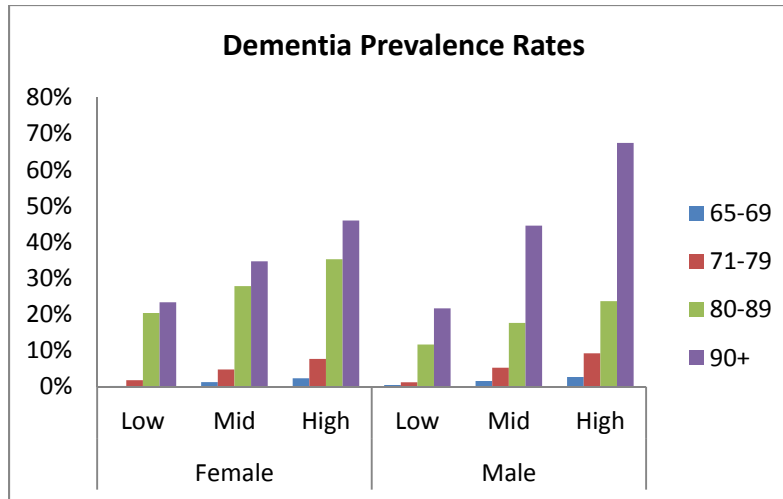
Table 2. Alzheimer's Prevalence Rates Used in the Analysis - by Age and Gender

	Female			Male		
Age Band	Low	Middle	High	Low	Middle	
65-69	0.00%	0.86%	1.72%	0.00%	0.35%	0.84%
71-79	0.95%	2.33%	3.70%	0.80%	2.30%	3.81%
80-89	14.44%	21.34%	28.24%	5.82%	12.33%	18.84%
90+	17.61%	28.15%	38.69%	10.00%	33.89%	57.77%

Alzheimer's Prevalence Rates
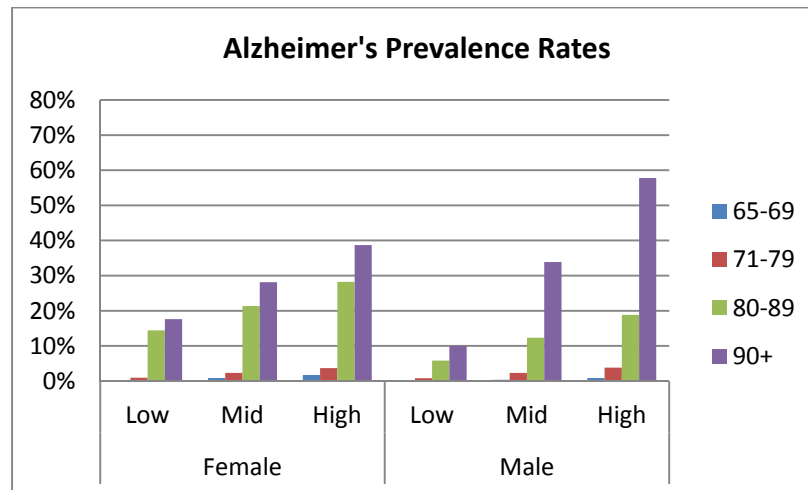
Incident Cases (New Cases)

Incidence rates for "All Dementia" were applied to the number of non-demented Veterans, enrollees, and patients by geography, age band, and gender at the beginning of the fiscal year. This resulted in the total number of new "All Dementia" cases that occurred during the fiscal year.

The number of new "Alzheimer's" cases was calculated using the same methodology as was used with the number of new "All Dementia" case calculation, except that "Alzheimer's" incidence rates were used instead of "All Dementia" incidence rates.

The analysis used the following Study Rates by Age Band and Gender for Incidence of <u>All Dementia</u> from the following Studies:

65-69	CSHA, 2000
70-74	CSHA, 2000
75-79	CSHA, 2000
80-84	CSHA, 2000
85+	CSHA, 2000

The analysis used the following Study Rates by Age Band only for Incidence of <u>Alzheimer's Disease</u> from the following Studies:

65-69	Miech, 2002
71-79	Plassman, 2011
80-89	Plassman, 2011
90+	Plassman, 2011

An explanation of the age banding methodology is provided in the following section, "Age Banding".

As shown in the sample tables and graphs below, a range of rates is provided at the low, middle and high levels. Middle represents the average rate reported in the various research studies, with Low and High set at the lower and upper bound of the 95% confidence interval respectively.

Table 3. All Dementia Incidence Rates - by Age and Gender

Age Band	Female			Male		
	Low	Middle	High	Low	Middle	High
65-69	0.24%	0.71%	1.18%	0.07%	0.37%	0.73%
70-74	0.44%	0.79%	1.15%	0.94%	1.47%	2.01%
75-79	1.33%	1.93%	2.53%	1.84%	2.65%	3.46%
80-84	3.32%	4.40%	5.48%	2.75%	3.86%	4.97%
85+	8.60%	11.02%	13.43%	7.40%	9.90%	12.40%

Dementia Incidence Rates
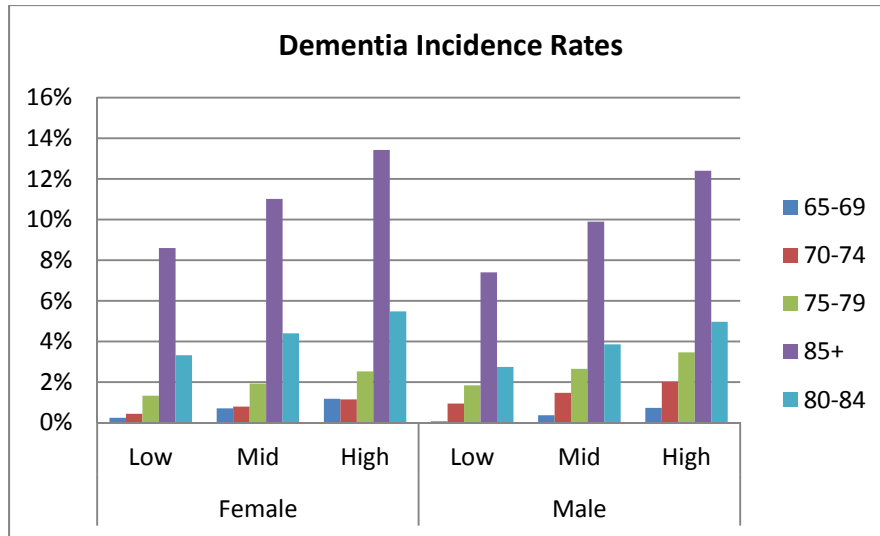
Table 4.   All Gender Alzheimer's Incidence Rates (Gender not broken out in studies), by Age

Age Band	Low	Middle	High
65-68	0.00%	0.22%	0.42%
72-79	0.80%	1.66%	2.51%
80-89	1.50%	2.42%	3.34%
90+	3.18%	6.40%	9.62%

Alzheimer's Incidence Rates
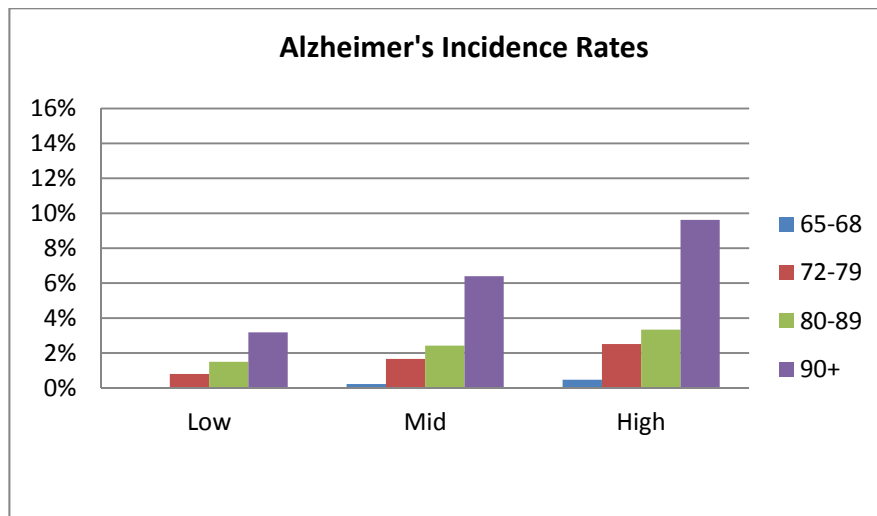
Age Banding

The analysis rates were produced in four age bands: 65-69; 70-79; 80-89 and 90+, by gender for both All Dementia and Alzheimer's disease.

Base Age Data

The population projection age banding in the data from the ADUSH/PP Office of Policy Analysis and Forecasting (PA&F) did not match exactly with the reference study age bandings; therefore, a specific methodology as to the assignment of rates and age bands had to be determined as part of the analysis.

The base projection data by age received from the ADUSH/PP Office of Policy Analysis and Forecasting (PA&F) was broken out by individual age year. This data was simply grouped into age bands to match those in the reference studies. Data for those Veterans 85 and older was originally received as grouped data. This grouped data was split into 85-89 and 90+ age bands prior to applying "All Dementia" and "Alzheimer's" rates. This split was made in accordance with the gender, geographic, and age distribution of FY12 historical enrollee data set.

The PA&F out year projections for Veterans and enrollees contained age banding of 65-69, 70-74, 75-79, 80-84, and 85+. In order to have age bands that matched study rate age bands, the 85+ band was split into 85-89 and 90+ age bands. This split was done prior to applying "All Dementia" and "Alzheimer's" rates and was made in accordance with the gender, geographic, and age distribution of FY12 historical enrollee data.

The PA&F out year projections for patients contained age banding of 65-84 and 85+. In order to have age bands that matched study rate age bands, these age bands were split into age bands 65-69, 70-74, 75-79, 80-84, 85-89, and 90+. This was split was done prior to applying "All Dementia" and "Alzheimer's" rates and was made percentagewise by the gender, geography, and age band combinations given in the PA&F enrollee projections (after the PA&F enrollee 85+ age band had already been split into 85-89 and 90+ age bands).

Reporting Age Band Data

Because the selected studies' age banding did not match exactly with the age bandings requested for the analysis, specific methodology as to the assignment of rates and age bands was determined. The methodology was used as follows:

- The prevalence rates of the 71-79 age band were applied to the cohort of 70-79 year olds for both "All Dementia" and "Alzheimer's". *It is possible that this may cause a slight overestimation of "All Dementia" and "Alzheimer's" total cases in our cohort of 70-79 year olds.*

- The incidence rates of the 72-79 age band were applied to the cohort of 70-79 year olds for "Alzheimer's." *It is possible that this may cause a slight overestimation of "Alzheimer's" new cases in our cohort of 70-79 year olds.*

- The incidence rates of the 65-68 age band were applied to the cohort of 65-69 year olds for "Alzheimer's*." It is possible that this may cause a slight underestimation of "Alzheimer's" new cases in our cohort of 65-69 year olds.*

- The "All Dementia" incidence rates used in the analysis did not include rates for the 85+ age band but did include rates for the 90+ age band. Due to this discrepancy, the analysis methodology applied the 90+ incidence rates to Veterans, enrollees, and patients in the 85-89 and 90+ age band. If the actual rate of incidence in the 85-89 age band is slightly lower than the 90+ age band use of the same rate for both age bands may slightly over estimate the projections in the 85-89 age band.

- The "All Dementia" incidence rates applied to the 85-89 and 90+ age bands in the analysis were study rates for the 85+ age band. This was due to the fact that the reference study containing "All Dementia" incidence rates contained incidence rates for 85+ age bands, but did not contain 85-89 and 90+ age bands.

Gender

The analysis included gender breakout where possible. In the case of Alzheimer's incidence rates for all Veteran populations (Veterans, Enrollees and Patients) in age bands 65-69, 70-79, 80-89, and 90+, only the category of "All Gender" is shown and is not broken out to show male and female separately as there were no applicable reference study rates.

For Incidence of All Dementia, the analysis applied the 70-74 age band rates to Veteran populations (Veterans, Enrollees and Patients) aged 70-74 by gender, applied the 75-79 age band rates to Veteran populations aged 75-79 by gender, and added the resulting populations together to create incidence of dementia in Veteran populations aged 70-79 by gender.

The study used the same approach for creating the number of new cases of dementia for Veteran populations aged 80-89 by gender.

Caution should be observed when breaking out gender in the projections. Due to the relatively low number of female Veterans, enrollees and patients, the number of

incidences and prevalence of female Veterans with dementia are also very small, most especially when drilling down to a specific age range, dementia status, VISN, market, state or fiscal year.

Geography

The analysis includes projection breakouts by state, VISN and market. The patient population projections from PA&F data contained age banding of 65-84 and 85+, and the projections were not broken out by state. In order to project "All Dementia" and "Alzheimer's" patients in age bands 65-69, 70-79, 80-89, and 90+, and by state, the analysis methodology required splitting the PA&F patient population projections percentagewise by the gender, geography, and age band combinations given in the PA&F enrollee projections (after the PA&F enrollee 85+ age band had already been split into 85-89 and 90+ age bands).

The resulting estimates are calculated for three different geographic breakouts:

- State – the 50 US states plus District of Columbia and Puerto Rico.
- Market – a geographic unit, defined and used by VHA's planning community, made up of a set of counties that usually contains at least one, or in some markets multiple, VA Medical Centers (VAMCs) and their associated clinics, generally designed to operate as an independent health care system. There are 81 markets that rollup to the 21 Veterans Integrated Service Networks (VISNs). Market boundaries can cross state boundaries.
- VISN – Veterans Integrated Services Networks are the 21 VHA corporate operation units defined along county boundaries but do not comport with state boundaries.

Modeling Estimates – Low/Middle/High - Confidence Intervals

The reference studies used for this analysis contained "All Dementia" and "Alzheimer's" prevalence and incidence rates specific to the samples used, as well as 95% confidence intervals for those rates, standard errors for those rates, or both. With these research findings a range of projections representing low, middle and high estimates were calculated using the lower limit of the 95% confidence limit, average and upper limit of the 95% confidence interval respectively.

The majority of the reference studies contained 95% confidence intervals. If a study did not contain 95% confidence intervals, intervals were created through the modeling

based on the standard errors given in the reference study paper. The analysis used the sample rates as middle rates, and then used the lower and upper bounds of the 95% confidence intervals as its low and high rates respectively. The rates were then multiplied by the Veteran, enrollee, and patient populations to create our "All Dementia" and "Alzheimer's" projections.

For "Alzheimer's" incidence and prevalence rates for the age band 65-69, the analysis created 95% confidence intervals using standard errors because confidence intervals were not given in the reference study papers from which these rates came. The lower bounds for these particular 95% confidence intervals turned out to be marginally negative. To correct for this, we set the lower bounds for these specific confidence intervals to zero.

Comparison Between 2004 and 2013 Analyses

The reported projection estimates between the 2004 and the 2013 studies vary for certain combinations of age band and estimate levels in all Veteran populations (Veterans, Enrollees and Patients). The variance is attributable to two causes: 1) Base Population between 2004 and 2013 studies changed from VetPop2000 to VetPop2011 and 2) the methodologies used to determine incidence and prevalence rates are different. The rate and methodologies were updated in this analysis to employ the most recent research study findings. For example, the table below provides a comparison of the projected national level patient population between the 2004 and the 2013 studies for incidence and prevalence by gender and aggregated age bands, for two selected years.

Table 5. 2004 & 2013 Study Comparison, National Estimate of Patients

Comparison Between 2013 Study and 2004 Study of the Prevalence and Incidence of Dementias
Low, Middle and High National Estimates of Patients For All Dementia
Incidence and Prevalence By Fiscal Year, Age Group and Gender

Incidence/Prevalence Fiscal Year Age Group	2004 Study Gender Male and Female			2013 Study Gender Male and Female			Change (2004-2014) Gender Male and Female			Percentage Change (2004-2014) Gender Male and Female		
	Low	Middle	High	Low	Middle	High	Low	Middle	High	Low	Middle	High
Incidence												
2014	31,420	58,138	93,694	46,761	67,424	88,663	15,341	9,286	-5,031	49%	16%	-5%
65 to 84	17,921	30,938	47,618	22,683	35,211	48,316	4,762	4,273	698	27%	14%	1%
85 and older	13,499	27,200	46,076	24,078	32,212	40,347	10,579	5,012	-5,729	78%	18%	-12%
2019	31,729	58,633	94,412	50,410	72,965	96,123	18,681	14,332	1,711	59%	24%	2%
65 to 84	18,369	31,712	48,810	24,854	38,776	53,300	6,485	7,064	4,490	35%	22%	9%
85 and older	13,360	26,921	45,602	25,556	34,189	42,823	12,196	7,268	-2,779	91%	27%	-6%
Prevalence												
2014	139,390	178,482	214,480	135,216	262,899	390,567	-4,174	84,417	176,087	-3%	47%	82%
65 to 84	66,166	82,419	97,845	68,713	145,066	221,419	2,547	62,647	123,574	4%	76%	126%
85 and older	73,224	96,063	116,635	66,503	117,833	169,148	-6,721	21,770	52,513	-9%	23%	45%
2019	140,295	179,557	215,731	133,597	275,636	417,659	-6,698	96,079	201,928	-5%	54%	94%
65 to 84	67,823	84,482	100,295	63,809	152,079	240,349	-4,014	67,597	140,054	-6%	80%	140%
85 and older	72,472	95,075	115,436	69,788	123,557	177,310	-2,684	28,482	61,874	-4%	30%	54%

* Changes in the projections between 2004 and 2012 are due to several differences: base populations changed from VetPop 2000 and Enrollment BY03 to VetPop 2011 and Enrollment BY12, and rate methodology was updated in 2012 to employ the most recent research study findings.

Presentation of Data

National level projections for Patients, Enrollees and Veterans by gender and age ranges for five, ten and fifteen year intervals are provided in Appendix A of this paper.

Detailed level projections including over one million data combinations by which the user can view the projected estimates are also available. The set of data dimensions include: gender, year, population, geography (state, VISN, market) and incidence or prevalence. These detailed projections are provided separately in Excel pivot tables in order to make it convenient for users to select the specific combinations of dimensions in which they are interested.

Appendix B describes the pivot table report format and content, including report filters and row and column dimensions. The set of valid values for the dimensions are included.

Limitations

The estimated number of Veterans with Dementia may be used to determine the health care services demand for this specific population. However, such determination is not comparable to the demand for health care services projected in VA Enrollee Health Projection Model (EHCPM). The EHCPM projects demand for health care services for the total enrollee population without identifying medical condition or specific services. In addition to accounting for enrollees' demographic characteristics, EHCPM reflects the collective impact of all of the diagnoses in the enrollee population and other factors such as health care coverage and travel distance to VA facilities in its modeling. These additional factors were not taken into consideration in this analysis.

Caution should be observed when using estimates that are low numbers. In using the pivot table reports, it is possible to drill down into the data to a very low level of granularity (e.g. prevalence of female Alzheimer's patients in the state of Rhode Island aged 70 to 79 in FY2025) that will result in a very low number. In this case, it is recommended to expand the dementia status, geographic area, age range or genders to produce a more reliable estimate.

National Level Projections – Patients

Projections of the Prevalence and Incidence of Dementias								
Low, Middle and High National Estimates of Patients For All Dementia								
Incidence and Prevalence By Fiscal Year, Age Group and Gender								
September 2013								

Incidence/Prevalence	Gender								
Fiscal Year	Female			Male			Male and Female		
Age Group	Low	Middle	High	Low	Middle	High	Low	Middle	High
Incidence									
2014	**949**	**1,352**	**1,764**	**45,812**	**66,072**	**86,899**	**46,761**	**67,424**	**88,663**
65 to 69	11	59	116	608	3,213	6,339	619	3,272	6,455
70 to 79	200	297	396	11,926	17,693	23,504	12,126	17,990	23,900
80 to 89	480	650	819	27,595	37,564	47,533	28,075	38,214	48,352
90 and older	259	346	433	5,683	7,603	9,522	5,942	7,949	9,955
2019	**934**	**1,405**	**1,899**	**49,476**	**71,560**	**94,224**	**50,410**	**72,965**	**96,123**
65 to 69	25	130	256	582	3,076	6,069	607	3,206	6,325
70 to 79	306	460	615	15,422	23,152	30,963	15,728	23,612	31,578
80 to 89	412	561	709	27,414	37,227	47,040	27,826	37,788	47,749
90 and older	191	255	319	6,058	8,105	10,152	6,249	8,360	10,471
2024	**1,222**	**1,909**	**2,636**	**52,214**	**75,074**	**98,382**	**53,436**	**76,983**	**101,018**
65 to 69	42	219	433	435	2,300	4,537	477	2,519	4,970
70 to 79	594	895	1,198	20,376	30,213	40,125	20,970	31,108	41,323
80 to 89	418	571	725	25,848	35,129	44,411	26,266	35,700	45,136
90 and older	167	224	281	5,555	7,432	9,309	5,722	7,656	9,590
2029	**1,922**	**2,983**	**4,096**	**54,383**	**77,825**	**101,695**	**56,305**	**80,808**	**105,791**
65 to 69	55	288	568	435	2,297	4,533	490	2,585	5,101
70 to 79	1,084	1,625	2,172	17,366	25,662	34,015	18,450	27,287	36,187
80 to 89	593	815	1,036	31,158	42,607	54,056	31,751	43,422	55,092
90 and older	191	255	319	5,425	7,258	9,090	5,616	7,513	9,409
Prevalence									
2014	**2,858**	**5,744**	**8,629**	**132,358**	**257,155**	**381,938**	**135,216**	**262,899**	**390,567**
65 to 69	88	304	519	4,522	15,533	26,544	4,610	15,837	27,063
70 to 79	210	882	1,555	11,725	49,246	86,766	11,935	50,128	88,321
80 to 89	1,302	1,974	2,647	85,811	130,115	174,419	87,113	132,089	177,066
90 and older	1,257	2,584	3,909	30,300	62,261	94,209	31,557	64,845	98,118
2019	**2,758**	**6,062**	**9,366**	**130,839**	**269,574**	**408,293**	**133,597**	**275,636**	**417,659**
65 to 69	186	640	1,094	3,430	11,782	20,134	3,616	12,422	21,228
70 to 79	371	1,559	2,746	17,659	74,166	130,674	18,030	75,725	133,420
80 to 89	1,221	1,852	2,482	77,792	117,956	158,120	79,013	119,808	160,602
90 and older	979	2,011	3,043	31,958	65,669	99,365	32,937	67,680	102,408
2024	**3,368**	**8,102**	**12,835**	**129,570**	**269,007**	**408,430**	**132,938**	**277,109**	**421,265**
65 to 69	293	1,005	1,717	2,917	10,020	17,122	3,210	11,025	18,839
70 to 79	730	3,066	5,403	19,150	80,431	141,712	19,880	83,497	147,115
80 to 89	1,465	2,221	2,977	78,629	119,225	159,821	80,094	121,446	162,798
90 and older	881	1,810	2,738	28,874	59,331	89,774	29,755	61,141	92,512
2029	**5,136**	**12,383**	**19,630**	**159,638**	**304,109**	**448,566**	**164,774**	**316,492**	**468,196**
65 to 69	382	1,311	2,240	2,897	9,951	17,005	3,279	11,262	19,245
70 to 79	1,224	5,143	9,061	15,100	63,419	111,739	16,324	68,562	120,800
80 to 89	2,457	3,725	4,993	111,989	169,809	227,628	114,446	173,534	232,621
90 and older	1,073	2,205	3,336	29,652	60,930	92,194	30,725	63,135	95,530

* Middle represents the average rate observed in the various research studies with Low and High set at the lower and upper bound of the 95% confidence interval.

National Level Projections – Enrollees

Projections of the Prevalence and Incidence of Dementias								
Low, Middle and High National Estimates of Enrollees For All Dementia								
Incidence and Prevalence By Fiscal Year, Age Group and Gender								
September 2013								

Incidence/Prevalence	Gender								
Fiscal Year	Female			Male			Male and Female		
Age Group	Low	Middle	High	Low	Middle	High	Low	Middle	High
Incidence									
2014	**1,512**	**2,145**	**2,792**	**67,045**	**96,516**	**126,791**	**68,557**	**98,661**	**129,583**
65 to 69	17	87	172	865	4,572	9,021	882	4,659	9,193
70 to 79	298	444	591	17,015	25,240	33,529	17,313	25,684	34,120
80 to 89	773	1,045	1,317	40,659	55,322	69,986	41,432	56,367	71,303
90 and older	425	568	712	8,507	11,381	14,255	8,932	11,949	14,967
2019	**1,455**	**2,174**	**2,926**	**73,400**	**105,894**	**139,217**	**74,855**	**108,068**	**142,143**
65 to 69	36	189	373	833	4,401	8,683	869	4,590	9,056
70 to 79	448	672	899	22,133	33,226	44,436	22,581	33,898	45,335
80 to 89	656	891	1,126	41,161	55,861	70,560	41,817	56,752	71,686
90 and older	315	422	528	9,273	12,406	15,539	9,588	12,828	16,067
2024	**1,857**	**2,883**	**3,964**	**77,429**	**111,106**	**145,428**	**79,286**	**113,989**	**149,392**
65 to 69	60	318	627	626	3,309	6,528	686	3,627	7,155
70 to 79	860	1,295	1,734	29,365	43,541	57,824	30,225	44,836	59,558
80 to 89	658	898	1,137	38,904	52,840	66,776	39,562	53,738	67,913
90 and older	279	373	467	8,534	11,417	14,300	8,813	11,790	14,767
2029	**2,877**	**4,444**	**6,087**	**80,256**	**114,649**	**149,657**	**83,133**	**119,093**	**155,744**
65 to 69	79	417	822	624	3,297	6,506	703	3,714	7,328
70 to 79	1,568	2,350	3,141	24,937	36,850	48,843	26,505	39,200	51,984
80 to 89	915	1,255	1,595	46,386	63,385	80,384	47,301	64,640	81,979
90 and older	315	422	528	8,310	11,117	13,924	8,625	11,539	14,452
Prevalence									
2014	**4,554**	**9,107**	**13,658**	**193,946**	**375,729**	**557,490**	**198,500**	**384,836**	**571,148**
65 to 69	131	449	767	6,420	22,050	37,680	6,551	22,499	38,447
70 to 79	312	1,310	2,308	16,680	70,056	123,431	16,992	71,366	125,739
80 to 89	2,044	3,099	4,154	125,226	189,879	254,532	127,270	192,978	258,686
90 and older	2,068	4,249	6,429	45,621	93,744	141,846	47,689	97,993	148,275
2019	**4,317**	**9,391**	**14,464**	**194,885**	**399,542**	**604,176**	**199,202**	**408,933**	**618,640**
65 to 69	271	932	1,593	4,922	16,906	28,890	5,193	17,838	30,483
70 to 79	541	2,271	4,002	25,406	106,703	188,001	25,947	108,974	192,003
80 to 89	1,884	2,857	3,830	115,507	175,143	234,779	117,391	178,000	238,609
90 and older	1,621	3,330	5,039	49,050	100,789	152,506	50,671	104,119	157,545
2024	**5,165**	**12,267**	**19,368**	**192,606**	**397,979**	**603,332**	**197,771**	**410,246**	**622,700**
65 to 69	423	1,453	2,484	4,195	14,409	24,624	4,618	15,862	27,108
70 to 79	1,056	4,435	7,813	27,567	115,783	203,998	28,623	120,218	211,811
80 to 89	2,220	3,367	4,513	116,464	176,594	236,724	118,684	179,961	241,237
90 and older	1,466	3,013	4,558	44,380	91,193	137,986	45,846	94,206	142,544
2029	**7,754**	**18,521**	**29,287**	**235,153**	**447,115**	**659,055**	**242,907**	**465,636**	**688,342**
65 to 69	552	1,896	3,241	4,157	14,279	24,400	4,709	16,175	27,641
70 to 79	1,771	7,439	13,107	21,678	91,046	160,414	23,449	98,485	173,521
80 to 89	3,665	5,558	7,450	164,008	248,684	333,360	167,673	254,242	340,810
90 and older	1,766	3,628	5,489	45,311	93,106	140,881	47,077	96,734	146,370

* Middle represents the average rate observed in the various research studies with Low and High set at the lower and upper bound of the 95% confidence interval.

National Level Projections– Veterans

Projections of the Prevalence and Incidence of Dementias								
Low, Middle and High National Estimates of Veterans For All Dementia								
Incidence and Prevalence By Fiscal Year, Age Group and Gender								
September 2013								

Incidence/Prevalence	Gender								
Fiscal Year	Female			Male			Male and Female		
Age Group	Low*	Middle*	High*	Low*	Middle*	High*	Low*	Middle*	High*
Incidence									
2014	**5,586**	**7,951**	**10,372**	**138,294**	**201,337**	**266,244**	**143,880**	**209,289**	**276,616**
65 to 69	59	311	613	1,968	10,404	20,527	2,027	10,715	21,141
70 to 79	1,279	1,905	2,537	44,042	65,468	87,069	45,321	67,373	89,606
80 to 89	2,821	3,825	4,830	77,298	105,417	133,536	80,118	109,242	138,366
90 and older	1,427	1,910	2,392	14,986	20,049	25,111	16,413	21,958	27,503
2019	**4,756**	**7,028**	**9,387**	**137,278**	**199,147**	**262,562**	**142,035**	**206,175**	**271,949**
65 to 69	93	491	970	1,528	8,075	15,933	1,621	8,567	16,902
70 to 79	1,563	2,338	3,119	48,746	72,969	97,429	50,309	75,306	100,549
80 to 89	2,146	2,923	3,699	72,267	98,386	124,505	74,413	101,309	128,204
90 and older	954	1,276	1,598	14,738	19,717	24,695	15,692	20,993	26,294
2024	**5,212**	**7,962**	**10,846**	**135,164**	**194,170**	**254,237**	**140,376**	**202,132**	**265,083**
65 to 69	142	749	1,478	1,023	5,405	10,664	1,164	6,154	12,142
70 to 79	2,292	3,438	4,595	53,634	79,394	105,338	55,927	82,831	109,932
80 to 89	2,002	2,736	3,471	67,242	91,625	116,007	69,244	94,361	119,478
90 and older	777	1,039	1,302	13,265	17,746	22,228	14,042	18,786	23,530
2029	**7,030**	**10,771**	**14,685**	**130,004**	**185,620**	**242,191**	**137,034**	**196,391**	**256,876**
65 to 69	180	954	1,882	968	5,119	10,100	1,149	6,073	11,982
70 to 79	3,563	5,339	7,133	39,932	58,961	78,116	43,494	64,300	85,249
80 to 89	2,445	3,352	4,259	76,244	104,335	132,426	78,688	107,687	136,685
90 and older	842	1,127	1,411	12,860	17,205	21,549	13,702	18,331	22,960
Prevalence									
2014	**16,230**	**32,567**	**48,900**	**379,330**	**758,548**	**1,137,729**	**395,560**	**791,115**	**1,186,629**
65 to 69	433	1,488	2,544	13,664	46,932	80,200	14,097	48,420	82,744
70 to 79	1,292	5,426	9,559	42,905	180,200	317,495	44,197	185,626	327,054
80 to 89	7,711	11,692	15,673	244,749	371,112	497,474	252,460	382,804	513,147
90 and older	6,794	13,960	21,124	78,013	160,304	242,559	84,807	174,264	263,683
2019	**13,673**	**29,240**	**44,806**	**356,254**	**738,304**	**1,120,317**	**369,927**	**767,544**	**1,165,123**
65 to 69	678	2,328	3,979	8,817	30,285	51,753	9,495	32,613	55,732
70 to 79	1,726	7,250	12,774	52,047	218,598	385,149	53,773	225,848	397,923
80 to 89	6,487	9,836	13,185	218,290	330,992	443,694	224,777	340,828	456,879
90 and older	4,782	9,826	14,867	77,100	158,429	239,722	81,882	168,255	254,589
2024	**14,549**	**33,193**	**51,836**	**337,959**	**692,068**	**1,046,146**	**352,508**	**725,261**	**1,097,982**
65 to 69	985	3,382	5,779	6,788	23,316	39,844	7,773	26,698	45,623
70 to 79	2,631	11,050	19,469	48,174	202,331	356,488	50,805	213,381	375,957
80 to 89	6,878	10,429	13,981	213,708	324,044	434,380	220,586	334,473	448,361
90 and older	4,055	8,332	12,608	69,289	142,377	215,434	73,344	150,709	228,042
2029	**19,225**	**44,605**	**69,982**	**380,006**	**716,998**	**1,053,959**	**399,231**	**761,603**	**1,123,941**
65 to 69	1,269	4,358	7,447	6,393	21,958	37,523	7,662	26,316	44,970
70 to 79	3,929	16,500	29,072	33,904	142,398	250,892	37,833	158,898	279,964
80 to 89	9,429	14,297	19,165	269,994	409,391	548,788	279,423	423,688	567,953
90 and older	4,599	9,449	14,298	69,714	143,251	216,756	74,313	152,700	231,054

* Middle represents the average rate observed in the various research studies with Low and High set at the lower and upper bound of the 95% confidence interval.

Pivot Table Dimensions - Incidence

The Excel pivot tables that accompany this paper contain projections presented in a standard report format with dynamic report, row and column dimensions (variables) that can be used to filter data and specify row and column breaks. Results are displayed for each select value of the row and column dimensions and aggregated across the selected values of the report level dimensions. Estimates reported at the fiscal year level are a sum of the results for the selected age range values. Note the report does not add estimates across populations, estimate level or fiscal year because doing so would inappropriately replicate results. The gender dimension is not available for the "Alzheimer's" rates.

Table 1. *Projections of the Incidence of Dementias*

Dimension	Valid Values
Report level dimensions (used as filters for the report) - results will be summed across all selected values of these dimensions.	
Dementia Status	Non-Alzheimer's Disease
	Alzheimer's Disease
	All (Alzheimer's plus Non-Alzheimer's)
VISN	21 VISNs (select one, a combination, or all)
Market	83 Markets (select one, a combination, or all)
State	50 states, District of Columbia, and Puerto Rico (select one, a combination, or all)
Row dimensions (select all values for which results are to be displayed)	
Fiscal Year	2014 to 2033 (select one, a combination, or all)
Age Range	65 to 69
	70 to 79
	80 to 89
	90 and older
Column dimensions (select all values for which results are to be displayed)	
Population	Patients
	Enrollees
	Veterans
Estimate	Low
	Middle
	High

Pivot Table Dimensions - Prevalence

The Excel pivot tables that accompany this paper contain projections presented in a standard report format with dynamic report, row and column dimensions (variables) that can be used to filter data and specify row and column breaks. Results are displayed for each select value of the row and column dimensions and aggregated across the selected values of the report level dimensions. Estimates reported at the fiscal year level are a sum of the results for the selected age range values. Note the report does not add estimates across populations, estimate level or fiscal year because doing so would inappropriately replicate results.

Table 2. *Projections of the Prevalence of Dementias*

Dimension	Valid Values
Report level dimensions (used as filters for the report) - results will be summed across all selected values of these dimensions.	
Dementia Status	Non-Alzheimer's Disease
	Alzheimer's Disease
	All (Alzheimer's plus Non-Alzheimer's)
Gender	Male
	Female
	All (both male and female)
VISN	21 VISNs (select one, a combination, or all)
Market	83 Markets (select one, a combination, or all)
State	50 states, District of Columbia, and Puerto Rico (select one, a combination, or all)
Row dimensions (select all values for which results are to be displayed)	
Fiscal Year	2014 to 2033 (select one, a combination, or all)
Age Range	65 to 69
	70 to 79
	80 to 89
	90 and older
Column dimensions (select all values for which results are to be displayed)	
Population	Patients
	Enrollees
	Veterans
Estimate	Low
	Middle
	High

All Dementia
The studies selected to be used for rates pertaining to the projection of All Dementia in this study were:

Breitner, J. C., et. al . (1999). APOE-e4 count predicts age when prevalence of AD increases, then declines: The Cache County Study. *Neurology*, *53*, 321–336.

Miech, R. A.. (2002). Incidence of AD may decline in the early 90s for men, later for women: The Cache County study. *Neurology*, *58*, 209–218.

Plassman, B. ., & Langa, K. M., et. al. (2007). Prevalence of Dementia in the United States: The Aging, Demographics and Memory Study. *Neuroepidemiology*, *29*, 125–132.

Plassman, B. L., & Langa, K. M., et. al. (2011). Incidence of Dementia and Cognitive Impairment, not Dementia in the United States. *Annals of Neurology*, *70*(3), 418–426.

The Canadian Study of Health and Aging Working Group (2000). The Incidence of Dementia in Canada. *Neurology*, *55*, 66–73.

Alzheimer's disease
The studies selected to be used for rates pertaining to the projection of Alzheimer's' Disease in this study were:

Breitner, J. C., et. al . (1999). APOE-e4 count predicts age when prevalence of AD increases, then declines: The Cache County Study. *Neurology*, *53*, 321–336.

Miech, R. A. (2002). Incidence of AD may decline in the early 90s for men, later for women: The Cache County study. *Neurology*, *58*, 209–218.

Plassman, B., & Langa, K. M., et. al. (2007). Prevalence of Dementia in the United States: The Aging, Demographics and Memory Study. *Neuroepidemiology*, *29*, 125–132.

Plassman, B. L., & Langa, K. M., et. al. (2011). Incidence of Dementia and Cognitive Impairment, not Dementia in the United States. *Annals of Neurology*, *70*(3), 418–426.

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