MARIN HEALTH & HUMAN SERVICES
Health, Well-being & Safety

Marin County Dementia Assessment

October 2017

Marin County Department of Health and Human Services

Marin County Department of Adult and Aging Services

I. Introduction

The purpose of this report is to detail the current and projected burden of Alzheimer's disease and other associated dementias in Marin County through 2045. This report was compiled by the Marin County Department of Health and Human Services in conjunction with Marin County Aging and Adult Services.

II. Definitions of Dementia

Dementia is a broad term with no specific clinical definition. Within the category of dementia are specific conditions such as Alzheimer's Disease, frontotemporal disorders, Lewy Body Dementia, as well as variations of vascular dementia (Alzheimer's Association, 2017; Chen, Lin, & Chen, 2009; Sosa-Ortiz, Acosta-Castillo, & Prince, 2012). Aside from these more common dementia types, rare diseases such as Huntington's disease or Creutzfeldt-Jakob's Disease are also considered to fall under the general category of dementia. Alzheimer's is the most common form of clinical dementia, with approximately 5 million patients in the United States as of 2015. The Centers for Disease Control (CDC) estimates that as of 2050, nearly 14 million Americans will be living with Alzheimer's (Centers for Disease Control and Prevention, 2015). According to the Alzheimer's Association, CDC, and scientific literature, between 60-80 percent of all dementia diagnoses are Alzheimer's (Alzheimer's Association, 2017; Centers for Disease Control and Prevention, 2015; Sosa-Ortiz et al., 2012). Given that Alzheimer's and other dementias (henceforth referred to as dementia) predominantly occur in older populations, Medicare data is of particular use for determining a definition for dementia. Table 1 presents the ICD-10 (International Classification of Diseases) diagnostic codes required by the Centers for Medicaid and Medicare Services (CMS) to elicit a dementia diagnosis (Alzheimer's Association, 2016; National Hospice and Pallative Care Organization, n.d.). ICD codes were developed and implemented by the World Health Organization, and are the "standard diagnostic tool for epidemiology, health management, and clinical purposes" for the approximately 117 countries which use the system, including the United States (World Health Organization, 2014). The codes are a method to tabulate diagnoses under a common umbrella across population groups.

Possible Primary ICD-10 Codes	
G300	Dementia Alzheimer's disease with early-onset
G301	Dementia Alzheimer's disease with late-onset
G309	Dementia Alzheimer's disease, unspecified
G31.01	Pick's disease
G31.09	Other frontotemporal dementia
G31.83	Corticobasal degeneration
G31.84	Dementia with Lewy bodies
G31.85	Mild cognitive impairment, so stated

Possible Secondary ICD-10 Codes	
F01.50	Vascular dementia without behavioral disturbance
F01.51	Vascular dementia with behavioral disturbance
F02.80	Dementia in other diseases classified elsewhere without behavioral disturbance
F02.81	Dementia in other diseases classified elsewhere with behavioral disturbance
F03.90	Unspecified dementia without behavioral disturbance
F03.91	Unspecified dementia with behavioral disturbance

Table 1: ICD-10 Codes for Dementia

Given the similarities in populations, patient needs, symptoms, and diagnostic criteria, dementias in total will be discussed moving forwards, unless otherwise specified. The implied understanding is that Alzheimer's disease comprises the majority of the cases.

III. Marin County Population Projections

In order to understand both the present and future dementia burden in Marin County, it is necessary to estimate the future population, and in particular, the population over 65. The California Department of Finance Demographic Research Unit created state and county specific projections in 2013 that stretch from 2010 to 2060 (State of California, Department of Finance, 2013). These projections are based off of the 2010 U.S. Census. Figure 1 indicates these projections by age group over time.

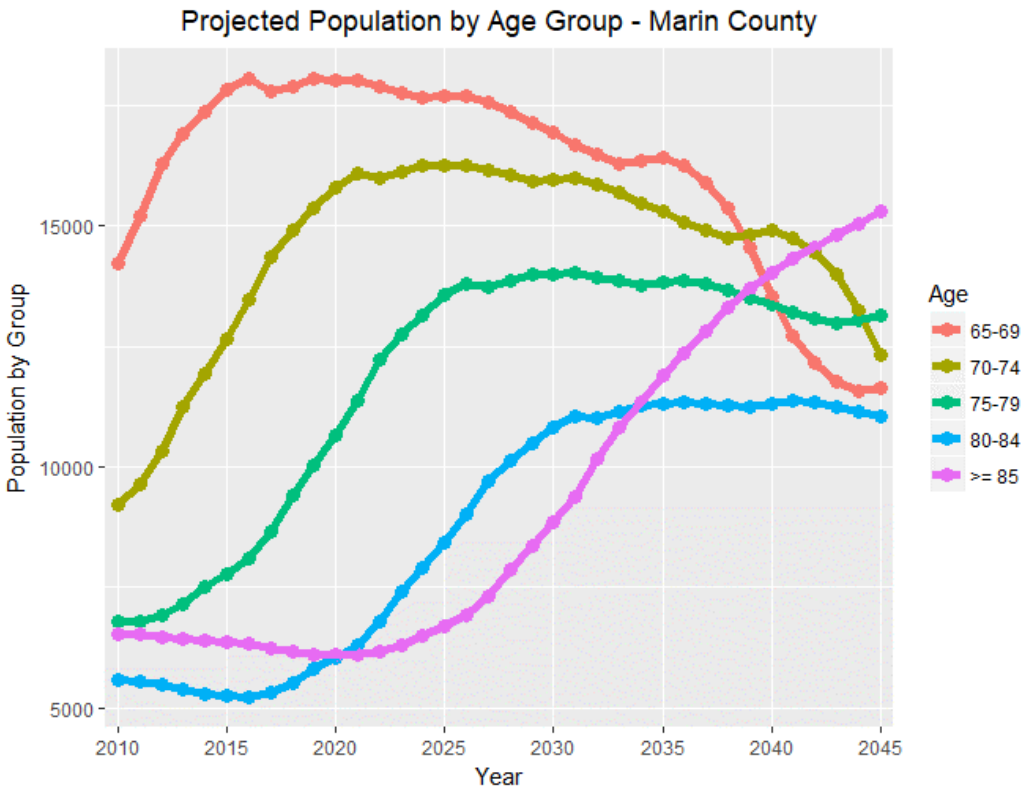


Figure 1: Projected Population by Age Group

In addition to raw population counts, it is important to understand the proportion of Marin County's population that is older than 60. Figure 2 presents this proportion over time.

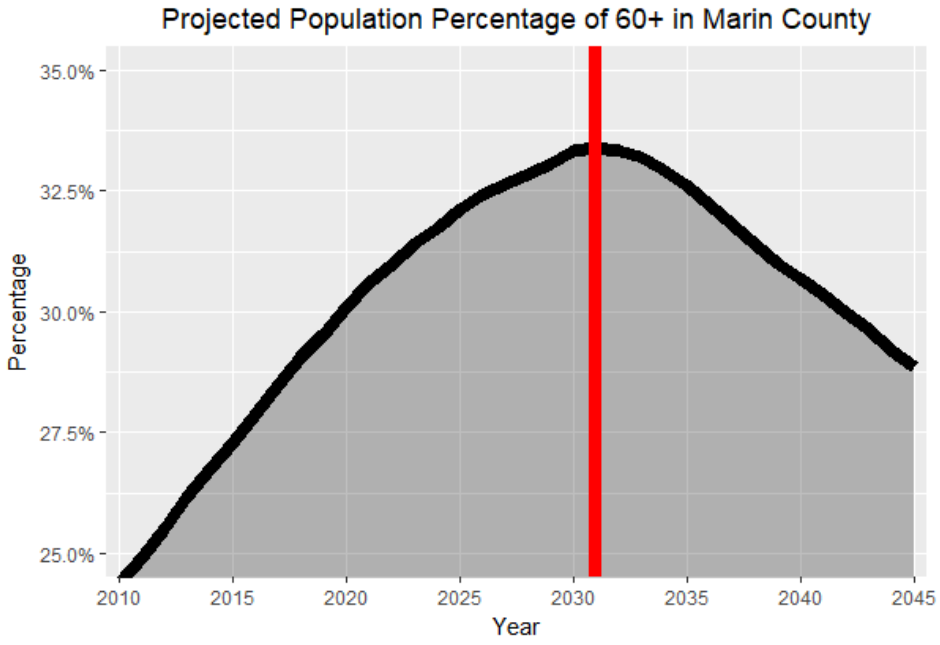


Figure 2: Projected Population Percentage of Seniors

Of note, the proportion peaks at 33.4% in 2031 (red line), when slightly more than one in three Marin County residents is projected to be older than 60. That proportion is projected to decrease, so that by 2045, approximately 29% of the population is over 60, roughly the same percentage as 2017.

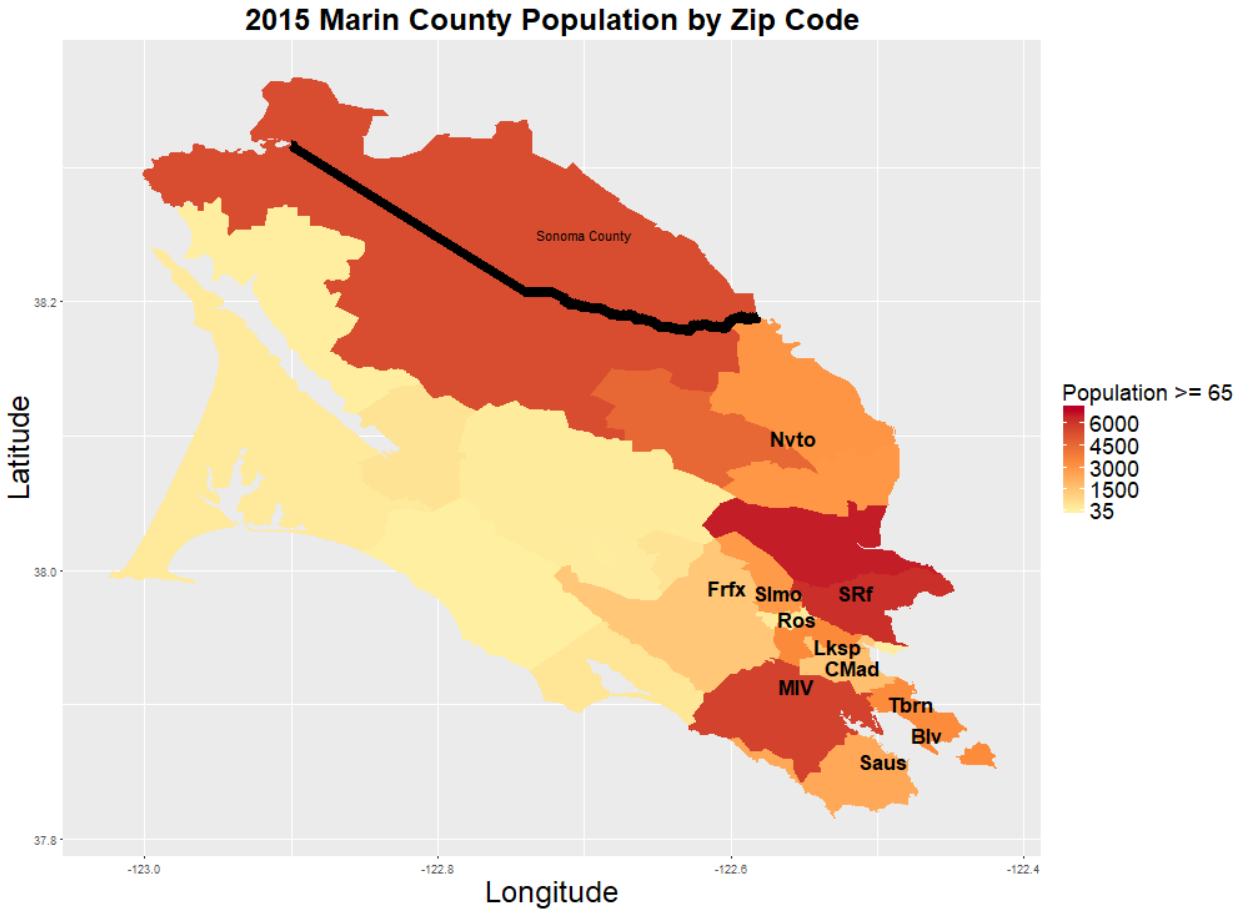
IV. Alzheimer's and Dementia Risk Factors

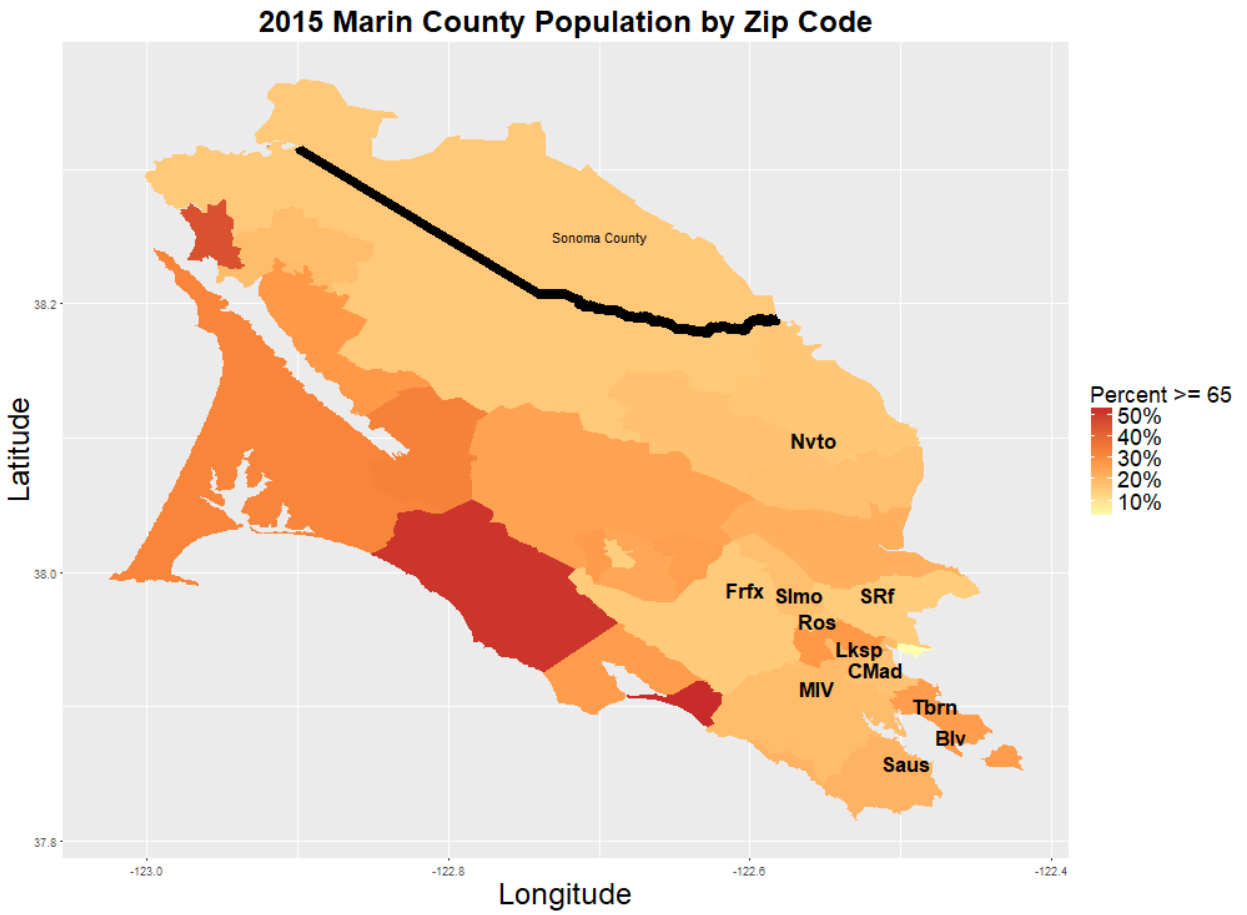
It has been established that the primary risk factor for the development of dementias is age, as multiple studies present increasing prevalence and incidence of dementias with increasing age (Bermejo-Pareja, Benito-León, Vega, Medrano, & Román, 2008; Centers for Disease Control and Prevention, 2015; Ferri et al., 2005; Hecksteden et al., 2016; Tejada-Vera, 2000; Wu et al., 2015). In addition to age, the risk factors with the strongest positive associations with dementias include cardiovascular disease risk and diabetes risk (Bellou et al., 2017; Centers for Disease Control and Prevention, 2015; Chen et al., 2009; Ott et al., 1999; Ruitenberg, Ott, Van Swieten, Hofman, & Breteler, 2001; Vos et al., 2016). Further possible associations with dementia include both depression and low social contact late in life (Bellou et al., 2017). It has also been proposed that Alzheimer's incidence and vascular dementia incidence differs by sex during aging (Ruitenberg et al., 2001). In particular, after the age of 85, the incidence of vascular dementia in men has been found to be greater than women, and the incidence of Alzheimer's disease in women found to be greater than in men (Ruitenberg et al., 2001). These incidence differences are likely to have less impact on overall dementia prevalence than on specifics and types of care associated with care for separate diseases.

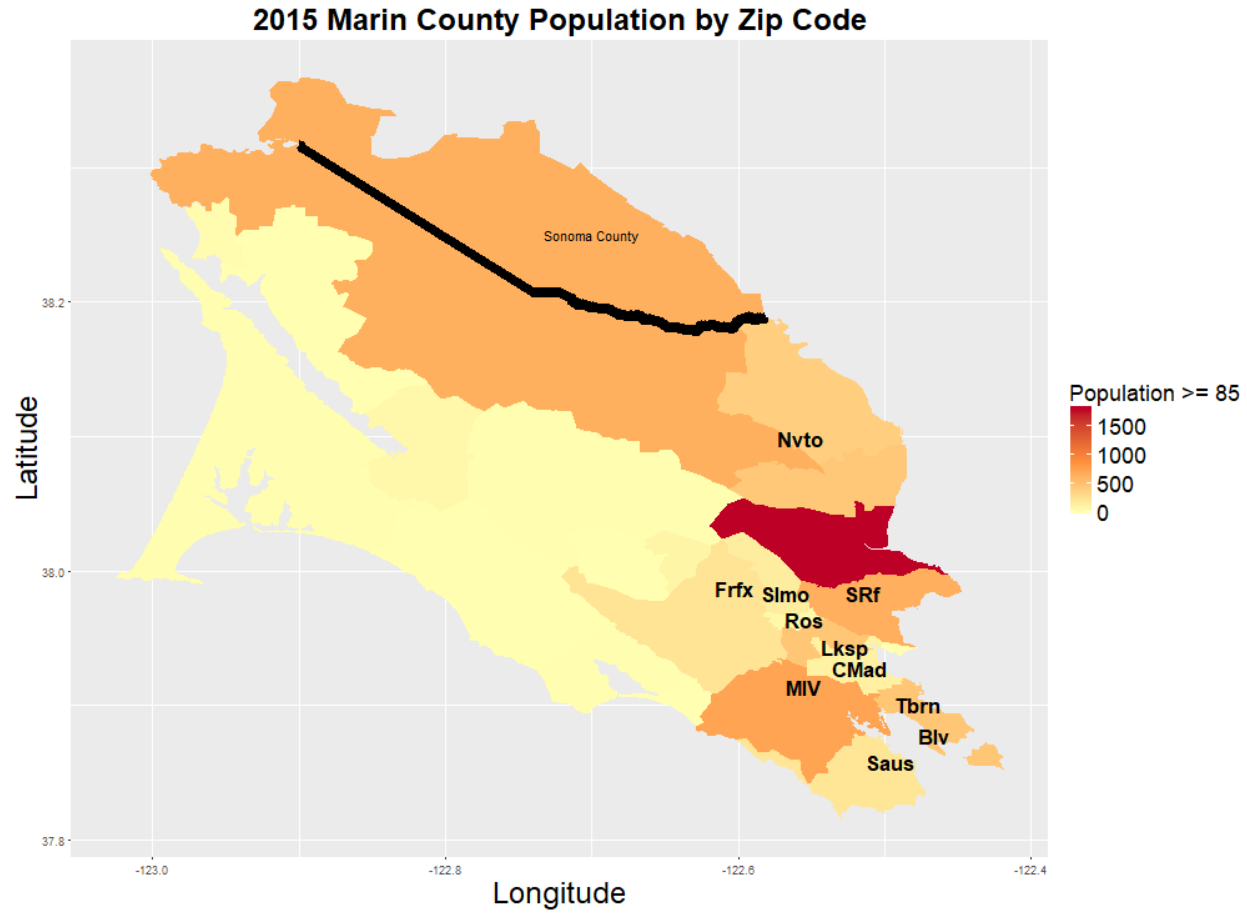
There is evidence that the prevalence of dementia in seniors (≥ 65) has decreased in the United States by approximately three percent (11.6% – 8.8%) from 2000 to 2012 (Langa et al., 2017). This hypothesized to be due to an increase in brain health via increased education and time spent in education and better control of cardiovascular risk factors (Langa et al., 2017). Therefore, with initiatives to increase cardiovascular health and social activity amongst seniors, it is possible that prevalence rates could continue to decline. However, with Marin County's generally excellent overall health, prevalence reduction from cardiovascular health improvements could be minimal compared to other counties with more significant burdens of cardiovascular risk factors.

V. Marin County Spatial Demographics

The following maps were produced from U.S. Census Bureau population and spatial data (State of California, Department of Finance, 2013; U.S. Census Bureau, 2014). Specifically, the population data is extracted from the 2015 American Community Survey. Additionally, the northernmost zip code (94952), encompasses highly populated areas of Sonoma County, and only lightly populated areas of Marin County. No adjustment is made for this zip code and county boundary in the maps, aside from a delineation of where the boundary with Sonoma County exists.




2015 Marin County Population by Zip Code
Sonoma County
Nvto
Frfx
Slmo
SRf
Ros
Lksp
CMad
MIV
Tbrn
Blv
Saus
38.2
38.0
37.8
-123.0
-122.8
-122.6
-122.4
Latitude
Longitude
Percent >= 65
50%
40%
30%
20%
10%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Sonoma County
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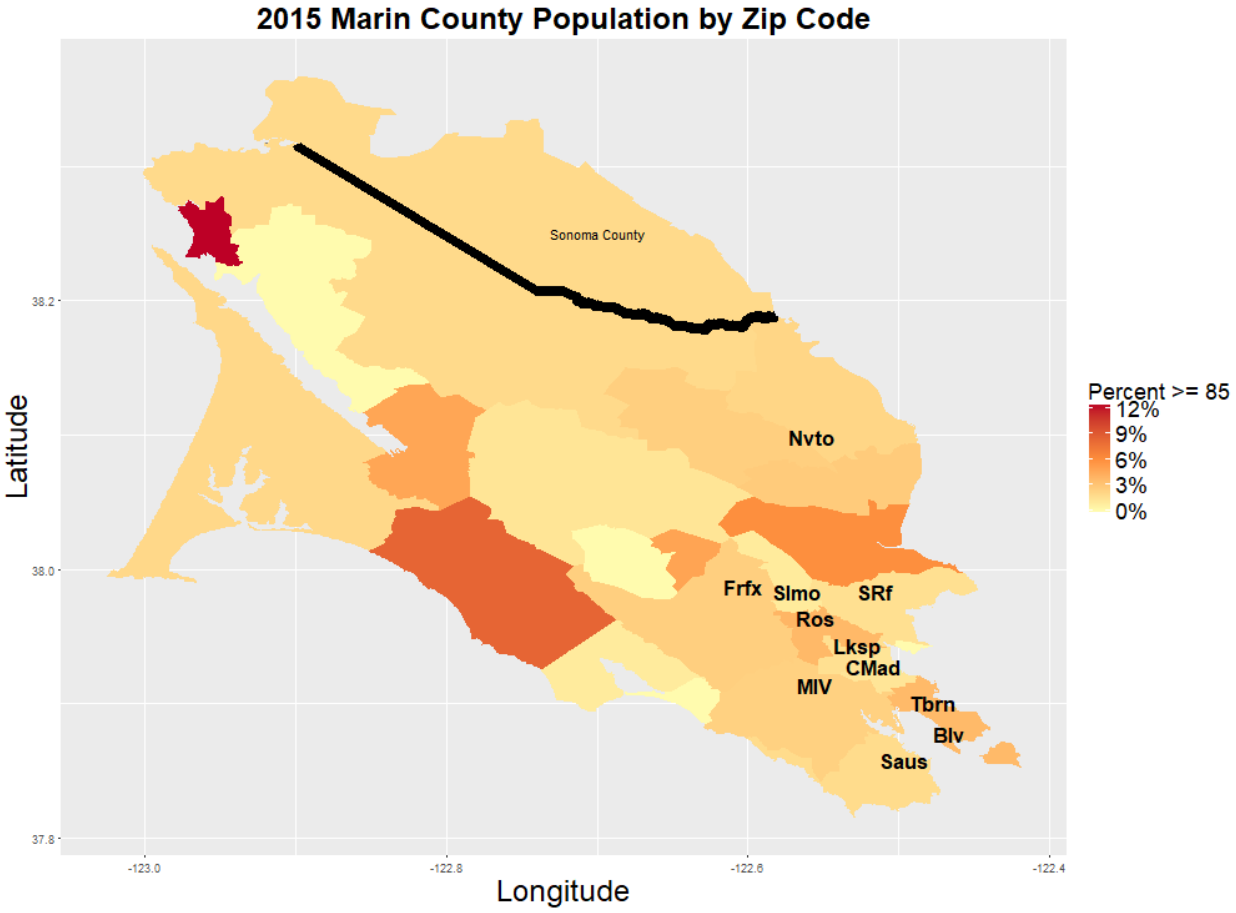
38.2
38.0
37.8
-123.0
-122.8
-122.6
-122.4
Latitude
Longitude
Population >= 85
1500
1000
500
0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MlV
Tbrn
Blv
Saus
38.2
38.0
37.8
-123.0
-122.8
-122.6
-122.4
Latitude
Longitude
Percent >= 85
12%
9%
6%
3%
0%

VI. Projection of Dementia Cases in Marin County

Given the California Department of Finance population projections, it is possible to estimate the number of dementia cases based on the prevalence of dementia by age. In 2005, Ferri et al. produced a study summarizing the worldwide prevalence estimates of dementias (inclusive of all subtypes) by World Health Organization geographic and adult/child mortality areas (Ferri et al., 2005). The following table presents the prevalence estimates by age for the lowest adult/child mortality (the healthiest) regions of the Americas. These numbers are in close agreement to those provided by the Alzheimer's Association in slightly less detail (Alzheimer's Association, 2017).

	Dementia Prevalence Estimates		
Age Group	**Low**	**Mean**	**High**
65-69	0.016	0.018	0.020
70-74	0.027	0.033	0.039
75-79	0.055	0.065	0.075
80-84	0.118	0.128	0.138
≥ 85	0.279	0.301	0.323

Table 2: Dementia Prevalence Estimates

Based on the prevalence estimates in Table 2 and the population projections from the California Department of Finance, the following dementia case projections for Marin County were obtained. These age group projections are based on the mean prevalence estimates from Table 2.

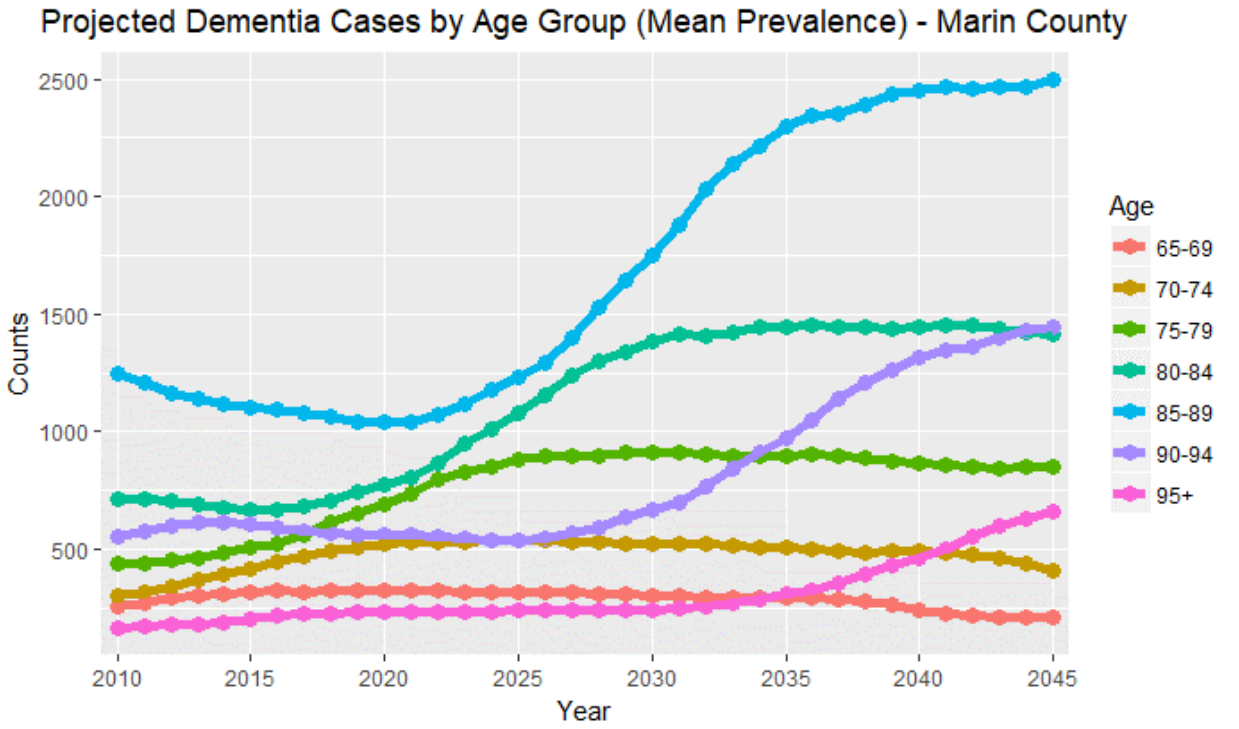


Figure 3: Projected Dementia Cases by Age Group

It is important to note that the population group which makes up the highest number of dementia cases is the 85-89 age range. This is likely due to the combination of increased prevalence of dementia with increasing age and that in high health communities like Marin, seniors are likely to live long enough to age into that group. Further, in comparison to Figure 2, where the highest proportion of seniors in Marin occurs in 2030, cases of dementia based on the projections will increase to a peak in approximately 2045. This is a crucial 15-year lag time, given that the financial and health care concerns associated with dementia related burdens of the aging population will occur predominantly in the years following the start and peak of the "1 in 3 in Marin are over 60" phase. While Figure 3 presents the projected cases by mean prevalence (and age), Figure 4 indicates the overall number of cases with upper and lower 95% confidence intervals.

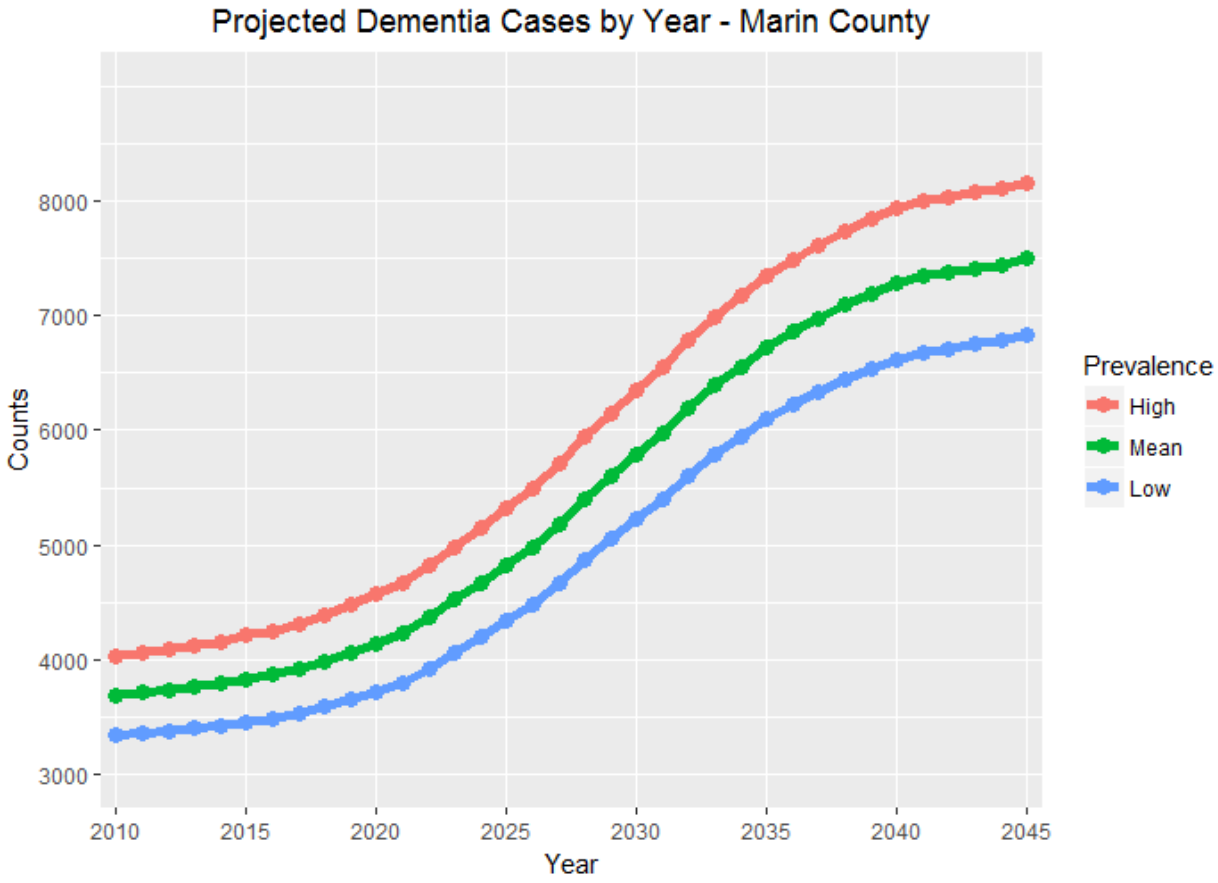
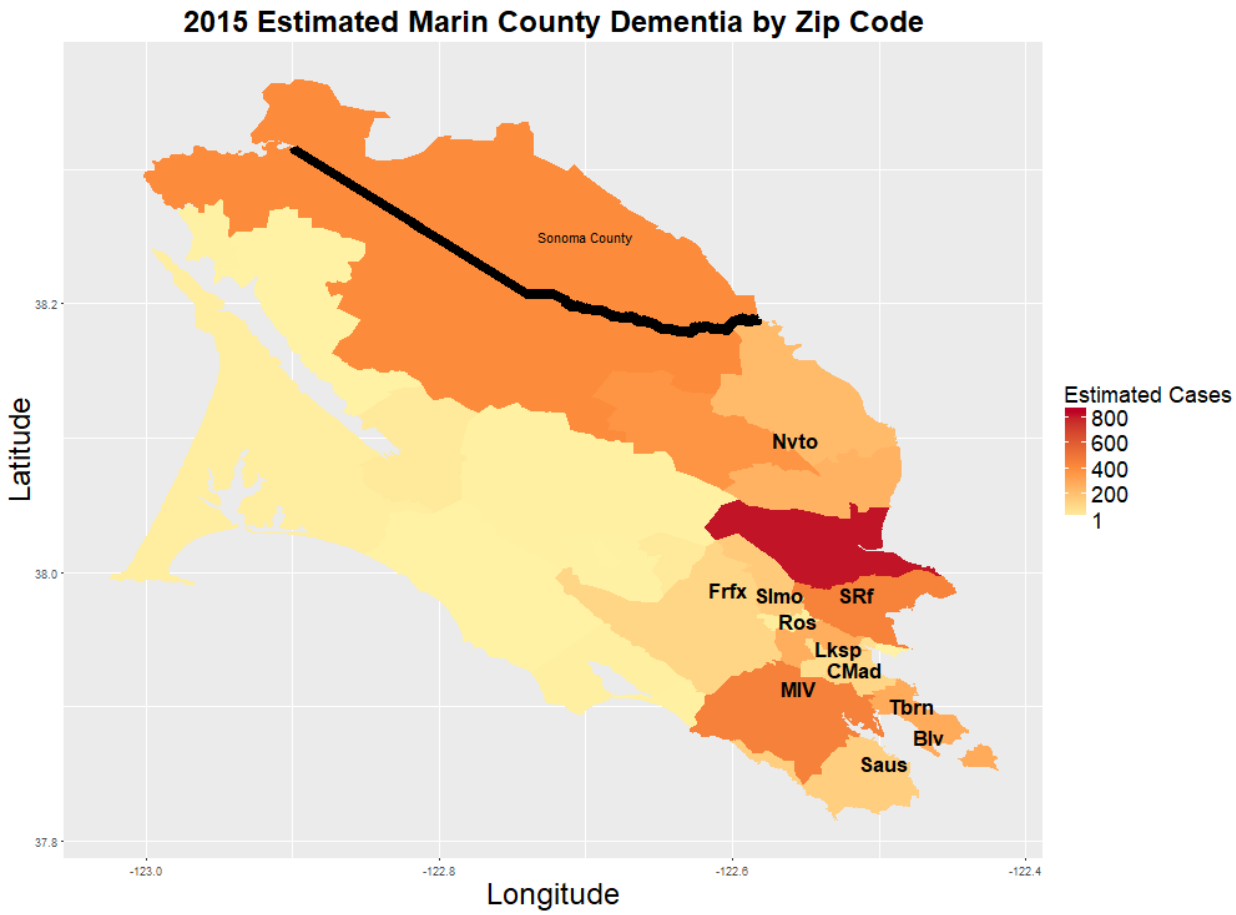


Figure 4: Projected Dementia Cases by Year

Table 3 presents the estimated number of cases per five-year block as well as the change per five-year block for the mean prevalence estimate. The estimates indicate that there is an approximate doubling of the number of cases from 2010 compared to 2040. These estimates are generally similar (by percent increase) to those provided by the Alzheimer's Association 2017 fact report by state (Alzheimer's Association, 2017). For the maps below, given that population projections were not available based on zip codes, the estimated cases are for 2015 only, and are not projected.

Prevalence	**2010**	**2015**	**2020**	**2025**	**2030**	**2035**	**2040**	**2045**
Low	3500	3500	3700	4300	5200	6100	6600	6800
Mean	3700	3800	4100	4800	5800	6700	7300	7500
High	4000	4200	4600	5300	6400	7300	7900	8200
Mean Change	-	*150*	*300*	*700*	*950*	*950*	*550*	*200*

Table 3: Approximate Projected Total Dementia Cases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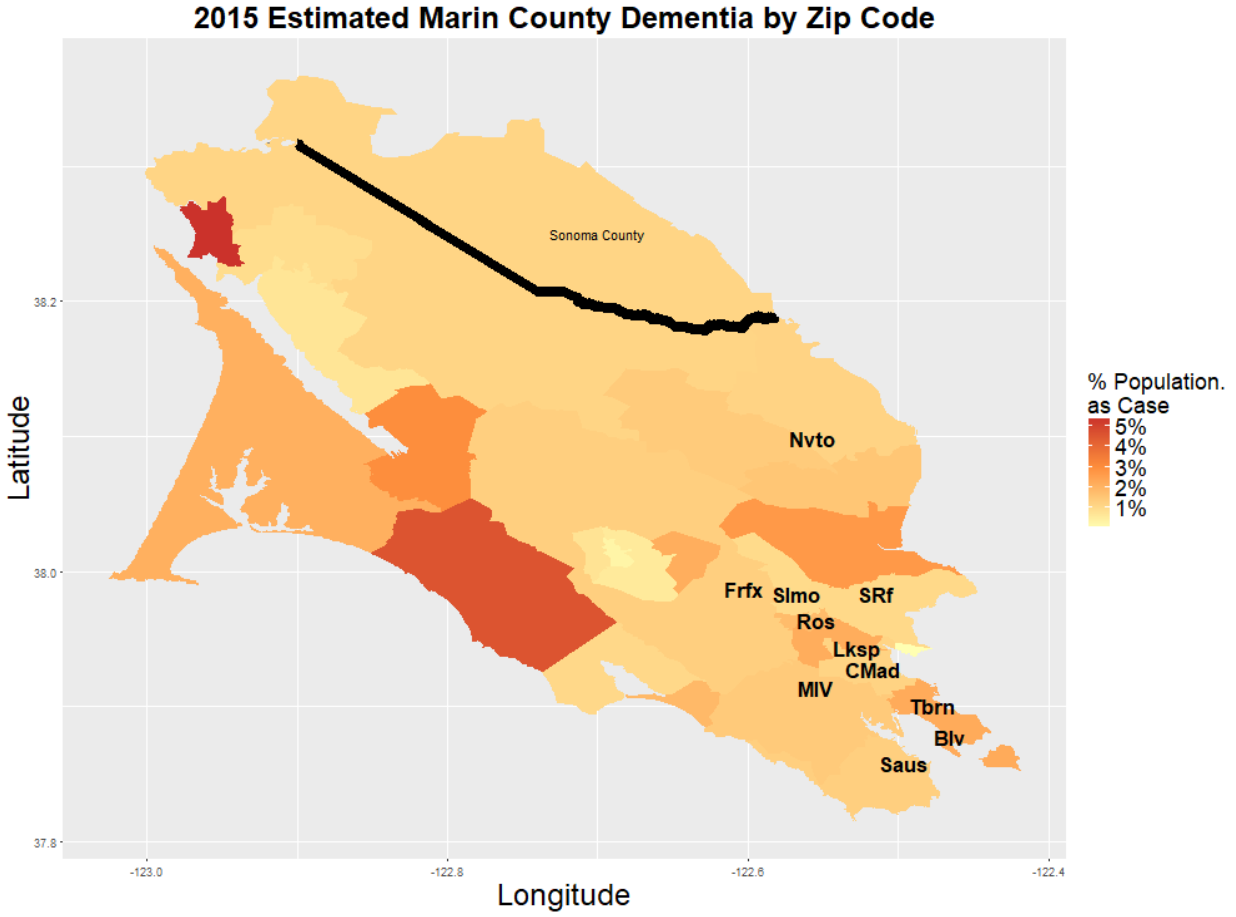
Tbrn
Blv
Saus
38.2
38.0
37.8
-123.0
-122.8
-122.6
-122.4
Latitude
Longitude
Estimated Cases
800
600
400
200
1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Tbrn
Blv
Saus
38.2
38.0
37.8
-123.0
-122.8
-122.6
-122.4
Latitude
Longitude
% Population.
as Case
5%
4%
3%
2%
1%

VII. Current and Projected Memory Care Facilities and Beds

Based on the projections, there are currently approximately 4,000 cases of dementia in Marin County. In order to ensure that current levels of care are available in the future as more cases occur, it is imperative that the number of memory care facilities and beds increase at a similar rate. The projections in Table 4 are based on the ratio of beds/cases that is estimated in 2017, and the number of facilities and beds based on data provided by the Marin County Aging and Adult Services. This set of projections does not asses the quality or appropriateness of the care, and just serves to provide an estimate of future infrastructure needs compared to present capacity.

2017 Memory Care Beds		
Care/Payment Type	**Facilities**	**Beds**
Private Pay (dedicated dementia care)	7	162
MediCal (potential dementia care)	8	592
MediCal (dedicated memory care)	1	36

2030 Memory Care Beds Projections		
Care/Payment Type	**Facilities**	**Beds**
Private Pay (dedicated dementia care)	10	235
MediCal (potential dementia care)	12	858
MediCal (dedicated memory care)	2	52

2045 Memory Care Beds Projections		
Care/Payment Type	**Facilities**	**Beds**
Private Pay (dedicated dementia care)	13	304
MediCal (potential dementia care)	15	1110
MediCal (dedicated memory care)	2	68

Table 4: Projected Memory Care Beds

Just as the number of dementia cases is projected to approximately double by 2045, so do the number of memory care beds needed to care for those patients. The facility counts were also increased by the same margin, although that is likely to be less relevant than the total number of beds. Of note, a more complete needs assessment would require a thorough knowledge of the number of at-home caregivers and organizations that assist with that care.

VIII. Home Care

Despite the estimation of facility bed infrastructure provided in Table 4, it is important to note that much of the dementia care does not occur in facilities, and that any increase in dementia prevalence in the community will lead to an increase in community burden as well. According to the Alzheimer's Association, approximately half of all unpaid caregivers provide care for a person with dementia, with an estimated 1.6 million unpaid caregivers in California alone in 2016, providing an estimated $1.8 billion of worth of care (Alzheimer's Association, 2017). Furthermore, 66 percent of unpaid family caregivers live with the person they care for in the community (Alzheimer's Association, 2017).

IX. Medicare Data Concerns

Given that dementias are predominately a disease associated with aging, Medicare/CMS data would seem to be a natural fit to estimate the number of cases in a given population. In fact, there is CMS data in both raw counts and percent of Medicare beneficiaries that have been diagnosed with a dementia. This data was available for California and counties from 2007 through 2014 (Centers for Medicare and Medicaid Services, 2014). However, this data resulted in significantly differing senior population estimates than those provided by the U.S. Census; Medicare data underestimated the population by at least 15,000 (approximately 33%) each year beginning in 2010. Due to the discrepancies, and the fact that the Medicare data was not stratified by age (resulting in an inability to apply age as a risk factor), Medicare data was not used for dementia estimation or projection.

X. Summary

- **a.** There is no set of Marin specific prevalence data on dementia
- **b.** All current prevalence data is based on estimations and projections
- **c.** Medicare data is likely to be inaccurate regarding the number of patients
- **d.** Approximately 33% of Marin's population with be 60 years and older by 2030
- **e.** The number of dementia patients (≥ 65) will approximately double in 30 years from approximately 4,000 to 7,500 by 2045

f. The peak of seniors occurring in 2030 does not correspond to peak of dementia cases, as prevalence of dementia increases strongly with age, resulting in the dementia peak in 2045

g. The projected number of dementia cases is based on 2010 population data and 2010 medical science – any significant medical changes will impact the projections

h. There is evidence that in the United States dementia prevalence in seniors has decreased by approximately three percent from 2000 to 2012, hypothesized to be a result of increased cardiovascular health

i. The underpinnings of this report agree with the Alzheimer's Association's 2017 report

XI. Theoretical Action Items

a. Conduct study to determine Marin specific dementia prevalence

b. Begin infrastructure planning for needed increased number of memory care beds

c. Raise community awareness for dementia prevention efforts including increased socialization of seniors and promotion of cardiovascular health

d. Coordinate with aging specific institutes at UC Davis, UC San Francisco, and Stanford University to determine best practices for collection and analysis of dementia and aging related data

e. Purchase Medicare data to conduct a more thorough analysis of existing dementia patients and their spatial distribution, primary care providers, and co-existing medical concerns – the costs associated with this purchase will range from approximately $5,000-$10,000 and the data acquisition will take between six and eight months

f. Partner with local private health insurance organizations (Kaiser, Blue Cross, etc.) to begin prevalence studies and to determine how best to leverage the resources and needs of all health care groups to provide optimal and cost-effective care for the 2030-2040 dementia spike

XII. Works Cited

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XIII. Appendix

	Population (2015)		Estimated Dementia Cases (2015)						
Zip Code	**Total**	**≥ 65 yrs**	**≥ 85 yrs**	**65-69 yrs**	**70-74 yrs**	**75-79 yrs**	**80-84 yrs**	**≥ 85 yrs**	**≥ 65 yrs**
94937	782	251	15	2	1	5	4	5	17
94964	3884	88	0	1	1	0	0	0	2
94929	139	63	17	1	0	1	1	5	7
94903	30555	6655	1805	24	46	62	149	543	825
94945	18602	3012	380	24	20	28	37	114	223
94941	31168	5781	720	38	45	52	97	217	450
94970	573	304	0	3	3	1	4	0	11
94933	812	114	0	1	1	0	0	0	3
94957	1316	206	50	1	1	3	4	15	24
94904	12458	3375	456	18	33	34	50	137	272
94924	1387	364	12	2	6	2	1	4	15
94965	11294	2365	196	17	23	22	26	59	147
94973	1653	429	79	2	5	5	0	24	36
94950	72	37	6	0	1	1	0	2	3
94938	636	169	0	2	2	2	0	0	5
94960	15777	2843	141	21	25	32	37	42	158
94920	12711	3329	456	16	29	38	65	137	285
94939	6936	1331	104	11	11	11	18	31	82
94901	42488	6290	638	41	49	76	88	192	447
94940	235	64	0	1	1	0	0	0	2
94925	9595	1628	114	9	12	21	39	34	115
94971	339	64	0	0	1	2	0	0	3
94963	701	167	0	2	1	0	1	0	4
94956	1351	446	63	1	5	8	7	19	40
94930	8796	1360	216	10	9	12	20	65	115
94949	16366	2941	435	18	21	27	58	131	254
94947	26252	4554	633	26	34	70	52	191	372
94946	747	186	9	1	2	1	2	3	10
94952	35011	5452	630	37	45	51	82	190	404
94972	0	0	0	0	0	0	0	0	0

Table 5: Population and Estimated Dementia Cases by Age and Zip Code