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# Planning for California's Growing Senior Population

## Technical Appendices

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Laurel Beck and Hans Johnson  
with research support from Landon Gibson

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## Appendix A: Detailed Tables

These tables show base and projected populations of seniors age 65 and older in California. Each table shows summary statistics for all seniors, those living in households who have self-care limitations, and those living in nursing homes. Table A1 provides estimated and projected populations and Table A2 provides distributions of those populations. Table A3 provides details on how the marital status of the senior population has changed over time, as well as our projections for 2030. Figure A1 displays information on the rate of nursing home utilization across age groups over time. Appendix B contains descriptions of the data and methods used to generate these estimates and projections.

**TABLE A1**

Number of seniors in California by selected characteristics, 2012 and 2030

	All seniors		With self-care limitations, living in households		Living in nursing homes	
	2012	2030	2012	2030	2012	2030
Total population	4,603,300	8,627,800	475,500	918,800	91,500	106,500
Age:						
65–69	1,471,300	2,445,000	69,000	118,600	8,200	9,100
70–74	1,068,600	2,197,300	64,500	128,200	8,100	11,500
75–79	785,200	1,720,700	74,700	172,900	13,600	16,000
80–84	625,900	1,217,000	90,800	181,400	18,000	21,800
85–89	411,900	645,200	92,400	163,900	20,100	21,000
90+	240,400	402,600	84,300	153,700	23,500	27,100
Gender:						
Female	2,586,200	4,705,400	316,000	590,700	57,800	68,700
Male	2,017,000	3,922,300	159,500	328,200	33,700	37,800
Ethnicity:						
African American	238,800	468,800	33,000	63,600	8,800	11,600
API	649,400	1,414,300	66,000	144,400	9,700	12,400
Latino	840,200	2,270,200	101,300	279,800	14,800	23,000
Other	78,700	185,000	10,300	22,500	1,700	2,500
White	2,796,200	4,289,600	264,900	408,600	56,500	56,900

SOURCE: Authors' projections for 2030; American Community Survey for 2012 adjusted to reflect nursing home populations.

NOTE: See Appendix B for methods.

**TABLE A2**

Percentage distribution of seniors in California by selected characteristics, 2012 and 2030

Characteristics of self-care limitation and group-quarters senior populations, percent distribution						
	All seniors (%)		With self-care limitations, living in households (%)		Living in nursing homes (%)	
	2012	2030	2012	2030	2012	2030
Total population	100.0	100.0	100.0	100.0	100.0	100.0
Age:						
65–69	32.0	28.3	14.5	12.9	9.0	8.5
70–74	23.2	25.5	13.6	14.0	8.9	10.8
75–79	17.1	19.9	15.7	18.8	14.9	15.0
80–84	13.6	14.1	19.1	19.7	19.7	20.5
85–89	8.9	7.5	19.4	17.8	22.0	19.7
90+	5.2	4.7	17.7	16.7	25.7	25.4
Gender:						
Female	56.2	54.5	66.5	64.3	63.2	64.5
Male	43.8	45.5	33.5	35.7	36.8	35.5
Ethnicity:						
African American	5.2	5.4	6.9	6.9	9.6	10.9
API	14.1	16.4	13.9	15.7	10.6	11.6
Latino	18.3	26.3	21.3	30.5	16.2	21.6
Other	1.7	2.1	2.2	2.4	1.9	2.3
White	60.7	49.7	55.7	44.5	61.7	53.4

SOURCE: Table A1.

**TABLE A3**

Senior population by marital status

	1990	2000	2012	2030 (projected)	2012–30 percent change
Married	1,697,200	1,953,400	2,447,100	4,289,300	75%
Widowed	1,008,600	1,085,300	1,183,100	1,990,000	68%
Divorced/separated	287,600	393,900	705,500	1,519,800	115%
Never Married	130,100	153,600	267,500	828,700	210%

Distribution of the senior population by marital status

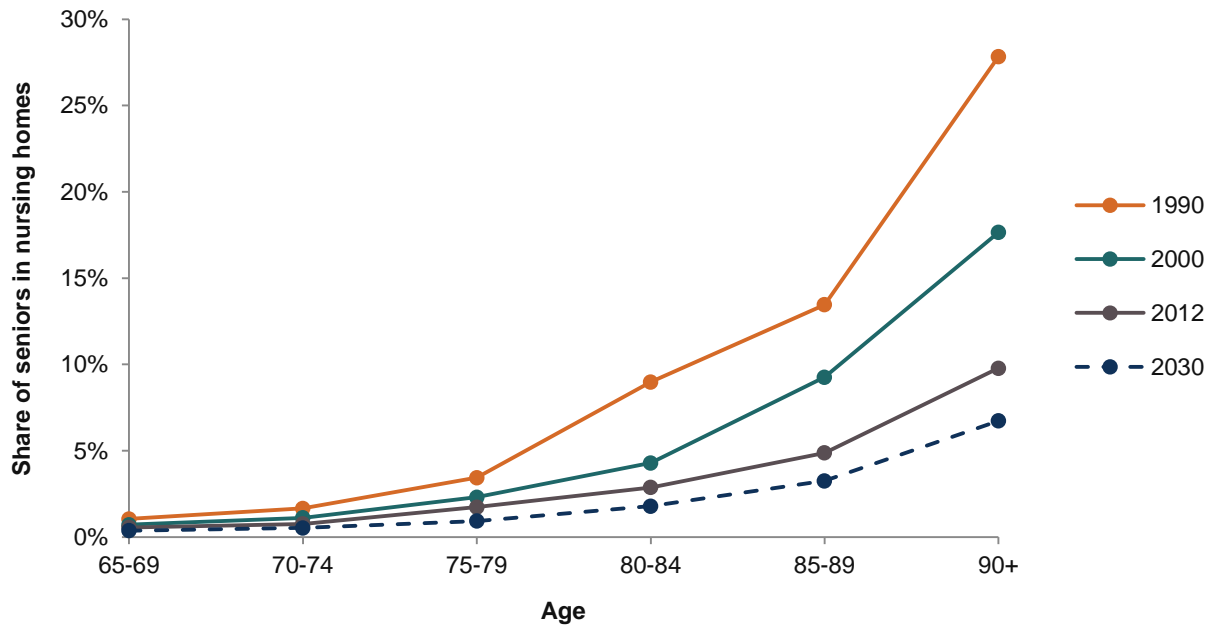
	1990	2000	2012	2030 (projected)
Married	54.3%	54.5%	53.2%	49.7%
Widowed	32.3%	30.3%	25.7%	23.1%
Divorced/separated	9.2%	11.0%	15.3%	17.6%
Never Married	4.2%	4.3%	5.8%	9.6%

SOURCE: Author calculations based on the American Community Survey and Decennial Census.

NOTE: See Technical Appendix A for detailed tables and Technical Appendix B for data and methods used to generate the projections.

**FIGURE A1**

Share of seniors in nursing homes is falling for all age groups



SOURCE: Authors' estimates based on ACS and Decennial Census data.

General trends point toward better health among California's aging population—along with the ability to remain at home as long as possible. But these trends are being partially offset by lower marriage and fertility rates, leading the rate of nursing home use to decline more modestly than it has in the past.<sup>1</sup>

<sup>1</sup> The state's nursing homes are below total capacity, reflecting the decline in overall utilization rates since 1990. data from the California Office of Statewide Health Planning and Development show that the state's total nursing home capacity was just under 111,500 beds. In 2012, California had an 85.5% occupancy rate, slightly higher than the national average of 82.5%.

## Appendix B: Data and Methods

To develop the projections of senior populations living in nursing homes and senior populations with self-care limitations, we use a multi-stage process. First, we use decennial census data and American Community Survey data for California to identify individual characteristics most strongly associated with having a self-care limitation and with living in institutionalized group quarters. Second, we develop population projections that include marital status, using California Department of Finance projections as our base. Third, we apply the results of our first stage to the results of our second stage to develop population projections for seniors with a self-care limitation and for seniors living in institutionalized group quarters. Finally, we use data from the California Department of Corrections and Rehabilitation and published reports from the Census Bureau to adjust the institutionalized group quarters populations to estimate and project the number of nursing home residents. Each of these stages is discussed in detail below.

In the first stage, we use individual records from the public-use microdata samples of the censuses of 1990 and 2000 as well as the combined 2011, 2012, and 2013 American Community Surveys available from the University of Minnesota’s Integrated Public Use Microdata Series.<sup>2</sup> For California residents age 65 and older, we develop logit models that predict the likelihood of either living in a group quarters institution or the likelihood of having a self-care limitation. The models are run separately for each year and for each of two dependent binary outcomes: living in a group quarters institution (or not), and having a self-care limitation (or not). Institutionalized group quarters are defined by the Bureau to include correctional institutions, mental institutions, and “institutions for the elderly, handicapped and poor.” Self-care limitation is defined as “any physical or mental health condition that has lasted at least 6 months and makes it difficult for them to take care of their own personal needs, such as bathing, dressing, or getting around inside the home. This does not include temporary health conditions, such as broken bones or pregnancies.” Independent variables include age, gender, ethnicity, and marital status. For the group quarters model, having a self-care limitation is also included as an independent variable. Table 1 describes the variables.

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<sup>2</sup> See King, Miriam, Steven Ruggles, J. Trent Alexander, Sarah Flood, Katie Genadek, Matthew B. Schroeder, Brandon Trampe, and Rebecca Vick. *Integrated Public Use Microdata Series, American Community Survey and decennial census [Machine-readable database]*. Minneapolis: University of Minnesota, 2014.

**TABLE B1**

Description of variables used in logistic regression models

Variable	Description
agegrp 67.5	age 65–69, reference group
agegrp 72.5	age 70–74=1
agegrp 77.5	age 75–79=1
agegrp 82.5	age 80–84=1
agegrp 87.5	age 85–89=1
agegrp 92.5	age 90+=1
SEX	female=1, male=0
MARST Curmar	currently married, reference group
MARST DivSep	divorced or separated=1
MARST Nevermarried	nevermarried=1
MARST Widowed	widowed=1
reth white	white ethnicity, reference group
reth afam	African American ethnicity=1
reth api	Asian or Pacific islander=1
reth hispa	Latino=1
reth other	Other ethnicity=1
DIFFCARE	Self-care limitation=1
GQINST	Living in institutionalized group quarters=1

We ran additional models with more independent variables, including nativity and educational attainment, and with multiple interactions. Because our sample sizes are very large, almost every independent variable and most interactions were statistically significant, even if the magnitude of the effect was small. In developing population projections, however, parsimony is critical. Any variable we identify in our regression models as highly associated with living in group quarters must be added to the population projections model. Adding more characteristics to a population projection model adds to the inherent uncertainty of the resultant projections. Our final model includes only variables that were both statistically significant and of sufficient magnitude to be useful in developing population projections. The results of those models are shown in Table B2.

**TABLE B2**

Logit model results, 2000, 2012.

Model 1: Predicting self-care limitation

Analysis of maximum likelihood estimates						
Parameter	Value	DF	Estimate	Standard	Wald	Pr > ChiSq
				Error	Chi-Square	
Intercept		1	-3.3022	0.00241	1879376.8	<.0001
YEAR	1990	1	0.3548	0.00242	21466.623	<.0001
YEAR	2006	1	0.1314	0.0023	3263.9248	<.0001
YEAR	2010	1	-0.0502	0.00232	466.2873	<.0001
YEAR	2011	1	-0.0402	0.00231	303.9096	<.0001
YEAR	2012	1	-0.0616	0.00229	720.7708	<.0001
YEAR	2013	1	-0.072	0.00228	994.4411	<.0001
agegrp	72.5	1	0.2812	0.00207	18494.621	<.0001
agegrp	77.5	1	0.7306	0.00202	130696.45	<.0001
agegrp	82.5	1	1.2143	0.00202	363030.79	<.0001
agegrp	87.5	1	1.7151	0.00215	636753.03	<.0001
agegrp	92.5	1	2.436	0.00239	1042343.3	<.0001
SEX	Female	1	0.2078	0.00133	24459.047	<.0001
MARST	DivSep	1	0.4004	0.00192	43642.028	<.0001
MARST	Nevermarried	1	0.5943	0.00258	52945.885	<.0001
MARST	Widowed	1	0.4654	0.00149	97589.382	<.0001
reth	afam	1	0.6192	0.00242	65724.212	<.0001
reth	api	1	0.1975	0.00189	10934.307	<.0001
reth	hispa	1	0.3619	0.00162	50055.274	<.0001
reth	other	1	0.4141	0.00451	8431.2711	<.0001

**TABLE B3**

Model 2: Predicting group quarters institutionalization

Analysis of Maximum Likelihood Estimates				
Parameter		Estimate	Standard Error	Pr > ChiSq
Intercept		-5.3439	0.00544	<.0001
YEAR	1990	0.2514	0.00449	<.0001
YEAR	2006	-0.2858	0.00456	<.0001
YEAR	2010	-0.5766	0.00483	<.0001
YEAR	2011	-0.5718	0.00478	<.0001
YEAR	2012	-0.5887	0.00477	<.0001
YEAR	2013	-0.6349	0.00478	<.0001
agegrp	72.5	0.2022	0.00516	<.0001
agegrp	77.5	0.5307	0.00492	<.0001
agegrp	82.5	0.8819	0.00477	<.0001
agegrp	87.5	1.1475	0.0049	<.0001
agegrp	92.5	1.466	0.00502	<.0001
SEX	Female	-0.0781	0.00288	<.0001
MARST	DivSep	0.8439	0.00418	<.0001
MARST	Nevermarried	1.4499	0.00472	<.0001
MARST	Widowed	0.5482	0.00342	<.0001
reth	afam	0.099	0.00482	<.0001
reth	api	-0.5128	0.00475	<.0001
reth	hispa	-0.4291	0.00385	<.0001
reth	other	-0.3119	0.0109	<.0001
DIFFCARE	Yes	2.8701	0.00293	<.0001

In the second stage of our process, we develop population projections by age, ethnicity, gender, and marital status. We rely largely on recently released population projections by the California Department of Finance. Those projections include age, ethnicity, and gender. Because marital status is an important predictor of institutionalization and self-care limitation, we add marital status to the Department of Finance projections. We do so by examining cohort specific trends in marital status between 2000 and 2013, with cohorts defined by age (five-year age groups), ethnicity, and gender. Using historic data, we observe that the share of never-married individuals changes very little over time for cohorts aged 50 and over. (For example, the share of 50–54 year olds that are never-married in 2000 is very close to the share of 63–67 year olds that are never-married in 2013). Therefore, we hold the share of never-married people constant for cohorts age 50 and older as we age them to 2030, using 2011–2013 American Community Survey data for our base. We also use a cohort approach for other marital statuses, but adjust the proportions in light of trends observed between 2000 and 2013.



Third, we add self-care limitation to the population projections. Results of the logistic regression models (Model 1 in Table B2) are used to project the probability that an individual has a self-care limitation. Specifically, for 240 demographic cells (6 age groups by 2 genders by 4 marital statuses by 5 ethnicities) we develop projected probabilities of having a self-care limitation. The projected probabilities assume that the average annual change in the coefficients on the year dummies continues into the future. Because the size of these coefficients is relatively small, our projections are not sensitive to the base period we chose to develop the trended projections. We chose 2000 to 2013 as our base period. The outcome of this step is a population projection that includes self-care limitation as well as age, gender, ethnicity, and marital status.

Fourth, in much the same manner, we add group quarters institutions to our projections. Now, we have 480 cells to project (because we have added the dichotomous self-care limitation to the 240 cells of the earlier projections). Unfortunately, the projections are very sensitive to the base period we use to develop the trends. For example, average annual changes in the coefficients on the year dummies are much more negative in the 2000 to 2013 period than they are in the 2010 to 2013 period. In the projections we present in the report, we moderate trends in probabilities from 2000 to 2013 to develop the projected probabilities for 2030. The outcome of this step is a population projection that includes group quarters institutionalization as well as self-care limitation, age, gender, ethnicity, and marital status. Because we moderate the average annual change, we are essentially slowing the historic observed rate of change during the projection period. This is a common approach in projections and serves to moderate changes in projected probabilities.

Finally, we make an adjustment to account for institutionalized group quarters other than nursing homes. Specifically, using California Department of Corrections and Rehabilitation prison counts by age, ethnicity, and gender for 2012, we estimate the share of prisoners among seniors living in institutionalized group quarters. (For most cells, the share is very low). We keep this share constant within age, gender, and ethnicity cells over the projection period to 2030. We subtract these prisoners from the estimates and projections. Then, using Census Bureau tables of nursing home populations for 2000 and 2010 by state, we adjust our estimates to be consistent with the Census Bureau numbers.<sup>3</sup> We apply the 2010 adjustment factor to our 2012 estimates and 2030 projections. The final estimates and projections therefore equate to nursing home populations, exclusive of prisoners and other residents of institutionalized group quarters. Our final numbers are very close to the Office of Statewide Health Planning and Development's 2012 count of nursing home residents.

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<sup>3</sup> See: U.S. Census Bureau, *P23-212, 65+ in the United States: 2010*, U.S. Government Printing Office, Washington, DC, 2014.



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Public Policy Institute of California  
500 Washington Street, Suite 600  
San Francisco, CA 94111  
T: 415.291.4400  
F: 415.291.4401  
PPIC.ORG

PPIC Sacramento Center  
Senator Office Building  
1121 L Street, Suite 801  
Sacramento, CA 95814  
T: 916.440.1120  
F: 916.440.1121