The Spatial Distribution of an Aging Population

Stanford Center on Longevity
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Summary

This report provides a summary of the geographic distribution of the elderly in the United States from 1970 through 2010. The work is supported by a seed grant from the MacArthur Research Network on an Aging Society to the Stanford Center on Longevity. The main objective of the project is to produce a better understanding of where older people live and how their socioeconomic characteristics vary within varying spatial units of analysis.

During the initial stage of the project, we completed the following tasks:

- We completed a literature review of the research on the geography of aging
- We interviewed experts and policy makers regarding current efforts to study the geography of aging
- We reviewed demographic, socioeconomic and environmental data sources at different levels of geographic specificity
- We completed descriptive analyses of demographic data on the geography of aging

Our review of the literature on aging revealed that no one has mapped the distribution of the elderly at small geographic scales, such as neighborhoods. While there are various data sources that can be used to look at the distribution of the elderly population at small geographic scales, there is currently no effort to map elderly communities with a national scope. Nor is there an existing methodology or a unified national framework of how to combine data on the demographic and socioeconomic characteristics of the elderly along with relevant environmental factors and the availability of service providers.

Despite the general lack of empirical work on the distribution of the elderly at the neighborhood level, our contact with policy makers and practitioners in the field of aging revealed a lot of interest in documenting where the elderly live. In particular, the existence of Naturally Occurring Retirement Communities (NORCs), or buildings and neighborhoods not specifically designed as retirement communities but where people have aged in place, has received great attention in policy circles as a new neighborhood phenomenon that could increasingly describe the experiences of the elderly U.S. population.

Our analysis of U.S. Census data shows that there is no substantial clustering of the elderly around other elderly individuals outside of states and counties that are traditional retirement destinations, such as Florida, Arizona, and California. Therefore, the number and prevalence of NORCs may be exaggerated and neighborhoods might be more mixed by age group than previously assumed. Our next steps will involve a further examination of the NORC phenomenon and the development of a neighborhood-level index of the socioeconomic and environmental conditions of the communities where the elderly live.

The progress report is organized as follows: we first provide an introduction to the topic of the geographic distribution of the elderly; second, we describe the work we have accomplished with a particular emphasis on our descriptive results; third, we give some preliminary conclusions and describe our short-term and long-term goals.

I. Introduction

Demographers agree that the United States will experience a rapid increase of older people in both numbers and as a percentage of the population. There is a growing understanding that mapping the spatial distribution of older people could make a significant contribution in helping both the public and the private sectors serve an increasingly elderly population. For example, in 2007, a Congressional Research Service report stated that "understanding geographic patterns and changes in population distribution can assist policy makers in targeting public funds for needed services, improve service delivery, and aid in community planning efforts."[1] Important issues such as social services, housing, health care, and transportation need to be coordinated with a better understanding of how neighborhoods would change with the aging of the population.

Federal legislation in 2006 urged states to adopt comprehensive plans to address the coming increases in their older populations. These plans, where they exist, are usually not grounded in an understanding of older residents' geography. A few Metropolitan Planning Organizations already coordinate aging, transportation, and housing information in their regional planning processes, but this coordinated approach is not standard procedure. There are those local leaders who use new mapping technologies to track the spatial distribution of older Americans for the improved delivery of social services. However, these federal, state, and local initiatives are the exception. In general, there have been no efforts to coordinate where and how older Americans live with the local delivery of social services.

Furthermore, urban planners and academics have not produced systematic research describing the neighborhood contexts of the elderly population. The main concern in the research community has revolved around the emergence of a spatial residential pattern called Naturally Occurring Retirement Communities (NORCs). NORC is a term coined by Michael Hunt in the 1980s to describe buildings and neighborhoods that were not initially planned for exclusive elderly living but gradually evolved as significant proportions of their residents became old. Some estimates show that "between 36 and 50 percent of people 55 and over are currently living in buildings or neighborhoods that can be considered NORCs."[2] NORCs may dramatically increase in number and size as the growing elderly population remains in the same neighborhoods into very old age. Nevertheless, there is no national-level research on the geographic distribution of NORCs, nor a good understanding of how NORCs emerge and develop over time.

With increasing awareness of the enormity in the size of an aging population, efforts to understand residential patterns and their implications should increase as well. Very basic issues must be addressed: does Census information support the claims that there are large concentrations of older residents, outside of institutional settings or intentional aging communities? What expert manipulation must be applied to connect housing patterns with the geography of familial, private, and public services? Should descriptions of NORCs be standardized across the nation? What should be the spatial dimensions of mapping of older

[1] Colello, Kirsten J. "Where do Older Americans Live? Geographic Distribution of the Older Population," March 5, 2007, Report RL33897.

[2] Prosper, Vera. "Naturally Occurring Retirement Community (NORC) Services Program." *Livable New York Resource Manual* www.aging.ny.gov/LivableNY/ResourceManual/Index.cfm

residents for policy purposes? What new technologies would help create maps that are visually compelling and useful for policy considerations?

For whatever reasons, whether concern for residents' privacy and safety, a lack of awareness about demographic projections, or perhaps a belief that more accurate, impactful information about an aging population might lead to greater demands for public services, these questions have not been adequately answered. This project intends to address these basic issues and visually display the results of the research. Combining economics, demography, sociology, and anthropology, researchers will collaborate with GIS experts to produce maps that demonstrate what is known about the housing patterns of older residents and gaps in the available information. The ongoing work of this project will make an important contribution by exploring the use of new technologies with serious investigation of multiple sources of information for better understanding of aging in America.

II. Work Completed

1. Completed interviews and correspondence with policy makers, practitioners, and researchers

Our contact with policy makers and practitioners in the field of aging revealed a lot of interest in documenting where the elderly live. In particular, while policy makers are very interested in the development of NORCs and the socioeconomic characteristics of the neighborhoods where the elderly live, there is very little research (mostly in the form of local case studies) that can inform national policy on aging communities.

See Appendix A for an annotated list.

2. Reviewed existing research

Our review of the literature on aging revealed that no one has mapped the distribution of the elderly at small geographic scales, such as neighborhoods. There are, however, multiple studies that have generated indicators of elderly well-being using national-level and metropolitan-level data. Some local service organizations have also done small-scale evaluations of the well-being of their elderly constitutions.

See Appendix B for annotated list of relevant research.

3. Reviewed available data sources

We sought information about numbers of people, age, gender, living arrangements, housing tenure, income distribution, health status, community mobility, marital status, proximity to family members living outside the older person's household, transportation networks, clean air, and environmental hazards. What we found was that important datasets (except for the Decennial Census and the American Community Survey) are unavailable at the neighborhood

level or information is gathered for different purposes, with different geographic aggregation, or different units of analysis as to be hard to merge together within a single analysis framework where the neighborhood is the units of analysis.

We think that some of the methodological problems associated with combining data from different sources at the national level can be addressed successfully by geocoding the available data on the elderly within the same spatial framework. For example, combining U.S. Census datasets on the geographic distribution of the elderly along with the geographic distribution of natural hazard zones, air pollution, and major transportation corridors could tell us how many and what percent of the elderly are exposed to potentially harmful environments. Still, we do acknowledge that not all problems related to our project can be solved by geocoding data, as there is great variability of the available data across localities and across different federal agencies. In these cases, we hope that the methodology we develop to map the available data on the elderly would serve as a useful first step in the planning process of local administrations that may add other layers to the data given the local needs of their constituents and the availability of local data.

See Appendix C for annotated list of relevant data.

4. Reviewed American Housing Survey (AHS) and developed proposed modifications

As part of our conversation with HUD, we were invited to submit comments for the 2015 redesign of the AHS in which we suggested how the survey could be more useful for researchers and practitioners in the field of aging. In proposing these modifications and additions, we paid particular attention to issues affecting the elderly population and the population with disabilities. We also proposed questions that would elicit further details about the neighborhoods where the AHS sampled units are located as well as the available services and amenities at the neighborhood level that are important for the creation of safe and vibrant neighborhoods.

See Appendix D for proposed modifications.

5. Completed preliminary statistical analysis of the distribution of the elderly across geographic units

See Section III below.

6. Completed case study of the distribution of elderly in San Mateo County, California

See Appendix E.

7. Reviewed methodology for using tabular versus mapped data for analyzing spatial distribution of populations

See Appendix F.

8. Reviewed features of various mapping tools

   See Appendix G.

III. Statistical analysis of the distribution of elderly across geographic units

Given the focus in policy circles on Naturally Occurring Retirement Communities (NORCs), we have generated some basic statistics of the distribution of the elderly across geographic units of different sizes – counties, census tracts, and census block groups. We have computed these statistics for the United States and for the four states with the greatest number of elderly (California, Florida, Texas, and New York).

Our two basic units of analysis are census tracts and census block groups. Census tracts are small statistical subdivisions of a county, designed to be homogeneous with respect to socioeconomic characteristics. They usually have between 2,500 and 8,000 residents. The disadvantage to using census tracts is that they do not always approximate actual neighborhoods and may be too large to detect actual concentrations of the elderly. The advantage of using census tracts is the wide availability of demographic and socioeconomic data at this particular geographic level. Census block groups, on the other hand, are the smallest geographic units in the U.S. Census for which the Bureau publishes sample data. Census block groups are subdivisions of census tracts, generally containing between 600 and 3,000 people. Most block groups are delineated by local participants in the Bureau's Participant Statistical Areas Program. Therefore, block groups follow salient local subdivisions within census tracts.

A. Geographic distribution of the elderly, 2010

As Table 1A shows, there are very few census tracts that have large concentrations of individuals over the age of 65. For example, there are only 379 census tracts where the elderly are a majority of the population representing only 0.51% of all census tracts. On the other hand, there are 1,630 census block groups where the elderly are a majority of the population, representing 0.74% of all census block groups. These distributions indicate that to the extent that any concentrations of elderly individuals do occur, they do so at very small geographic scales. Census tracts and even census block groups might be too large as geographic units to detect any meaningful concentration of elderly individuals.[3]

[3] In a complementary set of sensitivity analyses, we also examined whether our conclusions would change if we exclude from the analysis elderly individuals that live in institutional settings such as nursing homes. Excluding these individuals did not produce any substantive changes in the analyses.

Table 1A. Distribution of geographic units by density of elderly individuals (age 65+)

	County		Census Tract		Census Block Group	
Percent Individuals over 65	N	Percent	N	Percent	N	Percent
<10%	194	6.02	22,244	30.3	69,643	31.7
10-20%	2,538	78.8	42,141	57.4	117,020	53.3
20-30%	477	14.8	7,391	10.1	25,240	11.5
30-40%	11	0.34	966	1.32	4,527	2.06
40-50%	1	0.03	305	0.42	1,344	0.61
50-60%			144	0.20	603	0.27
60-70%			90	0.12	378	0.17
70-80%			90	0.12	391	0.18
80-90%			45	0.06	212	0.10
90-100%			10	0.01	46	0.02
>50%			379	0.51	1,630	0.74
Total	3,221	100%	73,426	100%	219,404	100%

In California, only 0.43% of census tracts and 0.65% of census block groups are majority elderly (Table 1B). In contrast, in Florida, 4.5 % of census tracts and 6.4% of census block groups are majority elderly (Table 1C).

Table 1B. Distribution of geographic units by density of elderly individuals (age 65+), California

	County		Census Tract		Census Block Group	
Percent Individuals over 65	N	Percent	N	Percent	N	Percent
<10%	9	15.5	3630	45.2	10,515	45.4
10-20%	42	72.4	3637	45.3	9,938	42.9
20-30%	7	12.1	615	7.66	2,059	8.9
30-40%			66	0.82	380	1.64
40-50%			41	0.51	120	0.52
50-60%			8	0.10	34	0.15
60-70%			9	0.11	34	0.15
70-80%			6	0.07	44	0.19
80-90%			9	0.11	33	0.14
90-100%			3	0.04	5	0.02
>50%			35	0.43	150	0.65
Total	58	100%	8,024	100%	23,162	100%

Table 1C. Distribution of geographic units by density of elderly individuals (age 65+), Florida

	County		Census Tract		Census Block Group	
Percent Individuals over 65	N	Percent	N	Percent	N	Percent
<10%	2	2.99	1011	24.2	2,996	26.4
10-20%	45	67.2	1849	44.2	4,862	42.8
20-30%	15	22.4	679	16.2	1,708	15.0
30-40%	4	5.97	305	7.29	681	5.99
40-50%	1	1.49	150	3.59	400	3.52
50-60%			77	1.84	267	2.35
60-70%			53	1.27	169	1.49
70-80%			39	0.93	184	1.62
80-90%			19	0.45	90	0.79
90-100%					12	0.11
>50%			188	4.5	722	6.4
Total	67	100%	4,182	100%	11,369	100%

In New York and Texas, only 0.3% and 0.2% of census block groups, respectively, are majority elderly.

Table 1D. Distribution of geographic units by density of elderly individuals (age 65+), New York

	County		Census Tract		Census Block Group	
Percent Individuals over 65	N	Percent	N	Percent	N	Percent
<10%			1290	26.5	4,405	29.0
10-20%	61	98.4	3089	63.4	8,832	58.1
20-30%	1	1.61	425	8.73	1,559	10.3
30-40%			45	0.92	280	1.84
40-50%			10	0.21	74	0.49
50-60%			5	0.10	20	0.13
60-70%			3	0.06	9	0.06
70-80%					4	0.03
80-90%			2	0.04	7	0.05
90-100%			1	0.02	4	0.03
>50%			11	0.22	44	0.30
Total	62	100%	4,870	100%	15,194	100%

Table 1E. Distribution of geographic units by density of elderly individuals (age 65+), Texas

	County		Census Tract		Census Block Group	
Percent Individuals over 65	N	Percent	N	Percent	N	Percent
<10%	21	8.27	2462	47.0	7,210	45.7
10-20%	187	73.6	2381	45.5	6,877	43.6
20-30%	45	17.7	363	6.93	1,422	9.0
30-40%	1	0.39	21	0.40	192	1.22
40-50%			4	0.08	46	0.29
50-60%			3	0.06	14	0.09
60-70%			1	0.02	10	0.06
70-80%			2	0.04	3	0.02
80-90%					2	0.01
90-100%			1	0.02	5	0.03
>50%			7	0.14	34	0.21
Total	254	100%	5,238	100%	15,781	100%

While Tables 1A though 1E show the number and percent of neighborhoods that are majority elderly, Table 2 shows the percent of the elderly that live in majority elderly neighborhoods. For example, at the national level, 1.8% of the elderly (or about 720,000 elderly individuals) live in census tracts that are majority elderly, and 3% of the elderly (or about 1.2 million elderly individuals) live in census block groups that are majority elderly.

The big exception to this national pattern is Florida, where 11.3% of the elderly live in majority elderly census tracts and 17.3% of the elderly live in majority elderly census block groups. California, New York, and Texas do not show such large percentages of the elderly living in majority elderly block groups. As a whole, these numbers place some doubt in the claims that a large part of the elderly population lives in NORC communities at least if those communities are defined at the neighborhood rather than the building level. The numbers also show that Florida is exceptional in its neighborhood concentration of elderly individuals.

Table 2A. Distribution of the elderly (age 65+) by geographic units

	United States			California			Florida			New York			Texas		
	County	Census tract	Census block group	County	Census tract	Census block group	County	Census tract	Census block group	County	Census tract	Census block group	County	Census tract	Census block group
<10%	10	17	19	9	29	29	4	12	13		14	16	45	32	31
10-20%	82	62	54	90	53	47	44	37	34	99.96	69	60	51	55	49
20-30%	7	15	18	1	13	15	43	21	19	0.04	14	17	4	12	15
30-40%	1	3	5		2	4	8	12	10		2	5	0.2	1	3
40-50%	0.1	1	2		1	2	1	7	7		0.4	1		0.2	1
50-60%		1	1		0.3	0.5		4	6		0.1	0.4		0.1	0.3
60-70%		0.4	0.7		0.5	0.7		3	4		0.1	0.3		0.1	0.3
70-80%		0.5	0.8		0.3	0.8		2	5			0.1		0.1	0.1
80-90%		0.3	0.5		1	0.8		1	2		0.1	0.2			0.1
90-100%		0.00004	0.1		0.0001	0.02			0.3		0.00004	0.1		0.0001	0.03
>50%		1.8	3.0		1.7	2.8		11.3	17.3		0.3	1.1		0.3	0.7
Total	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100
Total elderly N		40,809,984			4,246,514			3,259,602			2,617,943			2,601,886	
N elderly in a majority elderly geographic unit		719,995	1,222,791		72,389	119,959		367,683	564,003		8,498	28,161		7,609	19,407

A different way to express how concentrated the elderly are in certain neighborhoods is to calculate how segregated the elderly are from the rest of the population and how geographically isolated the elderly are in their own neighborhoods. We accomplish this task by calculating *the index of dissimilarity* and *the index of isolation* of the elderly within each county of the United States. The index of dissimilarity can be interpreted as the proportion of the elderly population that would have to move so that each neighborhood would have the same composition of the elderly as the county as a whole.[4] The isolation index can be interpreted as the probability that any given elderly person within a county shares a neighborhood with another elderly person, given the proportion of the elderly within each county.[5] Table 3 shows the top 50 counties with the highest levels of elderly segregation as measured by the index of dissimilarity. The numbers are presented for counties with at least 10,000 elderly residents since the isolation index is sensitive to the total size of the population under consideration. Both segregation indexes pertain to census block groups, the smallest geographic unit in our analysis.

The most segregated elderly county in the United States is Sumter County, FL. In this county, 48% of the elderly would need to move, so that their proportion in each block group would match their proportion at the county level. Moreover, the probability that any given elderly person lives with another elderly person in the same census tract is 59%. In fact, half of the most segregated elderly counties in the top 10 are all in Florida. A total of 16 Florida counties are in the top 50 most segregated counties. Other areas with high segregation of the elderly are found in Arizona, California, Texas, and Virginia.

[4] The index of dissimilarity is defined by the following formula:

$$D = \tfrac{1}{2} \Sigma |N_{1i}/N_1 - N_{2i}/N_2|,$$

where N_{1i} = population of the elderly in the *i*th census block group, N_{2i} = population of the non-elderly in the *i*th census block group, N_1 = total population of the elderly in the county, and N_2 = total population of the non-elderly in the county.

[5] The isolation index is computed as the weighted average of each census block group's elderly population:

$$I = \Sigma (N_i/N) (N_i/T_i),$$

where N_i = population of the elderly in the *i*th block group, N = total population of the elderly within the county, and T_i = total population in the *i*th block group.

Table 3. Geographic segregation of the elderly (age 65+), 2010, census block groups

Rank	County	State	Metropolitan Area	Total population	Total elderly	Index of dissimilarity	Isolation index
1	Sumter County	Florida	The Villages, FL	93,420	40,530	0.481	0.587
2	Ocean County	New Jersey	New York-Newark-Jersey City, NY-NJ-PA	576,567	121,104	0.478	0.425
3	Palm Beach County	Florida	Miami-Fort Lauderdale-West Palm Beach, FL	1,320,134	285,155	0.476	0.426
4	Beaufort County	South Carolina	Hilton Head Island-Bluffton-Beaufort, SC	162,233	33,032	0.458	0.375
5	Collier County	Florida	Naples-Immokalee-Marco Island, FL	321,520	84,951	0.442	0.429
6	Yuma County	Arizona	Yuma, AZ	195,751	30,646	0.438	0.313
7	Pinal County	Arizona	Phoenix-Mesa-Scottsdale, AZ	375,770	52,071	0.428	0.296
8	Maricopa County	Arizona	Phoenix-Mesa-Scottsdale, AZ	3,817,117	462,641	0.418	0.309
9	Lee County	Florida	Cape Coral-Fort Myers, FL	618,754	145,106	0.399	0.381
10	Lake County	Florida	Orlando-Kissimmee-Sanford, FL	297,052	71,825	0.384	0.376
11	Riverside County	California	Riverside-San Bernardino-Ontario, CA	2,189,641	258,586	0.373	0.251
12	Manatee County	Florida	North Port-Sarasota-Bradenton, FL	322,833	75,109	0.370	0.349
13	Sarasota County	Florida	North Port-Sarasota-Bradenton, FL	379,448	118,227	0.368	0.427
14	St. Lucie County	Florida	Port St. Lucie, FL	277,789	55,378	0.368	0.340
15	Indian River County	Florida	Sebastian-Vero Beach, FL	138,028	37,504	0.362	0.398
16	Marion County	Florida	Ocala, FL	331,298	85,318	0.362	0.391
17	Brazos County	Texas	College Station-Bryan, TX	194,851	14,059	0.358	0.136
18	Broward County	Florida	Miami-Fort Lauderdale-West Palm Beach, FL	1,748,066	249,424	0.357	0.266
19	Williamson County	Texas	Austin-Round Rock, TX	422,679	37,681	0.347	0.226
20	Martin County	Florida	Port St. Lucie, FL	146,318	39,972	0.345	0.383
21	Pasco County	Florida	Tampa-St. Petersburg-Clearwater, FL	464,697	96,245	0.339	0.317
22	Placer County	California	Sacramento-Roseville-Arden-Arcade, CA	348,432	53,562	0.338	0.299
23	Loudoun County	Virginia	Washington-Arlington-Alexandria, DC-VA-MD-WV	312,311	20,425	0.335	0.165
24	Pima County	Arizona	Tucson, AZ	980,263	151,293	0.335	0.267
25	Monterey County	California	Salinas, CA	415,057	44,422	0.333	0.181

26	Bell County	Texas	Killeen-Temple, TX	310,235	27,003	0.328	0.135
27	Arapahoe County	Colorado	Denver-Aurora-Lakewood, CO	572,003	57,580	0.326	0.185
28	Alexandria city	Virginia	Washington-Arlington-Alexandria, DC-VA-MD-WV	139,966	12,806	0.320	0.150
29	Pinellas County	Florida	Tampa-St. Petersburg-Clearwater, FL	916,542	194,099	0.319	0.310
30	Virginia Beach city	Virginia	Virginia Beach-Norfolk-Newport News, VA-NC	437,994	46,435	0.316	0.163
31	Prince William County	Virginia	Washington-Arlington-Alexandria, DC-VA-MD-WV	402,002	27,220	0.315	0.155
32	Santa Barbara County	California	Santa Maria-Santa Barbara, CA	423,895	54,398	0.310	0.194
33	Will County	Illinois	Chicago-Naperville-Elgin, IL-IN-WI	677,560	62,814	0.305	0.160
34	Fulton County	Georgia	Atlanta-Sandy Springs-Roswell, GA	920,581	83,424	0.303	0.141
35	Champaign County	Illinois	Champaign-Urbana, IL	201,081	20,066	0.302	0.147
36	Centre County	Pennsylvania	State College, PA	153,990	17,366	0.302	0.170
37	Loudon County	Tennessee	Knoxville, TN	48,556	10,434	0.301	0.307
38	Orange County	California	Los Angeles-Long Beach-Anaheim, CA	3,010,232	349,677	0.300	0.199
39	Travis County	Texas	Austin-Round Rock, TX	1,024,266	74,759	0.300	0.116
40	Clark County	Nevada	Las Vegas-Henderson-Paradise, NV	1,951,269	220,445	0.299	0.204
41	Denver County	Colorado	Denver-Aurora-Lakewood, CO	600,158	62,132	0.298	0.171
42	Onslow County	North Carolina	Jacksonville, NC	177,772	13,262	0.298	0.110
43	Norfolk city	Virginia	Virginia Beach-Norfolk-Newport News, VA-NC	242,803	22,796	0.298	0.147
44	Polk County	Florida	Lakeland-Winter Haven, FL	602,095	108,296	0.297	0.258
45	Madera County	California	Madera, CA	150,865	17,262	0.297	0.167
46	Utah County	Utah	Provo-Orem, UT	516,564	33,457	0.296	0.096
47	Benton County	Arkansas	Fayetteville-Springdale-Rogers, AR-MO	221,339	26,986	0.295	0.198
48	James City County	Virginia	Virginia Beach-Norfolk-Newport News, VA-NC	67,009	13,870	0.295	0.273
49	Dallas County	Texas	Dallas-Fort Worth-Arlington, TX	2,368,139	207,972	0.293	0.136
50	Alachua County	Florida	Gainesville, FL	247,336	26,627	0.291	0.158

B. Changes in the geographic distribution of the elderly, 1970-2010

In addition to examining the geographic distribution of the elderly for 2010, we also sought to detect any changes in that distribution over time. For all analyses of changes over time, our unit of analysis is the census tract since this is the smallest geographic unit that was continuously in existence between 1970 and 2010.

In 1970, only 55 census tracts were majority elderly across the United States. In contrast, by 2000, 379 census tracts were majority elderly. Despite the small numbers of actual neighborhoods that are majority elderly, this represents a seven-fold increase in the number of neighborhoods where the elderly are the majority population.

Table 4. Distribution of geographic units by density of elderly individuals (census tracts, age 65+)

	1970		1980		1990		2000		2010	
Percent Individuals over 65	N	Percent	N	Percent	N	Percent	N	Percent	N	Percent
<10%	20,024	57.8	20,131	45.13	19,966	33.2	22,609	34.7	22,244	30.3
10-20%	12,622	36.5	20,430	45.8	32,186	53.5	35,089	53.8	42,141	57.4
20-30%	1,532	4.43	3,201	7.18	6,747	11.2	6,247	9.59	7,391	10.1
30-40%	282	0.81	521	1.17	759	1.26	749	1.15	966	1.32
40-50%	102	0.29	169	0.38	255	0.42	212	0.33	305	0.42
50-60%	25	0.07	70	0.16	89	0.15	114	0.17	144	0.20
60-70%	14	0.04	48	0.11	47	0.08	58	0.09	90	0.12
70-80%	9	0.03	21	0.05	38	0.06	47	0.07	90	0.12
80-90%	7	0.02	14	0.03	24	0.04	36	0.06	45	0.06
90-100%			4	0.01	17	0.03	13	0.02	10	0.01
>50%	55	0.16	157	0.36	215	0.36	268	0.41	379	0.51
Total	34,617	100%	44,609	100%	60,128	100%	65,174	100%	73,426	100%

Table 5 shows the percent of the elderly that lived in majority elderly neighborhoods between 1970 and 2010.[6] There has been a remarkable stability in that percent since 1980. The only categories in Table 5 that show changes over time are the percent elderly living in neighborhoods that are less than 10% elderly and between 10 and 20% percent elderly. By 2010, only 17% of the elderly lived in census tracts that were less than 10% elderly. In contrast, 62% of the elderly lived in census tracts that were between 10 and 20% elderly.

Taken together Tables 4 and 5 show that there has been some growth in the number of majority elderly neighborhoods. Nevertheless, the actual percent of the elderly that lives in these neighborhoods has remained stable over time.

Table 5. Distribution of the elderly (age 65+) by census tract over time

	1970	1980	1990	2000	2010
<10%	39	28	20	21	17
10-20%	49	54	58	59	62
20-30%	9	12	17	15	15
30-40%	2	3	3	3	3
40-50%	1	1	1	1	1
50-60%	0.2	0.6	0.4	0.6	1
60-70%	0.3	0.6	0.4	0.4	0.4
70-80%	0.1	0.3	0.4	0.3	0.5
80-90%	0.1	0.3	0.2	0.4	0.3
90-100%		0.01	0.05	0.04	0.00004
>50%	0.8	1.8	1.5	1.8	1.8
Total	100	100	100	100	100
Total elderly N	13,748,728	20,719,864	31,241,832	34,991,752	40,809,984
N elderly in a majority elderly geographic unit	109,761	371,826	460,296	616,496	719,995

Finally, Table 6 shows the top 20 counties with the most segregated elderly population in the 1970-2010 period as measured by the index of dissimilarity.[7] Similarly to the 2010 numbers

[6] Please note that Table 5 only shows the number of elderly that live in census tracts. The Census Bureau did not fully tract the United States until the 1990 Census, so some of the increase in the elderly population in census tracts over time comes from the greater geographic coverage of Census data in later years.

[7] Please note that unlike Table 3, which presents the index of dissimilarity for census block groups, Table 6 shows the index of dissimilarity for census tracts. As noted above, census block groups are not available for all years between 1970 and 2000. Therefore, in order to keep the unit of analysis uniform over time, in this section we only present statistics for census tracts but not census block groups. Since census tracts are larger geographic units compared to block groups,

in Table 3 above, Table 6 shows that Florida, California, Arizona, and Texas have historically been the states with some of the most segregated elderly population by county. This trend continues through 2010.

the index of dissimilarity computed off of census tracts would in general be smaller compared to the index of dissimilarity computed off of census block groups.

Table 6. Geographic segregation of the elderly (age 65+), 1970-2010, census tracts

	1970		1980		1990		2000		2010	
Rank	County	Index of dissimilarity	County	Index of dissimilarity	County	Index of dissimilarity	County	Index of dissimilarity	County	Index of dissimilarity
1	El Paso County, Colorado	0.40	Ocean County, New Jersey	0.40	Ocean County, New Jersey	0.42	Ocean County, New Jersey	0.43	Sumter County, Florida	0.48
2	Riverside County, California	0.38	Maricopa County, Arizona	0.40	Palm Beach County, Florida	0.41	Palm Beach County, Florida	0.43	Beaufort County, South Carolina	0.43
3	Santa Barbara County, California	0.38	Dakota County, Minnesota	0.40	Maricopa County, Arizona	0.39	Maricopa County, Arizona	0.40	Palm Beach County, Florida	0.42
4	Solano County, California	0.37	Bell County, Texas	0.40	Dakota County, Minnesota	0.38	Broward County, Florida	0.39	Yuma County, Arizona	0.40
5	Orange County, California	0.37	Solano County, California	0.38	Arapahoe County, Colorado	0.37	Yuma County, Arizona	0.38	Ocean County, New Jersey	0.40
6	Miami-Dade County, Florida	0.37	Arapahoe County, Colorado	0.38	Bell County, Texas	0.36	Collier County, Florida	0.37	Maricopa County, Arizona	0.38
7	Muscogee County, Georgia	0.37	Salt Lake County, Utah	0.38	Riverside County, California	0.35	Riverside County, California	0.37	Pinal County, Arizona	0.38
8	Monterey County, California	0.35	Palm Beach County, Florida	0.37	Cumberland County, North Carolina	0.35	Indian River County, Florida	0.36	Collier County, Florida	0.37
9	Salt Lake County, Utah	0.35	Miami-Dade County, Florida	0.37	Salt Lake County, Utah	0.35	Sumter County, Florida	0.35	Lee County, Florida	0.35

10	Sacramento County, California	0.35	Broward County, Florida	0.37	Indian River County, Florida	0.34	Beaufort County, South Carolina	0.32	Indian River County, Florida	0.34
11	San Diego County, California	0.34	Riverside County, California	0.36	Broward County, Florida	0.34	Lee County, Florida	0.32	Riverside County, California	0.34
12	Norfolk city, Virginia	0.34	Jefferson County, Colorado	0.36	Williamson County, Texas	0.34	Arapahoe County, Colorado	0.31	Lake County, Florida	0.34
13	Richland County, South Carolina	0.34	El Paso County, Colorado	0.35	Newport News city, Virginia	0.33	Pima County, Arizona	0.31	Sarasota County, Florida	0.32
14	Maricopa County, Arizona	0.34	Cumberland County, North Carolina	0.35	Beaufort County, South Carolina	0.33	Dakota County, Minnesota	0.31	Williamson County, Texas	0.32
15	Richmond County, Georgia	0.34	Muscogee County, Georgia	0.34	St. Lucie County, Florida	0.33	Johnson County, Kansas	0.31	St. Lucie County, Florida	0.32
16	Dallas County, Texas	0.33	Richmond County, Georgia	0.34	Monterey County, California	0.33	Bell County, Texas	0.31	Marion County, Florida	0.32
17	Palm Beach County, Florida	0.33	Jefferson Parish, Louisiana	0.34	Collier County, Florida	0.32	Virginia Beach city, Virginia	0.30	Broward County, Florida	0.32
18	Brevard County, Florida	0.33	Honolulu County, Hawaii	0.33	Denton County, Texas	0.32	Monterey County, California	0.30	Monterey County, California	0.31
19	Ventura County, California	0.33	Richland County, South Carolina	0.33	El Paso County, Colorado	0.32	Sarasota County, Florida	0.30	Placer County, California	0.30
20	Bexar County, Texas	0.32	Will County, Illinois	0.32	Anoka County, Minnesota	0.32	Williamson County, Texas	0.30	Pima County, Arizona	0.30

C. A case study of the geographic distribution of the elderly: California's 36th Congressional District

Given the general lack of large concentrations of the elderly at the neighborhood level, as a case study we selected a small area known for its larger elderly population, namely the 36th Congressional District in California. Congressional District 36 has the largest percentage of older residents in the state. This District is a priority for both Democrats and Republicans as either party could win a majority of its voters. Older people in this District are found at all income levels. Therefore, the District was a natural fit to demonstrate the mapping possibilities of our project.

Congressional District 36 is in Riverside County in California. As Table 3 above shows, Riverside County is the 11th most segregated elderly county in the United States and the number one most segregated elderly county in California. Specifically in District 36, 8.2% of census block groups are majority elderly (see Table 7), which is substantially higher than the national number of 0.7% majority elderly census block groups.

Table 7. Distribution of geographic units by density of elderly individuals (age 65+), California Congressional District 36

	Census Tract		Census Block Group	
Percent Individuals over 65	N	Percent	N	Percent
<10%	56	32.0	115	32.5
10-20%	50	28.6	107	30.2
20-30%	30	17.1	44	12.43
30-40%	12	6.86	32	9.04
40-50%	18	10.3	27	7.63
50-60%	4	2.29	7	1.98
60-70%	3	1.71	12	3.39
70-80%			5	1.41
80-90%	2	1.14	5	1.41
90-100%				
>50%	9	5.14	29	8.2
Total	175	100%	354	100%

In our efforts to map the elderly population of the District 36, we identified city maps that show the location of public services, including fire, police, and emergency centers. We also found city and county maps showing the locations of hospitals, senior centers, churches, schools, parks and libraries. We also identified information from federal sources including air quality non-attainment zones, earthquake and flood prone areas. We found special studies including maps about the poorest parts of the Congressional district and the occurrence of disease patterns. Layering these and other pertinent data onto the same accurate, visually impactful map is a challenge that few communities, much less regions, have conquered. In our own mapping efforts, we were able to include the density of the older population, the percentage of Latinos, and median income levels on the same map (see Figure 1 below). That result is only the beginning of

understanding the older populations in an area and illustrating the potential of mapping technologies in the study of the elderly in the United States.

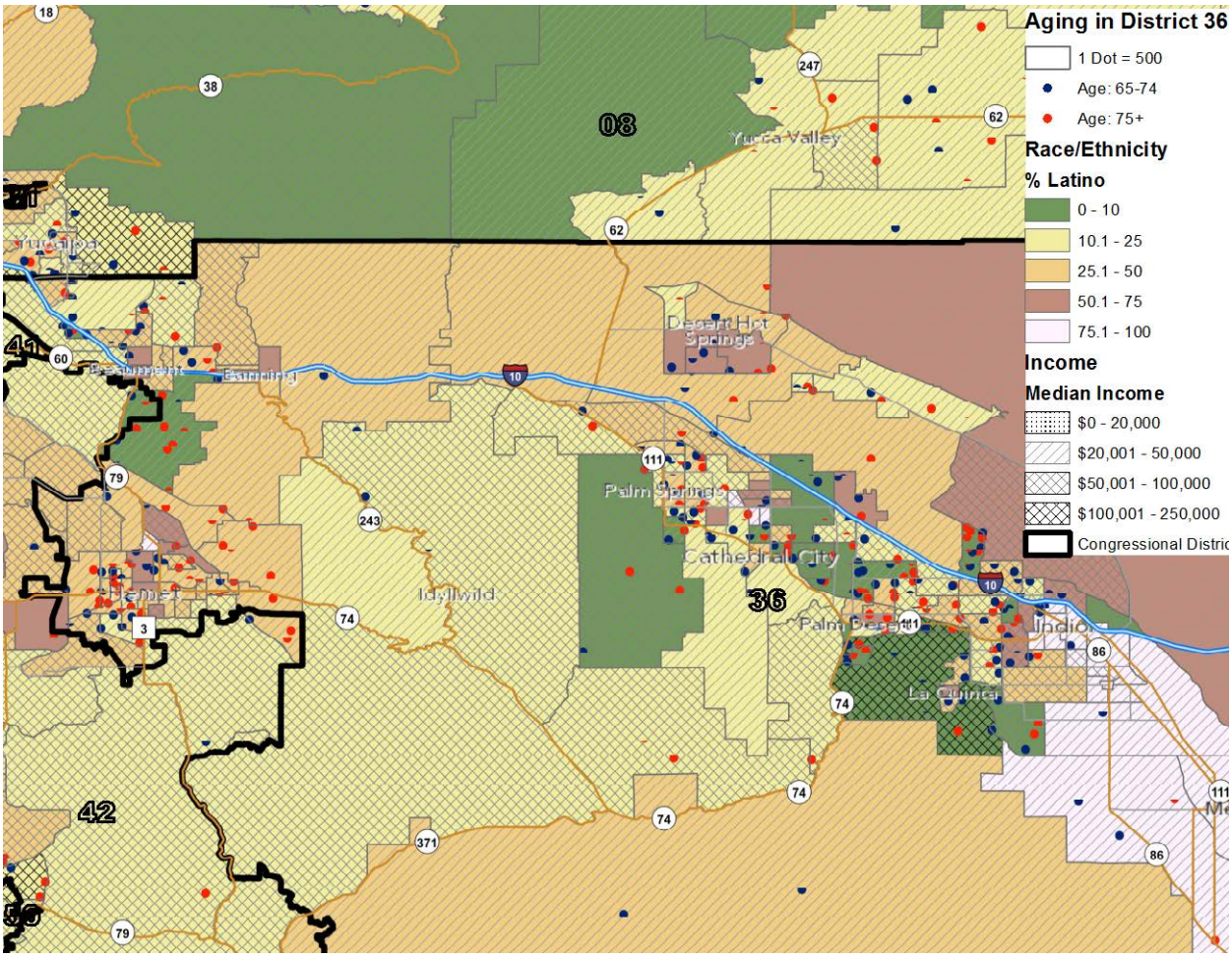

Figure 1. California Congressional District 36

In addition to this static map, we also developed an online map that allows for the filtering of neighborhood characteristics, such as age, percent Hispanic, and median income. http://www.stanford.edu/~cengel/aging/

III. Preliminary Conclusions, Next Steps, and Long-Term Goals of the Project

As we mention above, according to the AARP, between 36 and 50% of people 55 and over live in buildings or neighborhoods that can be considered Naturally Occurring Retirement Communities (NORCs), or buildings and neighborhoods not specifically designed as retirement communities but where people have either aged in place or to where the elderly have chosen to move. Because of this assumed clustering of aging individuals, local governments and local agencies were encouraged to find the NORCs in their service areas and to use the geographic locations of those NORCs in their planning activities. In fact, during the 1990s and early 2000s, some of these NORCs received funding from the Administration on Aging to develop services that satisfy the needs of their aging populations.

Our attempts to identify a list of federally funded NORCs have so far been futile. Moreover, as our preliminary analyses of U.S. Census data show, there is no substantial clustering of the elderly around other elderly individuals even at the smallest Census geographies, especially outside of states that are not traditional retirement destinations. We think that before figuring out what types of services the elderly need and where those services are located, it is imperative to understand to what extent clusters of elderly individuals and households exist and to what extent the claims regarding the existence of NORCs are true.

We think that the number and prevalence of NORCs may be exaggerated and that neighborhoods might be more mixed by age group than previously assumed. The implications of our work for practitioners in the field of aging might mean that figuring out efficiencies in service delivery may be much more difficult than previously thought. Therefore, our future work will focus on describing the prevalence of NORCs at the neighborhood level and the creation of new NORCs over time. In doing so we will critically examine the claim that Americans increasingly live in communities segregated by age. Our findings will also indicate whether there needs to be a revision of current funding and service-delivery models that assume that large concentrations of the elderly exist at the neighborhood level.

Next Steps

We have identified the following next steps to examine the geographic distribution of the elderly:

1. Map the distribution of the elderly for the entire United States at the census tract and census block levels and visualize both the number and the density of the elderly within census tracts and census blocks

2. Map the distribution of the elderly by race, income, and household composition

3. Develop an index of the local socioeconomic and environmental conditions of the elderly population. We will use the index to rank communities across the United States. Should we find suitable geocoded individual-level indicators of successful aging, in the long run we also plan to link the index of socioeconomic and environmental conditions to these indicators of successful aging.

Future research

We have identified the following areas for further work, pending funding:

1. Develop a tool for local communities to assess the needs of vulnerable aging populations.

   We envision the tool to combine information on the geographic distribution of services for the elderly as they relate to the socioeconomic composition of the elderly population and the housing and social service needs of the elderly population. We think that an online mapping tool with which users can interact would have a great potential of being useful for a broad array of stakeholders.

2. Make data on the elderly available in a useful format to relevant stakeholders such as:
   - Area agencies on aging
   - Metropolitan Planning Organizations (MPOs)
   - Private businesses who target the elderly
   - HUD
   - Department of Health and Human Services
   - AARP

3. Academic papers in peer-review journals
   - Mortality life tables at the neighborhood level (in collaboration with Cancer Prevention Institute of California)
     - "Racial and social class gradients in life expectancy in contemporary California" http://www.ncbi.nlm.nih.gov/pmc/articles/PMC2849870/
   - The geographic determinants of the incidence of cancer at the neighborhood level (in collaboration with Cancer Prevention Institute of California)
   - Neighborhood quality and housing quality for the elderly (funding from HUD may be available if we demonstrate how this project will make AHS data more useful for research)
   - Residential segregation by age in the United States: geographic variation across states and across time
     - How neighborhoods change over time in terms of their age composition and what factors cause neighborhoods to attract more elderly households over time
     - Think of the aging of neighborhoods in a similar way that sociologists have been thinking about the racial transitions of neighborhoods

4. Policy reports

Appendix A. Completed interviews and correspondence with policy makers

1. Shawn Bucholtz, Director, Housing and Demographic Analysis, Office of Policy Development and Research, Department of Housing and Urban Development

   We spoke with Shawn Bucholtz who is the Director of the American Housing Survey (AHS). Shawn expressed HUD's commitment to studying issues related to aging and to having the AHS be useful in measuring the housing conditions of the elderly. He invited us to submit comments for the 2015 redesign of the AHS in which we suggested how the survey could be more useful for researchers and practitioners in the field of aging. In proposing these modifications and additions, we paid particular attention to issues affecting the elderly population and the population with disabilities. We also proposed questions that would elicit further details about the neighborhoods where the AHS sampled units are located as well as the available services and amenities at the neighborhood level that are important for the creation of safe and vibrant neighborhoods (see Appendix C for a full list of the questions).

   Shawn also mentioned that HUD does non-competitive cooperative agreements with researchers from outside the Department. What this means is that we can submit a proposal to HUD to use some of their datasets and if that research project interests them, they can match up to 50% of the funding for the project. So far they have done grants of up to $30,000, but now they are reviewing proposals with a budget of about $250,000.

2. Milken Institute

   The Milken Institute publishes a ranking of the best cities for aging. The ranking is based on an index of socioeconomic and environmental factors either at the metropolitan or the state level. While this ranking is at a geographic level that is too big for the purposes of our project, we will use the intuition behind it as well as some of the datasets that went into the creation of the ranking to develop a similar tool at the neighborhood level.

   Dr. Chatterjee at the Milken Institute has offered to speak with us further about the ranking of the best cities for aging.
   Anusuya Roy Chatterjee, Ph.D.
   Senior Economist
   Milken Institute
   Ph: 310-570-4629
   achatterjee@milkeninstitute.org

3. Nikki Rudnick, Bipartisan Policy Center
   nrudnick@bipartisanpolicy.org

   Our conference call with Nikki Rudnick confirmed that there is a lot of policy interest around issues of aging in place. The conference call also confirmed that there is not much in terms of actual research that policy makers can use to track the geographic

concentration of the elderly. Nikki Rudnick tried to find someone in Washington who might have a list of federally-funded NORCs, but it did not appear that such list existed.

4. Fredda Vladeck
   Director, Aging in Place Initiative
   United Hospital Fund
   1411 Broadway, 12th Floor
   New York, NY 10018-3496
   (212) 494-0750 Tel
   (212) 494-0801 Fax
   fvladeck@uhfnyc.org

   Fredda Vladeck is a long-time practitioner in the field of aging in New York State. She was part of the state's initiative to formally define Naturally Occurring Retirement Communities at the building level and at the neighborhood level. The main point that we can use from our discussion with Fredda is that there is no consistent definition of NORCs and that all the mapping that has been done so far has been very piecemeal and unsatisfactory. NORCS are nothing more than demographic descriptors of places not built for seniors that now have a significant older adult population. There are many more NORCS (depending on what threshold one uses) than there are NORC Supportive Service Programs.

   Fredda made several other informal comments. She prefers not to focus on medical outcomes because that means treating the elderly as clients. She also seems to be in favor of studying the levels of social interaction and social support within communities. In some of her work, she has found a great variety in the levels of social support amongst neighbors that does not necessarily correlate with the income level of the neighborhood. Fredda also mentioned that she is hesitant to make generalizations about elderly communities since they all seem so different.

   There is no national policy on aging communities nor a consensus on the thresholds that could tip the resiliency of a community, so there is not a uniform definition out there. New York State is the only state to have enacted legislation defining the threshold and New York City modified it from there and followed suit.

5. Cancer Prevention Institute of California

   They have undertaken an effort to compile geospatial data to characterize the built, social, and immigration environments for the state of California (the California Neighborhoods Data System). These data can be linked to other datasets, including the California Cancer Registry, to enable an assessment of the impact of these specific neighborhood factors on cancer incidence, risk, treatment patterns, survival, and other outcomes.
   http://www.cpic.org/site/apps/nlnet/content3.aspx?c=skI0L6MKJpE&b=5730481&ct=7811639&notoc=1

They would be interested in working with us on projects that would utilize the California Neighborhoods Data System to study issues of aging. They would prefer an arrangement where we would pay a fee to use the data and/or cover the salary of their in-house GIS specialist to run all analyses.

Scarlett Lin Gomez, Ph.D.
Research Scientist, Cancer Prevention Institute of California
Consulting Associate Professor, Division of Epidemiology, Dept. of Health Research & Policy, Stanford University School of Medicine
Member, Stanford Cancer Institute
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Fax: 510-608-5085

6. Tina Ornduff, Google outreach program

   Generally speaking, Google is interested in large scale, community oriented project that involves the sharing of data across different communities and stakeholders. We need a more detailed vision of where we want to go regarding sharing the data, interaction, and integration before going back to Google for further expertise. Google would not do any development on the project, but they would be happy to facilitate contact with developers and experts.

7. Allen Glicksman, Director of Research and Evaluation, Planning Department, Philadelphia Corporation for Aging

   For the past four years, the Planning Department of the Philadelphia Corporation for Aging has been developing ways to integrate data sets created for GIS that include locations of healthcare services, housing for low income seniors, and aspects of the environment that can inhibit access to needed services including physical hazards and crime. They have recently published an article linking the GIS data to an omnibus health survey conducted in Philadelphia.

Examples of their work:
Aging and Crime
http://www.pcacares.org/Files/age_and_crime_map.pdf
Senior Citizens maps
http://www.pcacares.org/pca_learn_Maps.aspx

8. Kathryn Lawler, Atlanta Regional Commission

   Kathryn has worked with communities across the US striving to become more age-friendly, including four years as the Director of Aging Atlanta, a Robert Wood Johnson Foundation partnership focused on preparing the metro region for the rapid growth in the older adult population. Kathryn was a fellow at Harvard University's Joint Center on Housing Studies and served as staff to the Congressional Commission on Senior Housing and Healthcare in the 21st Century.

   Kathryn is a vocal proponent of need to coordinate housing and healthcare services for the elderly.
   http://www.nw.org/network/pubs/studies/documents/agingInPlace2001.pdf

9. Aviva Sufian
   Director of Regional Operations
   Administration for Community Living
   U.S. Department of Health and Human Services
   One Massachusetts Ave, NW
   Washington, DC 20201
   www.hhs.gov/acl/
   Phone (202) 357-3546
   Fax (202) 357-3556
   Email Aviva.Sufian@acl.hhs.gov

   Aviva Sufian attended the launch event for SCL's 2013 Design Challenge and expressed interest in our spatial mapping work. She confirmed that there is no master list of NORCs. She said her agency funds NORCs, but usually does so indirectly through local agencies and nonprofits.

10. Robert Kramer
    National Investment Center for the Seniors Housing & Care Industry
    Founder and Chief Executive Officer
    http://www.nic.org

    The National Investment Center for the Seniors Housing & Care Industry (NIC) is a nonprofit education and resource center. The mission is to facilitate informed investment in the seniors housing and care industry.

    Adele Hayutin met Robert Kramer when she spoke at the 2013 Direct Supply Executive Operators Conference for nursing home executives. Kramer was not aware of any

research on NORCs other than anecdotal reports. He suggested we look at the Boston NORC in Copley Square.

11. Direct Supply (nursing home executives)
http://www.directsupply.com/

Direct Supply is a major provider of equipment, eCommerce, and services for the nursing home industry. Our contacts there have continued to express interest in supporting efforts to map/research locations of older populations, especially as they seek to diversify from nursing home provision to other senior services and housing options.

http://www.directsupply.com/eof/
Direct Supply hosts an annual Executive Operators Forum so executives can work together.

12. National Aging in Place Council Policy Summit
http://www.ageinplace.org/

Jane Hickie attended this event in Washington, DC in October 2013. The National Aging in Place Council (NAIPC) is a senior support network founded on the belief that an overwhelming majority of older people want to remain in their homes as long as possible. The Council facilitates aging in place by connecting the elderly to a network of service providers and experts in the areas of healthcare, financial services, elder law, design, and home remodeling.

13. Rebecca Morley, Center for Healthy Housing
"National Healthy Housing Standard"
http://www.nchh.org/Policy/NationalHealthyHousingStandard.aspx

Jane Hickie met Rebecca Morley at the National Aging in Place Council Policy Summit. The Center for Healthy Housing has recently completed a National Healthy Housing Standard and will soon release their list of ranking cities for healthy housing.

Appendix B. Annotated list of relevant research

1. Federal Interagency Forum on Aging Related Statistics
   http://agingstats.gov/agingstatsdotnet/Main_Site/Data/2012_Documents/Docs/EntireChartbook.pdf
   - Key indicators of well-being at the national level over time

2. Best Cities for Successful Aging, Milken Institute
   http://successfulaging.milkeninstitute.org/best-cities-successful-aging.pdf
   - Ranking of cities based on an index of socioeconomic and environmental factors either at the metropolitan or the state level
   - Useful methodological appendix: data sources and ideas for variables to include in our own index

3. Proximity of adult children to aging parents

   Current demographic research on the geographic proximity between parents and children shows that older parents and adult children live surprisingly close to each other: about a third of unmarried mothers and adult children live within 10 miles of each other (Bianchi, McGarry and Seltzer 2010). Declines in the health and increases in functional limitations also lead to increased geographic proximity between parents and children (Rogerson, Burr and Lin 1997, Silverstein 1995). In fact, family members currently provide much of the support for frail elderly in the United States. With nursing homes and 12-hour-a-day home care currently costing about $75,000 a year, the long-term needs of the aging U.S. population are expected to place an even greater burden on informal family-based care arrangements as the growth in the older population far surpasses that of the younger population.

   Bianchi, Suzanne, Kathleen McGarry and Judith Seltzer. 2010. *Geographic dispersion and the well-being of the elderly.* Michigan Retirement Research Center Working Paper 2010-234. University of Michigan, Ann Arbor.
   http://www.mrrc.isr.umich.edu/publications/papers/pdf/wp234.pdf

   Rogerson, Peter A., Jeffrey A. Burr and Ge Lin. 1997. “Changes in geographic proximity between parents and their adult children.” *International Journal of Population Geography* 3:121-136

   Silverstein, M. 1995. “Stability and change in temporal distance between the elderly and their children.” *Demography 32:*29-45.

4. "Revealing the Invisible Coachella Valley," UC Davis Center for Regional Change CEHI (Cumulative Environmental Hazards Index) and SVI (Social Vulnerability Index) which are combined into a CEVA (Cumulative Environmental Vulnerability Assessment)
   http://regionalchange.ucdavis.edu/ourwork/publications/ceva-ecv/revealing-the-invisible-coachella-valley-putting-cumulative-environmental-vulnerabilities-on-the-map

"Cumulative Environmental Vulnerability and Environmental Justice in California's San Joaquin Valley"
http://www.epa.gov/ncer/cra/webinars/2012/london-resources-abstract.pdf

5. "Data Sources for the At-Risk Community Dwelling Patient Population"
   Given the difficulty of identifying data sources that contain the necessary level of detail, the investigators attempted to take a grassroots approach by going directly to one community (Worcester, Massachusetts) and asking local health care and social service providers to estimate the number of at-risk individuals.
   http://archive.ahrq.gov/prep/atrisk/atrisk3.htm

6. Gerald Hodge, The Geography of Aging, McGill-Queen's University Press, 2008.
   Mr. Hodge is an urban planner living and working in western Canada. This publication articulates the importance of understanding the spatial patterns of older populations in communities. We acknowledge his work for the themes that are significant in this area of research.

7. William Frey
   - Focuses on larger geographies and has not done work at the neighborhood level
   - The Uneven Aging of America,
     http://www.brookings.edu/research/papers/2011/06/28-census-age-frey
   - Mapping the Growth of Older America,
     http://www.globalaging.org/elderrights/us/2007/mappingolderamerica.pdf

Appendix C. Annotated list of data sources

1. U.S. Census 2010
    - Geographic distribution of the elderly by age and race at the census tract and census block levels

2. American Community Survey – 5-year estimates
    - Geographic distribution of the elderly by age and socioeconomic characteristics at the census tract level

3. American Housing Survey
    - Data on the housing conditions of the elderly population
    - Representative at the national and the metropolitan level
    - Possible to get access to census tract identifiers through a special contract for the use of internal census data

4. The California Neighborhoods Data System: a new resource for examining the impact of neighborhood characteristics on cancer incidence and outcomes in populations http://www.ncbi.nlm.nih.gov/pubmed/21318584
    - Available at the block level or the census tract level
    - Combines information from the U.S. Census and a database on geocoded businesses going back to 1990 (Dun & Bradstreet data)

5. EPA databases
    - Facilities are grouped in different databases, based on the environmental hazard, compliance, etc. For example Air Facility System (AFS), Toxics Release Inventory (TRI), Biannual reports from Hazardous Waste Generators (BR), Safe Drinking Water (SDWIS) and more. Requires interpretation of codes and queries.

6. Dartmouth Atlas of Health Care
   http://www.dartmouthatlas.org
    - Uses Medicare data to provide information and analysis about national, regional, and local markets, as well as hospitals and their affiliated physicians.
    - Hospital based (street addresses, can be georeferenced)
    - Hospital service area (HSA) or hospital referral region (HRR) level (GIS files available)

7. County Health Rankings
   http://www.countyhealthrankings.org
    - Calculates county based rank indicator for:
      Mortality, Morbidity, Health Behaviors, Clinical Care, Social & Economic Factors, Physical Environment
    - Input data are: http://www.countyhealthrankings.org/ranking-methods/data-sources-and-measures

8. Area Health Resource File (AHRF)
   http://arf.hrsa.gov/index.htm
   - Information on health facilities, health professions, measures of resource scarcity, health status, economic activity, health training programs, and socioeconomic and environmental characteristics
   - County and state level

9. National Weather Service
   - River flooding -- 6500 Gauges nationwide with known lat/lon),

   http://water.weather.gov/ahps/download.php (Shapefiles)
   Based on Advanced Hydrologic Prediction Service (AHPS)
   - Precipitation -- gridded data with 175,000 lat/lon points nationwide

   http://water.weather.gov/precip/download.php (Shapefiles)
   - Current Air Quality Forecast Guidance data can be scraped for any lat/lon combination with:

   http://airquality.weather.gov/probe_aq_data.php?latitude=38.9&longitude=-79.1&Submit=Get+Guidance

10. Weather Underground
    - Weather data from 42,000 weather stations across the country (temp, precipitation, wind, etc.)
    - Stations have known lat/lon coordinates.
    - Historical data can be retrieved via API (free, but with limits on daily requests)

    http://www.wunderground.com/weather/api/d/pricing.html

11. NOAA's National Climatic Data Center (NCDC)
    http://www.ncdc.noaa.gov/data-access
    - Climate data based on between 1200 and 20,000 stations

12. CDC WONDER Environmental data
    http://wonder.cdc.gov/EnvironmentalData.html
    Daily measures of air temperature (degree days), heat index, land surface temperature, outdoor air quality (fine particulate matter) and sunlight (insolation or solar irradiation
    - County level

13. USDA: Food Access Research Atlas Data File
    http://www.ers.usda.gov/datafiles/Food_Access_Research_Atlas/Download_the_Data/Current_Version/DataDownload.xlsx
    Join spreadsheet with Census GIS shapefile
    http://www.census.gov/geo/maps-data/data/tiger-cart-boundary.html
    - 2010 Census tract level

14. Caltrans transportation infrastructure
    http://www.dot.ca.gov/hq/tsip/gis/caltrans_earth/overview.php

15. National transportation related geo-spatial data
    https://www.fhwa.dot.gov/planning/census_issues/urbanized_areas_and_mpo_tma/geographic_resources/

16. Long-term care facilities in the United States (http://ltcfocus.org)
    - Data on nursing home care in the United States
    - Brown University Center for Gerontology and Healthcare
    - Available at the facility, county, and state levels
    - Information on facility characteristics, geo-coded facility locations, resident characteristics, local market characteristics, facility staffing, admissions, quality, and state long-term care policies
    - State Medicaid policies, payment rates, reimbursement methodology, bed holds

17. Assisted Living and Residential Care Facilities by State, AARP
    http://www.ahcancal.org/ncal/resources/Documents/residential-care-insight-on-the-issues-july-2012-AARP-ppi-ltc.pdf

18. Cost of Care by State, Genworth
    https://www.genworth.com/dam/Americas/US/PDFs/Consumer/corporate/130568_032213_Cost%20of%20Care_Final_nonsecure.pdf

Appendix D. Proposed Modifications and Additions to the American Housing Survey

Proposed Modifications and Additions to the American Housing Survey
Stanford Center on Longevity
October 14, 2013

Below please find our suggestions for modifications and additions to the questions of the American Housing Survey. In proposing these modifications and additions, we have paid particular attention to issues affecting the elderly population and the population with disabilities. We are also proposing some additional questions that would elicit further details about the neighborhoods where the AHS sampled units are located as well as the available services and amenities at the neighborhood level that are important for the creation of safe and vibrant neighborhoods.

I. Proposed modifications to existing questions:
We think the following additions to the categories of already existing questions in the AHS would elicit more specific responses that are particularly relevant to the elderly and/or people with disabilities

1. Main reason moved (WHYMOVE)
- needed a house/apartment to accommodate disability/functional limitation
- to be closer to family

2. Main reason this unit was chosen (WHYTOH)
    - unit has needed modifications to accommodate disability and/or functional limitation

3. Main reason current neighborhood was chosen (WHYTON)
    - convenient to religious institution/community center/library
    - access to cultural institutions and events

4. Are majority of your neighbors age 65+ (NORC)

5. Are majority of your neighbors age 75+ (NORC)

II. Proposed additional questions:

1. Social support and distance to non-coresident family members and close friends

1.1 Do any of your children who do not live with you live within 10 miles of you? By children we mean biological, step-, and adopted children.

1.2 Do any of your children who do not live with you live in your neighborhood?

1.3 Do any of your other relatives live within 10 miles of you?

1.4 Do any of your other relatives live in your neighborhood?

1.5 Do any of your close friends live within 10 miles of you?

1.6 Do any of your close friends live in your neighborhood?

1.7 Do you have any pets?

1.8 If yes, what kind?

1.9 How often do you feel that you lack companionship: Hardly ever, some of the time, or often?

1.10 How often do you feel left out: Hardly ever, some of the time, or often?

1.11 How often do you feel isolated from others? (Is it hardly ever, some of the time, or often?)

(Questions 1.9-1.11 comprise a Three-Item Loneliness Scale modified from the Revised UCLA Loneliness Scale (R-UCLA), see Hughes, M., Waite, L., Hawkley, L., Cacioppo, J. 2004. "A Short Scale for Measuring Loneliness in Large Surveys" *Research on Aging* 26(6): 655-672.

2. Questions about neighborhood features/services/hazards (partially adapted from a questionnaire administered by the Project on Human Development in Chicago Neighborhoods)

2.1 Are the following amenities/pubic services available in your neighborhood?
- a park, playground, or open space
- recreation programs
- cultural programs and events
- community center/senior center
- religious institution (church/synagogue/mosque/temple)
- library
- crime prevention program or a neighborhood watch
- police station/fire station
- hospital/emergency room/doctors' offices
- mental health center
- community garden/farmers' market
- lake/pond/river/beach

2.2 I'm going to read a list of things that are problems in some neighborhoods. For each, please tell me how much of a problem it is in your neighborhood (a big problem; somewhat of a problem; not a problem; don't know).
- litter, broken glass or trash on the sidewalks and streets
- graffiti on buildings and walls
- vacant or deserted houses or storefronts
- poor conditions of sidewalks

- poor street lighting
- lack of trees and other landscaping
- air pollution
- quality of the drinking water supply for the neighborhood
- drinking in public
- people selling or using drugs
- police not patrolling the area or not responding to calls
- lack of trust between local residents and businesses

2.3 Is your unit located in an area susceptible to the following hazards?

- flood
- fire
- mud slide/land slide
- earthquake
- storm surge
- hurricane/severe rain storm
- severe snow storm
- tornado

2.4 Who would you call in the event of an emergency?

- 911/police/fire station
- family members who do not live with me
- friends who do not live with me
- none
- do not know

2.5 Do you know how you would leave the neighborhood in the event of an emergency?

2.6 Would you need help leaving your house/apartment in the event of an emergency?

2.7 Would you need help leaving your neighborhood in the event of an emergency?

2.8 Would you require emergency services that accommodate household pets?

3. Questions about neighborhood conditions and social cohesion (adapted from a questionnaire administered by the Project on Human Development in Chicago Neighborhoods)

3.1 If a friend said that they were planning to move to your neighborhood, what would you tell them was the best thing about living in your neighborhood?

- inexpensive cost of living
- clean
- good public transportation
- plenty job opportunities
- pretty
- good schools

- good park system/street landscaping
- access to shopping, restaurants, other facilities

3.2 If a friend said that they were planning to move to your neighborhood, what would you tell them was the worst thing about living in your neighborhood?
- high cost of living
- polluted
- high crime
- poor public transportation
- poor schools
- people unfriendly
- poor access to shopping, restaurants, other facilities

3.3 People who choose to move out of their neighborhood may have a number of reasons. For each of the following reasons, please tell me if it is a reason why you or your family might want to move from this neighborhood.
- helping someone in the family get a job
- getting away from crime
- getting away from drugs
- better rent/housing costs
- better schools for your children
- to be in a safer neighborhood
- to have better stores and other facilities nearby
- to be closer to family/friends

3.4 For each of these statements, please tell me whether you strongly agree, agree, disagree, or strongly disagree
- If there is a problem around here, the neighbors get together to deal with it.
- This is a close-knit neighborhood.
- People in this neighborhood do favors for each other.
- When you get right down to it, no one in this neighborhood cares much about what happens to me.
- There are adults in this neighborhood that children can look up to.
- People around here are willing to help their neighbors.
- People in this neighborhood generally don’t get along with each other.
- You can count on adults in this neighborhood to watch out that children are safe and don’t get in trouble.
- If I had to borrow $100 in an emergency, I could borrow it from a neighbor.
- When I am away from home, I know that my neighbors will keep their eyes open for possible trouble to my place.
- People in this neighborhood do not share the same values.
- If I were sick, I could count on my neighbors to shop for groceries for me.
- People in this neighborhood can be trusted.
- The equipment and buildings in the park or playground that is closest to where I live are well kept.
- The park or playground closest to where I live is safe during the day.

- The park of playground closest to where I live is safe at night.
- If there was a fight in front of your house and someone was being beaten or threatened, how likely is it that your neighbors would break it up?
- Suppose that because of budget cuts the fire station closest to your home was going to be closed down by the city. How likely is it that neighborhood Residents would organize to try to do something to keep the station open?

3.5 Sometimes people in a neighborhood do things to take care of a local problem or to make the neighborhood a better place to live. Please tell me if you or a member of your household has been involved in the following activities since you lived in the neighborhood:
- Have you spoken with a local politician about a neighborhood problem?
- Have you talked to a person or group causing a problem in the neighborhood?
- Have you attended a meeting of a neighborhood group about a neighborhood problem or neighborhood improvement?
- Have you talked to a local religious leader or minister to help with a neighborhood problem or neighborhood improvement?
- Have you gotten together with neighbors to do something about a neighborhood problem or to organize neighborhood improvement?
- Have you voted in a local election for a measure that would fund neighborhood improvement projects?
- Have you gotten together with neighbors at a block party or at a community center to promote neighborhood spirit?

5. Disability questions

5.1 If someone in the household has a physical, mental, or emotional disability, does anyone help with these difficulties?

5.2. If yes, what is the relationship of the person who helps with these activities?
- co-resident spouse
- co-resident children/step-children/children in-law/grandchildren
- co-resident parent
- non-coresident children/step-children/children in-law/grandchildren
- non-coresident other family members/friends
- employee of institution/hired help

5.3. Suppose in the future, you needed help with basic house maintenance activities like cleaning or repairs. Do you have relatives or friends who would be willing and able to help you over a long period of time?

5.4. If yes, what is their relationship to you?
- co-resident spouse
- co-resident children/step-children/children in-law/grandchildren
- co-resident parent
- non-coresident children/step-children/children in-law/grandchildren

- non-coresident other family members/friends
- employee of institution/hired help

5.5. If you indicated that non-coresident family and friends will be able to help you, approximately how far do these people live to your current residence?

5.6 Do you have a car available to use when you need one?

5.7 Do you have a computer available to use when you need one?

5.8 Do you have an Internet connection available to use when you need one?

Appendix E. Case Study of San Mateo County, California

Prepared by Jonathan Streeter
Stanford Center on Longevity

In order to demonstrate how mapping can be used to display data, we examined information on the elderly in San Mateo County. The 2010 Census[1] showed San Mateo County, California with an overall population of 718,000 people, of which 13 percent, or just over 96,000, were age 65 or older (a proportion consistent with the national average). The area is characterized by regions of both high and low population density, as well as wealthier and poorer towns and neighborhoods.[2]

The largest share of people 65 and above among ethnic and racial groups in San Mateo county was for whites (nearly 20 percent). Blacks (16 percent) and Asians (11 percent) had a lower share of older people and the smallest share was for Hispanics at only 6 percent.

Projections by the California Department of Finance are for the share of seniors (those aged 65 and above) in San Mateo County to rise to 17 percent of the overall population, numbering approximately 128,000.[3] These estimates predict that among whites, blacks, and Asians, the share of older people will exceed 20 percent, while it will remain much lower for Hispanics at 8 percent.

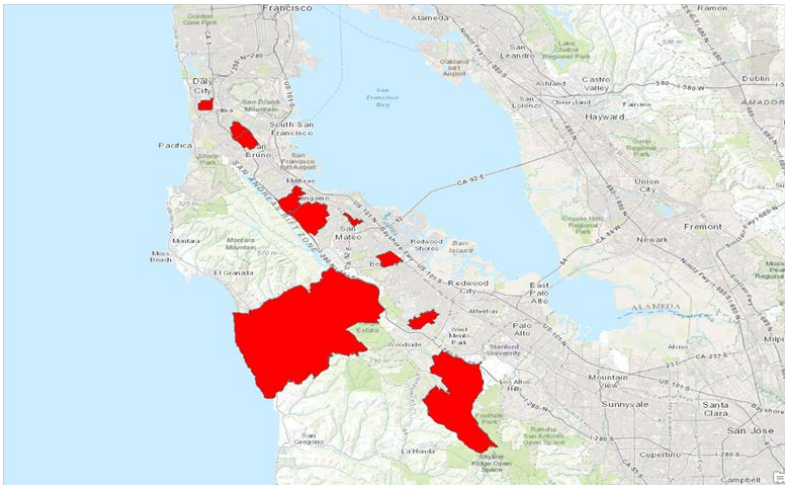
Census tract data

The Census Bureau has divided the county into 143 tracts, where they have gathered household and general population data. The average tract population is about 4,500. Eighty five percent of the tracts are less than 2 square miles in area, and only one tract stands out as particularly large, at 180 square miles.

Taken together, the ten individual tracts with the largest number of individuals aged 65 and older include about 10,000 people. For this article, Census tract mapping was done with ArcGIS mapping software which is an industry standard, but can be technically difficult to use.

[1] U.S. Census Bureau 2010 “Decennial Census.”
[2] Among all San Mateo County tracts in 2010, population density ranged from a low of 3 people (age 65 and above) per square mile to a high of 3,745. Among all tracts, median household income for those aged 65 and above ranged from a low of $12,300 to a high of $155,300.
[3] California Department of Finance. 2013. “State and County Total Population Projections by Race/Ethnicity and Detailed Age.”

San Mateo County: ten Census tracts with the highest number of individuals aged 65 and older



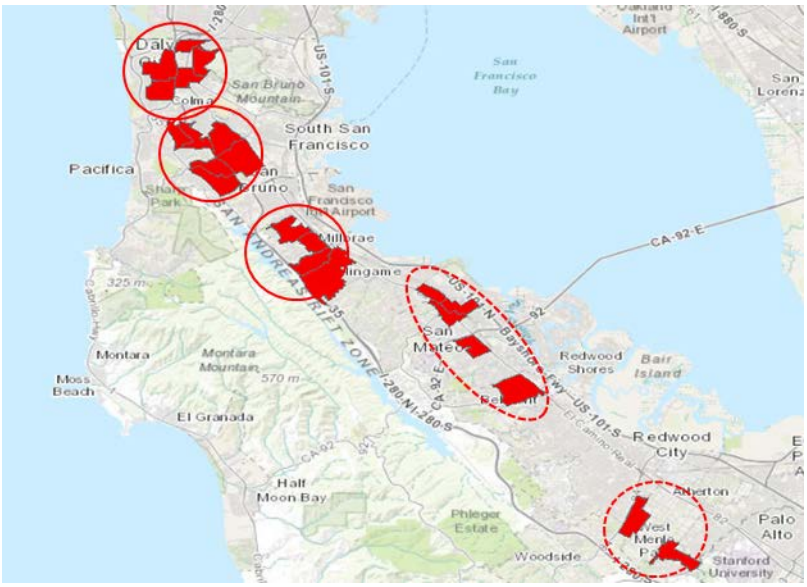
(U.S. Census Bureau 2010)

The ten highest-population areas within the county are spread apart from north to south, and one tract is over 40 square miles in area and includes unpopulated park land. As such, this information doesn't identify clustering of retired persons.

By applying specific demographic characteristics to an examination of the region, it's possible to gain a clearer understanding of where older people may be concentrated. In the case of San Mateo County, by selecting only those areas with a minimum population of 750 seniors (people 65 and above) which also have a high population density of such individuals (1,000 or more per square mile), a clearer picture emerges.

When mapped, the twenty-seven tracts that meet these criteria are located in three clear clusters as well as two looser groupings.

San Mateo County: high-population, high-density Census tracts (persons aged 65 and older)



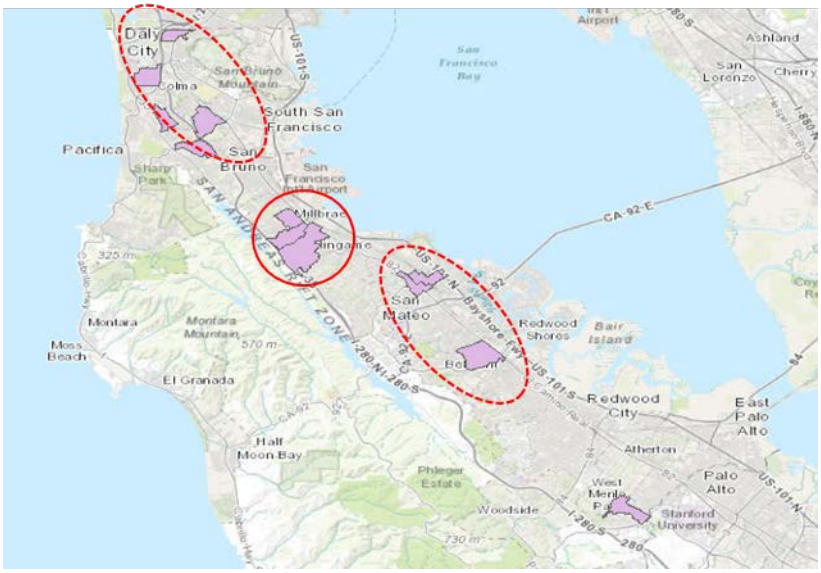
(U.S. Census Bureau 2010)

As a first approximation, the combination of population and density of persons 65 and over may be enough information to be used as a starting point for a private business or public sector program aimed at locating a meaningful group of retired people. In principle, this approach will work not only for a county like San Mateo, but for any region where there are enough older people to constitute a target market.

A third significant factor that can be considered is the wealth level of the retired population under consideration. For example, in San Mateo County, the median 65+ household income across all Census tracts is over $51,000 --significantly higher than the national average. Only about 11,500 households are in areas with an income below the national average.

In this example, it is possible to further refine the data by restricting the search to those tracts whose median household income for those 65 and older is above the median for the county as a whole. Adding this additional parameter to the high-population, high-density areas, narrows the scope to a group of just under 15,000 people aged 65 and older in 14 tracts. This subset of tracts contains one cluster and several loose groupings.

San Mateo County: high-population, high-density, high-income Census tracts (persons aged 65 and older)



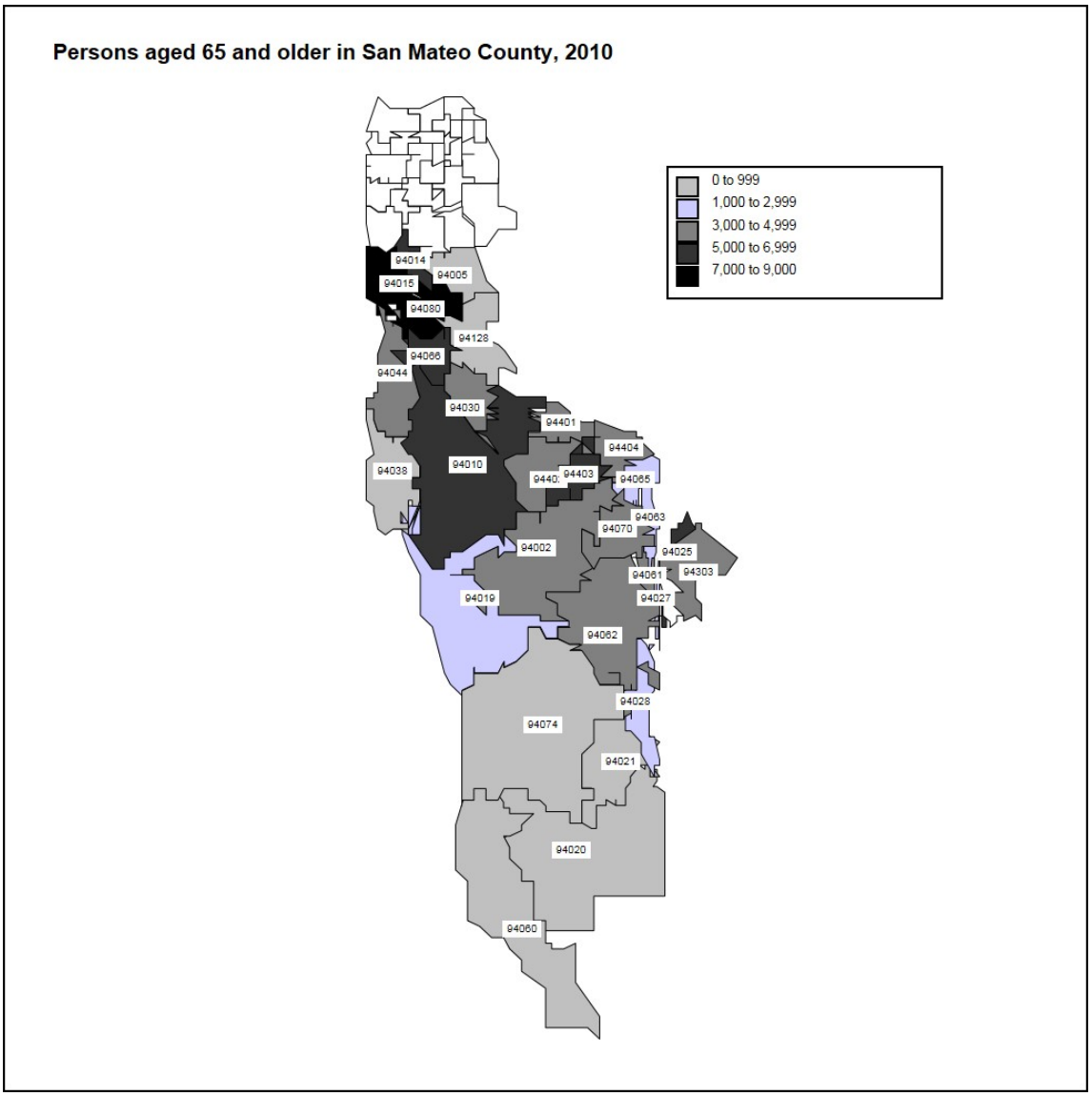
(U.S. Census Bureau 2010)

At this level of detail, initial business decisions can be made on a more informed basis, based on geographic proximity and purchasing power. Because the Decennial Census and American Community Survey offer further refinements, drilling down into particular household detail can make the search even more meaningful. For example, it's possible to search for older people who live alone, or all households with at least one older person. It's all possible to find the "old old" – that is, persons 75 and older—which have been of increasing interest to policy makers and businesses in recent years.

Zip code tabulation areas

While Census tract data are an important source of information, tools for mapping that information can be cumbersome. We therefore re-analyzed this same county data using zip code tract areas (a Census designation similar –but not identical—to USPS zip codes. In this case, we used Mapland, a Microsoft Excel add-in tool which is less complex to use.

Because they are larger than Census tracts, there are just 30 ZCTAs in San Mateo County. The median ZTCA population is about 26,000, and the median population of persons aged 65 and older is 4,000.

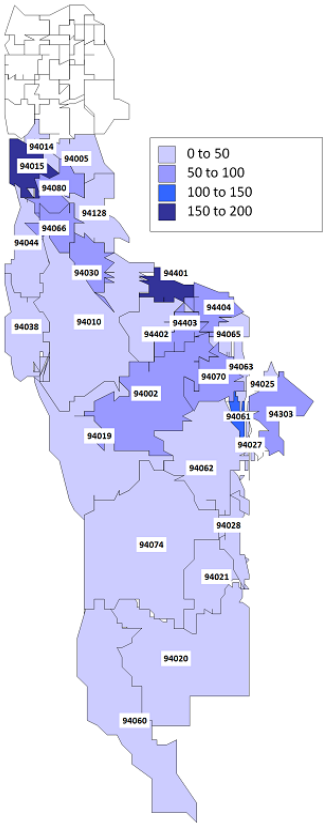


For the purposes of understanding whether seniors are aging in place, data from the Census Bureau's 2008-2012 American Community Survey on length of tenure in housing can be highly illustrative. For example, in some areas, there were a relatively large number of people aged 65 and older who recently began renting an apartment. In other areas, there were seniors who purchased a home. In each case, it's possible that this represents a retirement strategy.

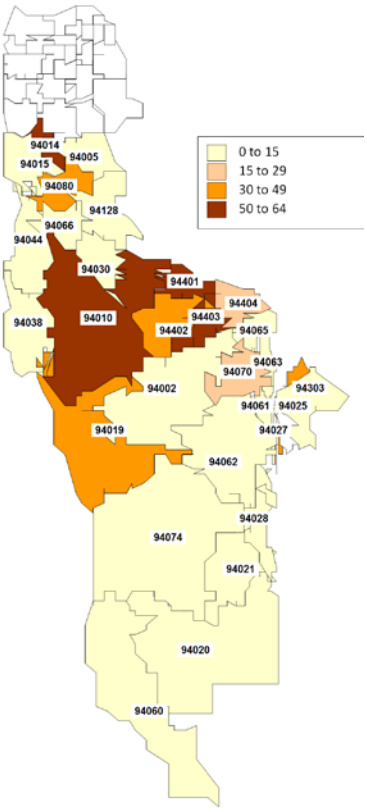
Summary

While "naturally occurring retirement communities" have gotten much attention, using the information available to locate significantly large numbers of older retired people requires moving beyond traditional definitions. For public and private sector organizations focused on reaching these individuals with specific programs, products, or services, the best strategy is to

Persons aged 65 and older newly renting in San Mateo County, 2010



Persons aged 65 and older buying a home in San Mateo County, 2010



identify large numbers of people of a specific age-range living in close proximity, rather than relying solely on areas with a 40 percent or more share of population "over 60."

Population data for areas gathered by Census at the tract level, combined with geographical and financial information, provides needed clarity when seeking to identify concentrations of older seniors. For businesses in particular, understanding the market at the local level, requires both mapping and analysis of the data available. In turn, this has implications for marketing efforts, and can provide valuable insights into how best to reach the population.

As shown through the analysis of just one county, the task of finding retired people is one that requires skilled review of the information available, but which yields actionable results. Combining tabular and mapping data is likely to be the best way to illustrate the location of high-density older communities.

Appendix F. Notes on Tabular versus Mapped Data

Prepared by Jonathan Streeter
Stanford Center on Longevity

Data displayed on maps can be helpful as a way of highlighting or pinpointing areas of interest. At the same time maps by themselves can't easily display multiple levels of information, which are often needed to make business and policy decisions. One solution is to view the underlying data in table form, which enables analysis and helps with interpreting mapped information.

In order for data to be used in mapping, it must be tagged with specific geo-coding information. For example, median household income which is numeric, can be provided on a Census tract or zip code basis, which is geographical. Once the data is geo-coded, it can then be loaded into mapping software, where it can be combined with "shapefiles", which draw boundaries and features.

The Census Bureau provides extensive demographic data on individuals and households linked to individual Census tracts. The Bureau also provides the shapefiles for those tracts. Together, this information can be used to create maps and to create tabular data related to those maps.

San Mateo County Case Study

As a case study for this report, we explored Census statistics available on the elderly living in San Mateo County, in order to demonstrate how tabular and mapped data could be used to make the information useful and meaningful. Among the geographical types that are available, this research focused on two separate types: Census tracts and zip code tabulation areas (ZCTAs)

Census Tract Analysis

2012 American Community Survey data on age demographics for San Mateo County and 2010 Decennial Census data on median income for San Mateo County were both downloaded in Census tract format using the American Fact Finder online at:

http://factfinder2.census.gov/faces/nav/jsf/pages/download_center.xhtml

Shapefiles for the state of California were downloaded from "2014 TIGER/Line® Shapefiles" at:

https://www.census.gov/cgi-bin/geo/shapefiles2014/layers.cgi

These files were then joined using ArcGIS software. Once the tables and the shapes were joined together, the combined information could be exported from ArcGIS as a single dataset. In this instance it provided land area (for calculating density), matched with age data, and in turn matched that to income data.

The downloaded data yielded 143 tracts that covered almost all of the land area of San Mateo, with a few exceptions. These may have occurred because of a lack of data for those parts of the county, or because files were not coded exactly the same.

The dataset was then refined in Excel by eliminating anomalous lines (e.g. that had zero population), and by sorting and calculating as needed. Although Census did not provide a category for population of "75 years and older," it could be calculated by summing the columns that accounted for people that age ("75 – 79", "80 – 84", and "85 years and older"). The information obtained from the Census shapefiles was used to determine the population density (People aged 65 and older per square mile).

Making Sense of the Census Tract Data

The simplest way to refine the available tract-level demographic data was to establish a numerical value that defined significance. In this analysis, we selected a parameter of at least 750 people aged 65 and over for any particular tract to be of importance. In the case of San Mateo, that created a subset of 41 tracts (out of the original 143).

Tract Number	6132	6050	6137	6024	6064	6056	6014	6087	6018	6111	6057	6089	6020	6114
Population age 65+	1610	1607	1448	1371	1211	1201	1094	1064	1058	1039	1014	1010	989	987
Population aged 75+	841	921	543	768	757	601	554	580	565	551	453	514	486	503
Tract population	6494	7603	8755	6679	4820	5556	6658	6974	6148	5913	5273	6556	7649	4237
65+ share of tract population	25%	21%	17%	21%	25%	22%	16%	15%	17%	18%	19%	15%	13%	23%
75+ share of tract population	13%	12%	6%	11%	16%	11%	8%	8%	9%	9%	9%	8%	6%	12%
Tract land area (sq. miles)	15.42	1.57	42.5	1.05	0.36	3.33	0.56	0.97	0.72	1.28	3.1	2.37	1.41	3.4
Population density (people/sq mile)	421	4,843	206	6,369	13,351	1,670	11,798	7,184	8,539	4,620	1,700	2,770	5,417	1,245
Population density of 65+	104	1,024	34	1,307	3,354	361	1,939	1,096	1,470	812	327	427	700	290
Number of households with 65+	1,090	968	1,116	1,067	971	799	757	722	725	701	685	735	734	604
Median household income 65+	$94,152	$55,156	$48,434	$19,608	$56,134	$144,219	$58,780	$80,083	$53,611	$52,014	$155,313	$56,827	$43,182	$149,318
Men 65+ living alone	97	97	118	138	173	43	24	58	56	69	38	100	62	31
Women 65+ living alone	270	268	351	390	440	116	135	198	154	155	112	244	128	79

Tract Number	6016.05	6011	6096.03	6034	6026	6037	6007	6088	6005	6016.03	6038.02	6074	6013	6025
Population age 65+	981	977	969	961	958	952	935	935	926	909	895	891	882	882
Population aged 75+	387	492	437	349	414	506	422	410	394	372	474	538	386	364
Tract population	6189	5716	5318	5483	8167	5430	7568	5696	7443	5800	5056	4451	7510	5092
65+ share of tract population	16%	17%	18%	18%	12%	18%	12%	16%	12%	16%	18%	20%	12%	17%
75+ share of tract population	6%	9%	8%	6%	5%	9%	6%	7%	5%	6%	9%	12%	5%	7%
Tract land area (sq. miles)	0.36	0.25	2.31	0.44	0.73	0.69	0.31	1.1	0.51	0.48	0.24	0.44	0.43	0.48
Population density (people/sq mile)	17,005	23,111	2,306	12,518	11,135	7,873	24,196	5,166	14,469	12,099	20,759	10,150	17,433	10,537
Population density of 65+	2,695	3,950	420	2,194	1,306	1,380	2,989	848	1,800	1,896	3,675	2,032	2,047	1,825
Number of households with 65+	694	684	675	721	729	574	679	661	654	657	641	580	674	569
Median household income 65+	$57,730	$65,046	$60,844	$45,350	$51,875	$48,333	$92,019	$59,786	$36,409	$51,667	$53,490	$18,694	$24,073	$71,125
Men 65+ living alone	24	49	58	73	47	26	35	49	34	55	55	67	66	18
Women 65+ living alone	78	104	169	209	143	96	79	129	74	99	151	247	148	74

Tract Number	6033	6010	6080.04	6015.01	6063	6130	6045	6048	6129	6012	6059	6049	6113
Population age 65+	881	877	877	865	864	825	817	809	798	793	785	771	753
Population aged 75+	416	360	394	388	604	461	480	502	396	373	500	443	356
Tract population	6404	6913	6521	5063	4073	3386	3402	5059	4356	6252	5579	3243	4757
65+ share of tract population	14%	13%	13%	17%	21%	24%	24%	16%	18%	13%	14%	24%	16%
75+ share of tract population	6%	5%	6%	8%	15%	14%	14%	10%	9%	6%	9%	14%	7%
Tract land area (sq. miles)	3.09	1.04	1.42	0.18	0.39	1.79	0.62	0.4	0.62	0.77	0.3	0.59	0.68
Population density (people/sq mile)	2,070	6,672	4,593	27,715	10,318	1,892	5,455	12,673	7,032	8,148	18,679	5,477	7,047
Population density of 65+	285	846	618	4,735	2,189	461	1,310	2,027	1,288	1,033	2,628	1,302	1,115
Number of households with 65+	676	660	657	584	635	573	603	627	588	529	628	539	562
Median household income 65+	$45,188	$51,912	$44,917	$69,948	$56,875	$101,118	$38,661	$53,864	$56,938	$50,219	$29,700	$56,213	$51,518
Men 65+ living alone	87	38	46	16	81	56	64	57	42	44	105	45	52
Women 65+ living alone	161	93	222	73	325	156	211	217	193	87	294	139	155

Once a subset of tracts was created to contain only those tracts with a relevant population size, it became possible to identify further characteristics that would impact decision making, using several methods.

Shading

In mapping, shading is commonly used to denote degrees of intensity or importance. This can also be achieved with tabular data, although in a way that does not provide visual geographic reference.

By examining the subset, it's possible to rank tracts by the number of individuals (low, medium, and high), as well as ranking median income (low, medium, high). This was done by simple division (1/3 low, 1/3 medium, and 1/3 high, for each characteristic).

In this example where either of the two factors is low, then that tract yields a combined ranking of low importance. Where the factors are medium, or a mixture of high and medium, the importance is ranked as medium. Only when both factors are high would the result be of overall high importance.

Population				
	High	High/Low	High/Medium	High/High
	Medium	Medium/Low	Medium/Medium	Medium/High
	Low	Low/Low	Low/Medium	Low/High
		Low	*Medium*	*High*
		Income		

In table form:

	Tracts with at least 750 people aged 65 or older				
CensusTract	***6132***	***6056***	***6014***	***6087***	***6057***
Population age 65+	1610	1201	1094	1064	1014
Population aged 75+	841	601	554	580	453
Tract population	6494	5556	6658	6974	5273
65+ share of tract population	25%	22%	16%	15%	19%
75+ share of tract population	13%	11%	8%	8%	9%
Tract land area (sq. miles)	15.42	3.33	0.56	0.97	3.10
Population density (people/sq mile)	421	1,670	11,798	7,184	1,700
Population density of 65+	104	361	1,939	1,096	327
Number of households with 65+	1,090	799	757	722	685
Median household income 65+	$94,152	$144,219	$58,780	$80,083	$155,313
Men 65+ living alone	97	43	24	58	38
Women 65+ living alone	270	116	135	198	112
Population rank	*High*	*High*	*High*	*High*	*High*
Income rank	*High*	*High*	*High*	*High*	*High*

Top Ten

Considering the subject of this research was to assist in identifying the location of the elderly, another approach to narrowing the focus was to simply create a smaller subset, taking those ten tracts with the highest population of people aged 65 and over.

	Sorted left to right by population aged 65+									
Tract Number	***6132***	***6050***	***6137***	***6024***	***6064***	***6056***	***6014***	***6087***	***6018***	***6111***
Population age 65+	1610	1607	1448	1371	1211	1201	1094	1064	1058	1039
Population aged 75+	841	921	543	768	757	601	554	580	565	551
Tract population	6494	7603	8755	6679	4820	5556	6658	6974	6148	5913
65+ share of tract population	25%	21%	17%	21%	25%	22%	16%	15%	17%	18%
75+ share of tract population	13%	12%	6%	11%	16%	11%	8%	8%	9%	9%
Tract land area (sq. miles)	15.42	1.57	42.5	1.05	0.36	3.33	0.56	0.97	0.72	1.28
Population density (people/sq mile)	421	4,843	206	6,369	13,351	1,670	11,798	7,184	8,539	4,620
Population density of 65+	104	1,024	34	1,307	3,354	361	1,939	1,096	1,470	812
Number of households with 65+	1,090	968	1,116	1,067	971	799	757	722	725	701
Median household income 65+	$94,152	$55,156	$48,434	$19,608	$56,134	$144,219	$58,780	$80,083	$53,611	$52,014
Men 65+ living alone	97	97	118	138	173	43	24	58	56	69
Women 65+ living alone	270	268	351	390	440	116	135	198	154	155

This subset of ten can then be re-sorted according to the desired characteristics like population density or median household income.

	Sorted left to right by population density (person aged 65+ per square mile)									
Tract Number	***6064***	***6014***	***6018***	***6024***	***6087***	***6050***	***6111***	***6056***	***6132***	***6137***
Population age 65+	1211	1094	1058	1371	1064	1607	1039	1201	1610	1448
Population aged 75+	757	554	565	768	580	921	551	601	841	543
Tract population	4820	6658	6148	6679	6974	7603	5913	5556	6494	8755
65+ share of tract population	25%	16%	17%	21%	15%	21%	18%	22%	25%	17%
75+ share of tract population	16%	8%	9%	11%	8%	12%	9%	11%	13%	6%
Tract land area (sq. miles)	0.36	0.56	0.72	1.05	0.97	1.57	1.28	3.33	15.42	42.5
Population density (people/sq mile)	13,351	11,798	8,539	6,369	7,184	4,843	4,620	1,670	421	206
Population density of 65+	3,354	1,939	1,470	1,307	1,096	1,024	812	361	104	34
Number of households with 65+	971	757	725	1,067	722	968	701	799	1,090	1,116
Median household income 65+	$56,134	$58,780	$53,611	$19,608	$80,083	$55,156	$52,014	$144,219	$94,152	$48,434
Men 65+ living alone	173	24	56	138	58	97	69	43	97	118
Women 65+ living alone	440	135	154	390	198	268	155	116	270	351

	Sorted left to right by median household income for those aged 65+									
Tract Number	***6056***	***6132***	***6087***	***6014***	***6064***	***6050***	***6018***	***6111***	***6137***	***6024***
Population age 65+	1201	1610	1064	1094	1211	1607	1058	1039	1448	1371
Population aged 75+	601	841	580	554	757	921	565	551	543	768
Tract population	5556	6494	6974	6658	4820	7603	6148	5913	8755	6679
65+ share of tract population	22%	25%	15%	16%	25%	21%	17%	18%	17%	21%
75+ share of tract population	11%	13%	8%	8%	16%	12%	9%	9%	6%	11%
Tract land area (sq. miles)	3.33	15.42	0.97	0.56	0.36	1.57	0.72	1.28	42.5	1.05
Population density (people/sq mile)	1,670	421	7,184	11,798	13,351	4,843	8,539	4,620	206	6,369
Population density of 65+	361	104	1,096	1,939	3,354	1,024	1,470	812	34	1,307
Number of households with 65+	799	1,090	722	757	971	968	725	701	1,116	1,067
Median household income 65+	$144,219	$94,152	$80,083	$58,780	$56,134	$55,156	$53,611	$52,014	$48,434	$19,608
Men 65+ living alone	43	97	58	24	173	97	56	69	118	138
Women 65+ living alone	116	270	198	135	440	268	154	155	351	390

Multiple Parameters

A final way to analyze the data was to select among the 143 Census tracts for three separate variables, eliminating any tracts that did not meet all three requirements. These 15 tracts meet the following conditions for the population aged 65 and older: more than 750 individuals, density of more than 1,000 people per square mile, median income over $52,000

	Sorted left to right by population aged 65 and older														
Tract Number	*6050*	*6064*	*6014*	*6087*	*6018*	*6016.05*	*6011*	*6007*	*6038.02*	*6025*	*6015.01*	*6063*	*6048*	*6129*	*6049*
Population age 65+	1607	1211	1094	1064	1058	981	977	935	895	882	865	864	809	798	771
Population aged 75+	921	757	554	580	565	387	492	422	474	364	388	604	502	396	443
Tract population	7603	4820	6658	6974	6148	6189	5716	7568	5056	5092	5063	4073	5059	4356	3243
65+ share of tract population	21%	25%	16%	15%	17%	16%	17%	12%	18%	17%	17%	21%	16%	18%	24%
75+ share of tract population	12%	16%	8%	8%	9%	6%	9%	6%	9%	7%	8%	15%	10%	9%	14%
Tract land area (sq. miles)	1.57	0.36	0.56	0.97	0.72	0.36	0.25	0.31	0.24	0.48	0.18	0.39	0.4	0.62	0.59
Population density (people/sq mile)	4,843	13,351	11,798	7,184	8,539	17,005	23,111	24,196	20,759	10,537	27,715	10,318	12,673	7,032	5,477
Population density of 65+	1,024	3,354	1,939	1,096	1,470	2,695	3,950	2,989	3,675	1,825	4,735	2,189	2,027	1,288	1,302
Number of households with 65+	968	971	757	722	725	694	684	679	641	569	584	635	627	588	539
Median household income 65+	$55,156	$56,134	$58,780	$80,083	$53,611	$57,730	$65,046	$92,019	$53,490	$71,125	$69,948	$56,875	$53,864	$56,938	$56,213
Men 65+ living alone	97	173	24	58	56	24	49	35	55	18	16	81	57	42	45
Women 65+ living alone	268	440	135	198	154	78	104	79	151	74	73	325	217	193	139

Again, they can be sorted for characteristics like median household income and density.

	Sorted left to right by median household income for 65+														
Tract Number	*6007*	*6087*	*6025*	*6015.01*	*6011*	*6014*	*6016.05*	*6129*	*6063*	*6049*	*6064*	*6050*	*6048*	*6018*	*6038.02*
Population age 65+	935	1064	882	865	977	1094	981	798	864	771	1211	1607	809	1058	895
Population aged 75+	422	580	364	388	492	554	387	396	604	443	757	921	502	565	474
Tract population	7568	6974	5092	5063	5716	6658	6189	4356	4073	3243	4820	7603	5059	6148	5056
65+ share of tract population	12%	15%	17%	17%	17%	16%	16%	18%	21%	24%	25%	21%	16%	17%	18%
75+ share of tract population	6%	8%	7%	8%	9%	8%	6%	9%	15%	14%	16%	12%	10%	9%	9%
Tract land area (sq. miles)	0.31	0.97	0.48	0.18	0.25	0.56	0.36	0.62	0.39	0.59	0.36	1.57	0.4	0.72	0.24
Population density (people/sq mile)	24,196	7,184	10,537	27,715	23,111	11,798	17,005	7,032	10,318	5,477	13,351	4,843	12,673	8,539	20,759
Population density of 65+	2,989	1,096	1,825	4,735	3,950	1,939	2,695	1,288	2,189	1,302	3,354	1,024	2,027	1,470	3,675
Number of households with 65+	679	722	569	584	684	757	694	588	635	539	971	968	627	725	641
Median household income 65+	$92,019	$80,083	$71,125	$69,948	$65,046	$58,780	$57,730	$56,938	$56,875	$56,213	$56,134	$55,156	$53,864	$53,611	$53,490
Men 65+ living alone	35	58	18	16	49	24	24	42	81	45	173	97	57	56	55

	Sorted left to right by greatest density of persons aged 65+ per square mile														
Tract Number	*6015.01*	*6011*	*6038.02*	*6064*	*6007*	*6016.05*	*6063*	*6048*	*6014*	*6025*	*6018*	*6049*	*6129*	*6087*	*6050*
Population age 65+	865	977	895	1211	935	981	864	809	1094	882	1058	771	798	1064	1607
Population aged 75+	388	492	474	757	422	387	604	502	554	364	565	443	396	580	921
Tract population	5063	5716	5056	4820	7568	6189	4073	5059	6658	5092	6148	3243	4356	6974	7603
65+ share of tract population	17%	17%	18%	25%	12%	16%	21%	16%	16%	17%	17%	24%	18%	15%	21%
75+ share of tract population	8%	9%	9%	16%	6%	6%	15%	10%	8%	7%	9%	14%	9%	8%	12%
Tract land area (sq. miles)	0.18	0.25	0.24	0.36	0.31	0.36	0.39	0.4	0.56	0.48	0.72	0.59	0.62	0.97	1.57
Population density (people/sq mile)	27,715	23,111	20,759	13,351	24,196	17,005	10,318	12,673	11,798	10,537	8,539	5,477	7,032	7,184	4,843
Population density of 65+	4,735	3,950	3,675	3,354	2,989	2,695	2,189	2,027	1,939	1,825	1,470	1,302	1,288	1,096	1,024
Number of households with 65+	584	684	641	971	679	694	635	627	757	569	725	539	588	722	968
Median household income 65+	$69,948	$65,046	$53,490	$56,134	$92,019	$57,730	$56,875	$53,864	$58,780	$71,125	$53,611	$56,213	$56,938	$80,083	$55,156
Men 65+ living alone	16	49	55	173	35	24	81	57	24	18	56	45	42	58	97
Women 65+ living alone	73	104	151	440	79	78	325	217	135	74	154	139	193	198	268

Zip Code-linked Data

Although Census block groups and tracts are the smallest geographical units for which Census data is available, the mapping software programs that can provide that level of detail are typically difficult to learn and expensive. One solution is to use Census demographic information provided for zip codes (or, more accurately Zip code Tract Areas). Zip codes cover larger areas, but can be used with simpler software programs like the add-in to Microsoft Excel, Mapland.

Another benefit of zip code-related data points is that they have specific town and city place names associated with them (unlike Census Tracts, which have only a county identification). As a result, a person familiar with a particular region can make a quick association between the numbers reported and the location they are associated with.

Creating Zip Code Tract Area Data for San Mateo County

In the case of San Mateo County, Census provides data for 30 Zip code tract areas (ZCTAs). Although this geographic designation is for areas larger than a neighborhood or local community, it nevertheless provides for an analysis of "local" information.

While ZCTAs are not an exact match with Zip codes, the geographic areas they cover are reasonably close. Thus, population density (people per square mile) can be approximated by dividing the Census population data with the Zip code coverage area.

For this article, data on age demographics and on median income for San Mateo County were both downloaded from the 2008-2012 American Community Survey 5-Year Estimates program in ZCTA format using the American Fact Finder online at:

http://factfinder2.census.gov/faces/nav/jsf/pages/download_center.xhtml

Zip code shapefiles were provided in the Mapland program.

Demographics of San Mateo County Elderly by Zip Code

The ZCTAs for San Mateo County generally have at least 1,000 people aged 65 or over. While the share of people 65 plus is similar to the national average of about 13 percent in most of areas of San Mateo County, there are two ZCTAs where the percentage of older people was remarkably higher: Portola Valley with 25 percent aged 65 plus, and Atherton with 23 percent aged 65 plus.

Median income for householders 65 and older in 25 of the 30 San Mateo County ZCTAs was higher than the state-wide median of $42,408, and in four areas --Atherton, La Honda, Montara, and Portola Valley—more than twice the state median.

There appears to be little correlation between population density and income; the lowest median income for householders 65 and over was in Redwood City and the highest was in Atherton, yet

the two areas are nearly the same in terms of the density of persons aged 65 and older per square mile. (Estimates for population density are approximations, as the geographic boundaries for zip codes are not precisely identical to ZCTAs.)

Sorted by population aged 65 and older, from largest to smallest

Town	ZCTA	Population age 65+	Population aged 75+	Men 65+ living alone	Women 65+ living alone	ZTCA population	65+ share of ZTCA population	75+ share of ZTCA population	Number of households with 65+	Median household income 65+	ZTCA land area (sq. miles)	Population density (people/sq mile)	Population density of 65+
Daly City	*94015*	8,763	4,146	429	1,005	60,927	14.4%	6.8%	6,094	$57,358	5.8	10,576	1,521
South San Francisco	*94080*	8,381	4,075	554	1,311	63,975	13.1%	6.4%	6,153	$41,671	10.3	6,224	815
Burlingame	*94010*	6,454	3,242	424	1,115	40,737	15.8%	8.0%	4,437	$78,627	11.8	3,442	545
Daly City	*94014*	5,877	2,658	266	627	47,014	12.5%	5.7%	4,294	$43,796	6.3	7,454	932
San Mateo	*94403*	5,856	3,054	382	1,204	39,642	14.8%	7.7%	4,160	$57,224	5.6	7,040	1,040
Menlo Park	*94025*	5,621	2,876	431	1,187	40,526	13.9%	7.1%	3,986	$68,750	11.8	3,448	478
San Bruno	*94066*	5,215	2,421	317	802	41,130	12.7%	5.9%	3,758	$44,653	6.1	6,706	850
San Mateo	*94404*	4,610	1,836	264	838	33,749	13.7%	5.4%	3,338	$64,097	4.3	7,923	1,082
Pacifica	*94044*	4,521	1,924	325	774	37,296	12.1%	5.2%	3,373	$50,469	14.7	2,543	308
East Palo Alto	*94303*	4,491	2,107	274	640	45,467	9.9%	4.6%	3,271	$58,723	8.0	5,710	564
San Mateo	*94401*	4,462	2,578	488	1,296	34,429	13.0%	7.5%	3,483	$42,415	3.1	10,943	1,418
Millbrae	*94030*	4,237	2,456	256	803	21,536	19.7%	11.4%	2,908	$54,087	3.4	6,359	1,251
Redwood City	*94061*	4,208	2,227	362	947	36,245	11.6%	6.1%	3,205	$47,664	3.9	9,391	1,090
San Carlos	*94070*	4,199	2,046	302	863	29,166	14.4%	7.0%	3,061	$62,117	6.1	4,749	684
San Mateo	*94402*	3,963	2,025	219	710	23,981	16.5%	8.4%	2,793	$73,750	4.9	4,934	815
Redwood City	*94062*	3,949	1,737	253	583	25,876	15.3%	6.7%	2,761	$72,891	70.9	365	56
Belmont	*94002*	3,856	1,943	272	733	25,992	14.8%	7.5%	2,753	$60,625	5.7	4,589	681
Half Moon Bay	*94019*	2,445	909	185	498	18,424	13.3%	4.9%	1,855	$62,382	52.6	350	46
Redwood City	*94063*	2,067	844	201	356	30,949	6.7%	2.7%	1,620	$39,660	6.8	4,539	303
Portola Valley	*94028*	1,607	846	94	269	6,534	24.6%	12.9%	1,087	$99,688	15.2	429	105
Atherton	*94027*	1,600	800	52	131	7,089	22.6%	11.3%	1,006	$133,977	5.2	1,364	308
Redwood City	*94065*	1,157	382	83	198	11,359	10.2%	3.4%	859	$55,417	2.4	4,660	475
Brisbane	*94005*	429	158	57	65	4,282	10.0%	3.7%	348	$71,111	4.4	974	98
Moss Beach	*94038*	359	135	23	43	3,040	11.8%	4.4%	211	$72,375	1.6	1,929	228
Montara	*94037*	356	134	23	49	2,913	12.2%	4.6%	265	$84,828	5.8	503	62
Pescadero	*94060*	182	54	25	11	1,554	11.7%	3.5%	127	$67,750	73.0	21	2
La Honda	*94020*	179	59	21	16	1,559	11.5%	3.8%	139	$119,453	55.8	28	3
San Gregorio	*94074*	26	6	5	2	214	12.1%	2.8%	21	$34,674	18.5	12	1
Loma Mar	*94021*	12	5	2	2	192	6.3%	2.6%	9	-	4.5	42	3
SFO	*94128*	5	1	0	0	69	7.2%	1.4%	0	-	3.5	20	1

Sorted by median household income, aged 65 and older, from highest to lowest

Town	ZCTA	Population age 65+	Population aged 75+	Men 65+ living alone	Women 65+ living alone	ZTCA population	65+ share of ZTCA population	75+ share of ZTCA population	Number of households with 65+	Median household income 65+	ZTCA land area (sq. miles)	Population density (people/sq mile)	Population density of 65+
Atherton	*94027*	1,600	800	52	131	7,089	22.6%	11.3%	1,006	$133,977	5.2	1,364	308
La Honda	*94020*	179	59	21	16	1,559	11.5%	3.8%	139	$119,453	55.8	28	3
Portola Valley	*94028*	1,607	846	94	269	6,534	24.6%	12.9%	1,087	$99,688	15.2	429	105
Montara	*94037*	356	134	23	49	2,913	12.2%	4.6%	265	$84,828	5.8	503	62
Burlingame	*94010*	6,454	3,242	424	1,115	40,737	15.8%	8.0%	4,437	$78,627	11.8	3,442	545
San Mateo	*94402*	3,963	2,025	219	710	23,981	16.5%	8.4%	2,793	$73,750	4.9	4,934	815
Redwood City	*94062*	3,949	1,737	253	583	25,876	15.3%	6.7%	2,761	$72,891	70.9	365	56
Moss Beach	*94038*	359	135	23	43	3,040	11.8%	4.4%	211	$72,375	1.6	1,929	228
Brisbane	*94005*	429	158	57	65	4,282	10.0%	3.7%	348	$71,111	4.4	974	98
Menlo Park	*94025*	5,621	2,876	431	1,187	40,526	13.9%	7.1%	3,986	$68,750	11.8	3,448	478
Pescadero	*94060*	182	54	25	11	1,554	11.7%	3.5%	127	$67,750	73.0	21	2
San Mateo	*94404*	4,610	1,836	264	838	33,749	13.7%	5.4%	3,338	$64,097	4.3	7,923	1,082
Half Moon Bay	*94019*	2,445	909	185	498	18,424	13.3%	4.9%	1,855	$62,382	52.6	350	46
San Carlos	*94070*	4,199	2,046	302	863	29,166	14.4%	7.0%	3,061	$62,117	6.1	4,749	684
Belmont	*94002*	3,856	1,943	272	733	25,992	14.8%	7.5%	2,753	$60,625	5.7	4,589	681
East Palo Alto	*94303*	4,491	2,107	274	640	45,467	9.9%	4.6%	3,271	$58,723	8.0	5,710	564
Daly City	*94015*	8,763	4,146	429	1,005	60,927	14.4%	6.8%	6,094	$57,358	5.8	10,576	1,521
San Mateo	*94403*	5,856	3,054	382	1,204	39,642	14.8%	7.7%	4,160	$57,224	5.6	7,040	1,040
Redwood City	*94065*	1,157	382	83	198	11,359	10.2%	3.4%	859	$55,417	2.4	4,660	475
Millbrae	*94030*	4,237	2,456	256	803	21,536	19.7%	11.4%	2,908	$54,087	3.4	6,359	1,251
Pacifica	*94044*	4,521	1,924	325	774	37,296	12.1%	5.2%	3,373	$50,469	14.7	2,543	308
Redwood City	*94061*	4,208	2,227	362	947	36,245	11.6%	6.1%	3,205	$47,664	3.9	9,391	1,090
San Bruno	*94066*	5,215	2,421	317	802	41,130	12.7%	5.9%	3,758	$44,653	6.1	6,706	850
Daly City	*94014*	5,877	2,658	266	627	47,014	12.5%	5.7%	4,294	$43,796	6.3	7,454	932
San Mateo	*94401*	4,462	2,578	488	1,296	34,429	13.0%	7.5%	3,483	$42,415	3.1	10,943	1,418
South San Francisco	*94080*	8,381	4,075	554	1,311	63,975	13.1%	6.4%	6,153	$41,671	10.3	6,224	815
Redwood City	*94063*	2,067	844	201	356	30,949	6.7%	2.7%	1,620	$39,660	6.8	4,539	303
San Gregorio	*94074*	26	6	5	2	214	12.1%	2.8%	21	$34,674	18.5	12	1
Loma Mar	*94021*	12	5	2	2	192	6.3%	2.6%	9	-	4.5	42	3
SFO	*94128*	5	1	0	0	69	7.2%	1.4%	0	-	3.5	20	1

Sorted by population density, aged 65 and older, from highest to lowest

Town	ZCTA	Population age 65+	Population aged 75+	Men 65+ living alone	Women 65+ living alone	ZTCA population	65+ share of ZTCA population	75+ share of ZTCA population	Number of households with 65+	Median household income 65+	ZTCA land area (sq. miles)	Population density (people/sq mile)	Population density of 65+
Daly City	*94015*	8,763	4,146	429	1,005	60,927	14.4%	6.8%	6,094	$57,358	5.8	10,576	1,521
San Mateo	*94401*	4,462	2,578	488	1,296	34,429	13.0%	7.5%	3,483	$42,415	3.1	10,943	1,418
Millbrae	*94030*	4,237	2,456	256	803	21,536	19.7%	11.4%	2,908	$54,087	3.4	6,359	1,251
Redwood City	*94061*	4,208	2,227	362	947	36,245	11.6%	6.1%	3,205	$47,664	3.9	9,391	1,090
San Mateo	*94404*	4,610	1,836	264	838	33,749	13.7%	5.4%	3,338	$64,097	4.3	7,923	1,082
San Mateo	*94403*	5,856	3,054	382	1,204	39,642	14.8%	7.7%	4,160	$57,224	5.6	7,040	1,040
Daly City	*94014*	5,877	2,658	266	627	47,014	12.5%	5.7%	4,294	$43,796	6.3	7,454	932
San Bruno	*94066*	5,215	2,421	317	802	41,130	12.7%	5.9%	3,758	$44,653	6.1	6,706	850
South San Francisco	*94080*	8,381	4,075	554	1,311	63,975	13.1%	6.4%	6,153	$41,671	10.3	6,224	815
San Mateo	*94402*	3,963	2,025	219	710	23,981	16.5%	8.4%	2,793	$73,750	4.9	4,934	815
San Carlos	*94070*	4,199	2,046	302	863	29,166	14.4%	7.0%	3,061	$62,117	6.1	4,749	684
Belmont	*94002*	3,856	1,943	272	733	25,992	14.8%	7.5%	2,753	$60,625	5.7	4,589	681
East Palo Alto	*94303*	4,491	2,107	274	640	45,467	9.9%	4.6%	3,271	$58,723	8.0	5,710	564
Burlingame	*94010*	6,454	3,242	424	1,115	40,737	15.8%	8.0%	4,437	$78,627	11.8	3,442	545
Menlo Park	*94025*	5,621	2,876	431	1,187	40,526	13.9%	7.1%	3,986	$68,750	11.8	3,448	478
Redwood City	*94065*	1,157	382	83	198	11,359	10.2%	3.4%	859	$55,417	2.4	4,660	475
Pacifica	*94044*	4,521	1,924	325	774	37,296	12.1%	5.2%	3,373	$50,469	14.7	2,543	308
Atherton	*94027*	1,600	800	52	131	7,089	22.6%	11.3%	1,006	$133,977	5.2	1,364	308
Redwood City	*94063*	2,067	844	201	356	30,949	6.7%	2.7%	1,620	$39,660	6.8	4,539	303
Moss Beach	*94038*	359	135	23	43	3,040	11.8%	4.4%	211	$72,375	1.6	1,929	228
Portola Valley	*94028*	1,607	846	94	269	6,534	24.6%	12.9%	1,087	$99,688	15.2	429	105
Brisbane	*94005*	429	158	57	65	4,282	10.0%	3.7%	348	$71,111	4.4	974	98
Montara	*94037*	356	134	23	49	2,913	12.2%	4.6%	265	$84,828	5.8	503	62
Redwood City	*94062*	3,949	1,737	253	583	25,876	15.3%	6.7%	2,761	$72,891	70.9	365	56
Half Moon Bay	*94019*	2,445	909	185	498	18,424	13.3%	4.9%	1,855	$62,382	52.6	350	46
La Honda	*94020*	179	59	21	16	1,559	11.5%	3.8%	139	$119,453	55.8	28	3
Loma Mar	*94021*	12	5	2	2	192	6.3%	2.6%	9	-	4.5	42	3
Pescadero	*94060*	182	54	25	11	1,554	11.7%	3.5%	127	$67,750	73.0	21	2
SFO	*94128*	5	1	0	0	69	7.2%	1.4%	0	-	3.5	20	1
San Gregorio	*94074*	26	6	5	2	214	12.1%	2.8%	21	$34,674	18.5	12	1

Again, because zip code information is associated with place names, familiarity with the region makes analysis of the numbers more intuitive. Additionally, the relatively small number of ZCTAs in the county makes visual interpretation and comparison easier.

Summary

Analyzing the information available on the elderly is made easier by identifying those factors and locations that offer the most potential for delivering products, services, and programs. Businesses seeking new markets need information about prospective customers such as income, proximity to one another, household status, and background. Policy makers need this information as well as to understand whether seniors are being isolated or out of reach of community services.

Mapping the data can provide a good overview of these factors. Adding tabular data can give

deeper insight and help shed light on trends or patterns that might not be immediately apparent.

Among the datasets provided by the Census Bureau, tract data offer the greatest close-up detail, but are challenging to use in the current software environment. Zip code tabulation data yield information on broader geographic areas (typically larger than a “neighborhood”), but can be useful both because they are easier to map and because a visual analysis of the information in table form benefits from having location names associated with it.

Appendix G. Comparison of Mapping Tools

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Maps hold the potential to visually convey key decision-making information in a clear and concise manner, but the mapping software programs currently available can be expensive to obtain and difficult to use. We surveyed some of the leading programs in order to clarify what can be done with geospatial distribution data.

Mapping tools[i]

At present, the most widely used commercial mapping tools require a high level of user expertise for demonstrating demographic data. Using these programs effectively requires a dedicated resource with the ability to understand the desired output and to design and revise maps accordingly.

The industry standard is ArcGIS, which is used to create the vast majority of images used in publications and online. It requires a high level of mastery to be used effectively. Mapland, a less expensive and easier to master program, works as an add-in to Microsoft Excel. It allows for the display of data at the county and zip code levels for an extra fee.

The best known free mapping tools from the public sector are those which reside on the Census Bureau's various websites. These tools are easier to use, but are designed to address only very specific issues (age, migration, income). The bureau's "American Fact Finder" offers the most flexibility, but is also the most difficult program to master.

The smallest level of detailed data published by the Census is at the block group level. Typically block groups contain about 600 people or 240 households. This close-up detail is ideal for map-based analysis, although only a few tools (including ArcGIS and SocialExplorer) are capable of displaying block groups.

Publisher	*Name*	*Difficulty*	*Detail*	*Cost*
Census	Census data mapper	Low	County	Free
	Census flows mapper	Low	County	Free
	Interactive Population Map	Low	County	Free
	County & Business Demographics	N/A	County	Free
	American Fact Finder	High	Block group	Free
ESRI	ArcGIS online	High	Block group	$2,500 year
	ArcGIS Desktop	High	Block group	$1,500 year
Google	Google Earth	High	County	Free
	Google Maps API for Business	High	County	Free
	Google Maps Engine	High	County	$5 per mo./$50 per year
Softill	Mapland	Moderate	Zip code	$300 - $500
Social Explorer	Social Explorer	Moderate	Block group	$100 for 3 months

Refining the Data

Of these tools, only ArcGIS allows for extensive manipulation of the underlying data. For example, it's possible to limit what shows up on the map by excluding certain values, or by including only certain areas. That is, ArcGIS could be used to create a map of block groups or census tracts in a particular county where household income is lower than median for the state. In other programs, it is only possible to select a single parameter (e.g. household income) and then display the data in various ways (shades, density dots, etc.).

Custom Tool

Providing maps similar to the off-the-shelf Census programs in terms of ease of use, but with the flexibility of ArcGIS to manipulate the data, requires advanced programming capabilities. Optimally, a proficient ArcGIS expert user could to create a tool that would allow non-expert users to easily build their own maps. For this to be effective, very specific direction must be provided regarding what the output should look like, and the data should be selectable, etc.

Conclusion

There do not appear to be any straightforward solutions to the problem of creating maps that quickly and clearly identify concentrations of older people in ways that are meaningful to business users and policy makers. The data and the technology are available to solve this issue, but it would require a specific program and substantial expertise to develop the right tools.

[i]

Information on each of the mapping tools discussed above can be found online as follows:

Name	***Website***
Census data mapper	http://tigerweb.geo.census.gov/datamapper/map.html
Census flows mapper	http://flowsmapper.geo.census.gov/flowsmapper/map.html
Interactive Population Map	http://www.census.gov/2010census/popmap/
County & Business Demographics	http://www.census.gov/cbdmap/error.php
American Fact Finder	http://factfinder2.census.gov/faces/nav/jsf/pages/index.xhtml
ArcGIS online	http://www.esri.com/software/arcgis/arcgisonline
ArcGIS	http://www.esri.com
Google Earth	https://earth.google.com
Google Maps API for Business	http://www.google.com/intx/en/work/mapsearth/
Google Maps Engine	http://www.google.com/work/mapsearth/products/mapsengine.html
Mapland	http://www.softill.com/
Social Explorer	http://www.socialexplorer.com/