ProFamy: The cohort-component approach for projecting family households and elderly living arrangements

Zeng Yi, Professor, Duke University and Peking University
Zhenglian Wang, Senior Research Scientist , Duke University

OUTLINES

1. **Methodological And Data Issues**

2. **Illustrative Applications of Forecasts of Households, Elderly Living Arrangements and Disability, and Housing**

1. METHODOLOGICAL AND DATA ISSUES
1.1. MODELS/METHODS FOR HOUSEHOLD PROJECTION OR SIMULATION

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Three types of method: headship-rate, Micro simulation and Macro simulation

(1) Classic headship-rate method (to be discussed in a few minutes)

(2) Micro models

- can handle a large state space with many covariates;
- the relation of individuals can be explicitly retained;
- provide rich output including the stochastic distribution and confidence intervals of outcomes.

→**Very powerful in detailed analyses of complex behavioural patterns and kinship simulations**

Three kinds of random variations: (e.g. Van Imhoff and Post, 1998):
--Monte Carlo random variations;
--subject to sampling errors for starting and projected populations;
--"specification randomness"

(3) Macro models

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(a) Limited in # of covariates included and retaining complex relations among individuals, but:

→not limited to the sample size, can fully use census information as starting point to project households of entire population
→relatively easy to use if a user-friendly software is provided

(b) Most macro household projection models require data on transition probabilities among different household types, which are not available from conventional data resources such as surveys, census and vital statistics, and not closely linked to demographic rates.

→ Need to develop a macro model that requires only conventional data (i.e. using demographic rates as input).
→ This is what ProFamy model tries to do

1.2. Demographic statuses of all individuals of the population in the ProFamy model

Status	Symbol	Definition and codes	U.S. application
Age	X	0,1,2,3,…,W; W is chosen by user	x=0,1,2,3,…,100
Sex	S	1. Female; 2. Male	s=1,2
Race (optional)	R	Determined by user	r=1,2,3,4
Marital status	M	4 or 7 marital status model chosen by user	m=1,2,3,4,5,6,7
Co-residence with parent(s)	K	1. Living with two parents; 2. Living with one parent only; 3. Not living with parents.	k=1,2,3
Parity	P	p = 0,1,2,…, H; H is chosen by user	p=0,12,3,4,5+
# co-residing children	C	c = 0,1,2,…, H (cp)	c=0,1,2,3,4,5+
Residence (optional)	U	1. Rural; 2. Urban	Not considered
Projection year	t	Single year from t_1 to t_2, chosen by user	t_1=2000; t_2=2050

Notes: (1) Status k can also be defined in ProFamy model as having 0, 1, or 2 surviving parents, disregarding co-residence. Status c can also be defined as having 1,2,…,P surviving children, disregarding co-residence

Figure 1. Seven marital statuses model
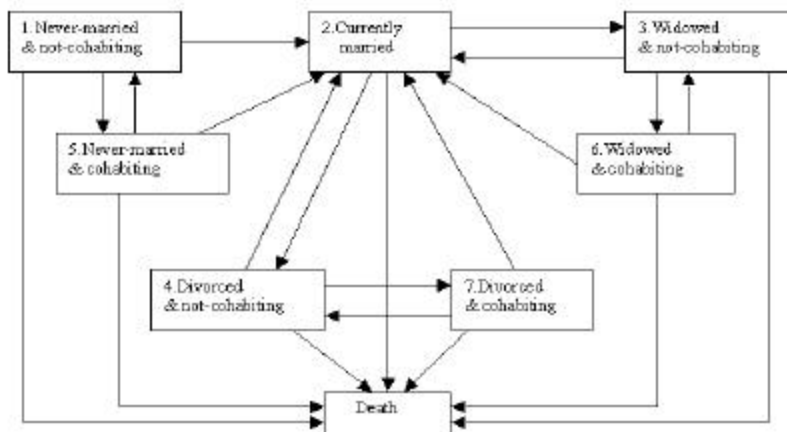
1.3 Accounting System and Computational Strategy

Accounting system: the household type and size are derived from the characteristics of the reference person (or marker).

Details on accounting equations, computational strategies and procedures, how to ensure the consistence between males and females and between parents and children are referred to: Zeng, Vaupel and Wang (1997; 1998) and Zeng, Land, Wang and Gu (2006).

Selected Publications

ng Yi, James W. Vaupel, and Wang Zhenglian. 1997. "A Multidimensional Model for Projecting Family Households -- With an Illustrative Numerical Application." *Mathematical Population Studies* 6: 187-216.

Zeng Yi, James W. Vaupel and Wang Zhenglian. 1998. "Household Projection Using Conventional Demographic Data." In: Frontiers of Population Forecasting". *Population and Development Review*, Supplementary Issue of Volume 24: 59-87.

Zeng Yi, Kenneth C. Land, Zhenglian Wang, and Danan Gu. 2006. "U.S. Family Household Dynamics and Momentum -- Extension of ProFamy Method and Application" Forthcoming in *Population Research and Policy Review*, 25(1), 1-41.

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Zeng Yi, 2007. Options of Fertility Policy Transition in China. Forthcoming in *Population and Development Review*. 33 (2): 215-246.

Paper not yet published
-- Zeng Yi, Kenneth C. Land, Zhenglian Wang, and Danan Gu. 2005. "Household Forecasting at State and Small Area Levels "Presented at PAA. Under review.
-- Zhenglian Wang, Danan Gu, and Zeng Yi. 2006. Housing Forecasts at State and Small Area Levels – A New Approach and Applications to the State, Two Counties and One Town of North Carolina. Presented at PAA.
-- Zeng Yi, Zhenglian, Wang, and Danan Gu. 2005. Forecasts of Consumption of Motor Vehicle and Its Sensitivity Analysis. GM project Report.

1.4. A Comparison of ProFamy Model and Headship Rate Method

(1) Linkage with demographic rates

Headship Rate: *Does not use demographic rates as input & cannot link to demographic events,* extremely hard to incorporate demographic assumptions of fertility, mortality, marriage/union formation and dissolution etc. (Mason and Racelis 1992; Spicer et al., 1992)

ProFamy: Use demographic rates from conventional sources as input; closely link projected households with demographic rates and summary measures on marriage/union formation and dissolution, fertility and mortality etc.

ProFamy family household and elderly living arrangement projection: Extended cohort component approach, **using demographic rates as input**
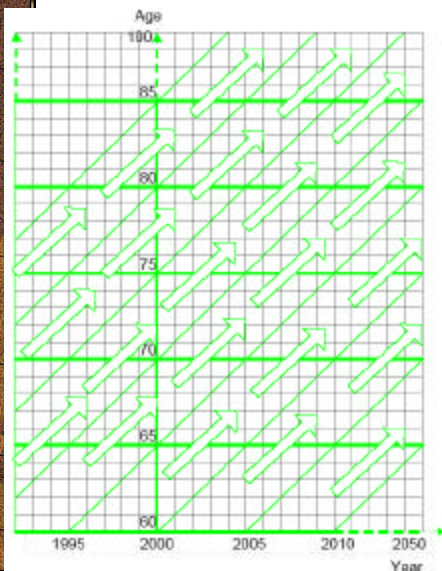
Headship-rate household projection: **cross-sectional extrapolation** of the age-specific headship-rate, without linkage to demographic rate
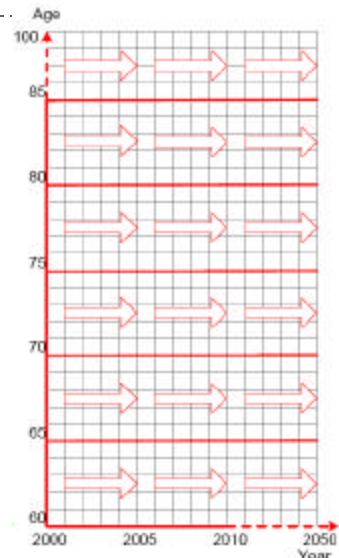
(2) Information produced and their adequacy for planning

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Headship Rate: *little information on household types & no household sizes projection, inadequate for planning purposes* (Bell and Cooper, 1990), e.g. housing forecasting using headship rates cannot provide future housing needs by household size, which may be misleading.

Table 2. Households types projected by headship rates methods
(Bureau of the Census, 1996)

Code	Household type	Household size
1	Married couple household	Not available
2	Female-headed household, no spouse	Not available
3	Male-headed household, no spouse	Not available
4	Female non-family household	Not available
5	Male non-family household	Not available

ProFamy: projected household types and sizes

Type code	Household types	Household sizes
One generation households		
1-6	One person only by sex and marital status	1
7-12	One person & other/non-relative by sex and marital status of the person	2,3,4,5,or 6+
13-14	One married couple only; One cohabiting couple only	2
15-16	One married couple & other/non-relative; One cohabiting couple & other/non-relative	3,4,5,6,or 7+
Two-generation households		
17-18	Married couple & children; Cohabiting couple & children	3,4,5,6,7,8,or 9+
19-24	Single-parent & children by sex and marital status of the single parent	2,3,4,5,6,7,8,or 9+
Three-generation households		
25-28	Married (or cohabiting) couple with children and 1 or 2 grandparents	4,5,6,7,8,or 9+
29-40	Sex-marital status-specific single-parent & children & 1 or 2 grandparents	3,4,5,6,7,8,or 9+

ProFamy are much more useful in business & governmental planning, policy analysis, and academic research than are the 5 household types projected using the headship-rate method.

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For example:

→ **Prskawetz et al. (2004) found that the headship-rate method yields serious misleading (overestimating) results about the increase in automobile use in Austria, because the headship-rate method forecasts household numbers without information on household sizes.**

→ **Wang et al. (2006) found that the headship-rate method yields serious misleading results about the housing demand in NC of U.S., because the headship-rate method cannot forecast households/housing by household sizes.**

→ **Two recent articles published in *Nature* show that rapid increase in households with smaller size, which results in higher per capita resource consumption, implies a threat of larger demand for resources (Keilman, 2003) and poses serious challenges to biodiversity conservation (Liu et al., 2003).**

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(3) Other family household members than heads

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▪**Headship Rate:** *Lumps all other household members than heads into "non-heads"* (Burch, 1999), cannot be used for forecasting of family status and living arrangement of elderly, children, and adults, who are non-heads and consist of a majority of the population.

▪**ProFamy:** *simultaneously Project household, marital status, living arrangement and age/sex (optional: race or rural/urban) distributions of all members of entire population including reference persons and non-reference persons,* such as:

➢number & % of elderly living alone, with spouse only, with children and others, institutionalized etc.

➢number & % of children with single parent,

➢number & % of middle-age adults with both children and parents;

1.5. A Summary of the Data and Resources Used by ProFamy to Forecast Households

(1) Base population for the nation and states.

Contents of the data	Main data resources (US applications)
A census micro data file for the whole country and each state, with a few needed variables of sex, age, race (optional), marital/union status, relationship to the householder, and whether living in a private or institutional household. If a sample data set is used, 100% tabulations of age-sex distributions of the entire population and those living in group quarters, as well as the total number of households, derived from the census data must be provided.	2000 and 1990 census 5% micro data files and the 100% censuses tabulations at the national level; the 5% or 100% data set for each state, with a few needed variables of sex, age, race, marital/union status, relationship to the householder, and geographic codes, etc.; 100% data are available at the Census Research Data Center

(2) Model standard schedules at national level (not necessary for the states and small areas), available from ProFamy package

Contents of the data	Main data resources
(a) Age-race-sex-specific death rates (marital-status specific, if possible, but not yet available in the ProFamy package).	Census Bureau
(b) Age-race-sex-specific o/e rates of marriage/union formation and dissolution	Pooled NSFH, NSFG, CPS, SIPP data sets, see Zeng et al. (2005).
(c) Age-race-parity-specific o/e rates of marital and non-marital fertility	
(d) Age-race-sex-specific net rates of leaving the parental home, estimated based on two adjacent census micro data files and the intra-cohort iterative method (Coale,1984; 1985; Stupp, 1988; Zeng, Coale et al., 1994).	2000 and 1990 census micro data files
(e) Age-sex-specific rates of emigrants to the rest of the world and immigrants from the rest of the world.	Census Bureau

(3) Demographic summary measures for the nation and states, not necessary for small areas

Contents of the data	Main data resources
(a) Total Fertility Rates (TFR) by parity	Census Bureau & National Center on Health Statistics
(b) Life expectancies at birth	
(c) Total numbers of male and female migrants	
(d) General rates of marriage and general rates of divorce	Based on vital statistics and pooled survey data sets
(e) Mean age at first marriage and births	
(f) General rates of cohabiting and general rates of union dissolution	

1.6. VALIDATIONS OF ProFamy MODEL: Projecting U.S. households from 1990 to 2000 and compare to the 2000 census observations

Table 4 A comparison between ProFamy-projected and census-observed households and Population in 2000, United States

	Census observation	ProFamy Projected Number or %	Diff.%	CB Projected (headship) Number or %	Diff.%
Total number of households	105,480,101	105,266,104	-0.2	103,245,963	-2.1
Average households size	2.59	2.54	-1.9	2.62	1.2
% married couple household	51.66	52.81	2.23	53.75	4.0
% cohabiting couple household	1.95	1.98	2.0	NA	NA
% living in group quarters	2.76	2.71	-2.0	NA	NA
% of cohabiting partners	1.95	1.80	-7.5	NA	NA
% of 1 person households	25.82	25.04	-3.0	NA	NA
% of 2 person households	32.63	33.38	2.3	NA	NA
% of 3 person households	16.53	18.25	10.4	NA	NA
% of 4 person households	14.20	14.05	-1.0	NA	NA
% of 5+ person households	10.83	9.28	-14.3	NA	NA

Table 4.   A comparison between ProFamy-projected and census-observed households and Population in 2000, United States--Continued

	Census observation	ProFamy Projected Number or %	Diff.%	CB Projected (headship) Number or %	Diff.%
Total population size	281,421,906	276,351,300	-1.8	NA	NA
% among total population					
Children age<18	25.69	25.32	-1.4	NA	NA
60+	16.27	16.9	3.8	NA	NA
65+	12.43	13.2	4.7	NA	NA
80+	3.26	3.59	10.0	NA	NA
Dependent ratio of children	0.42	0.41	-1.2	NA	NA
Dependent ratio of old	0.20	0.21	4.5	NA	NA
Dependent ratio of children and old	0.62	0.62	0.6	NA	NA

**Figure 2. Comparing the total population sizes projected by the Census Bureau and ProFamy**
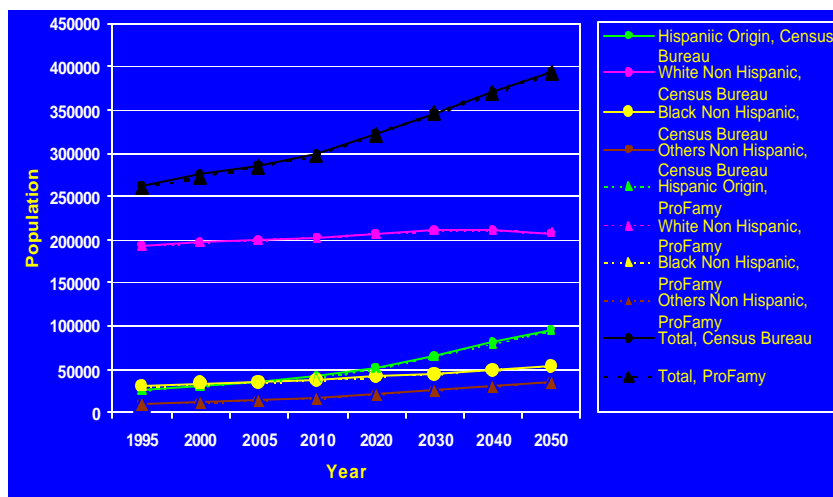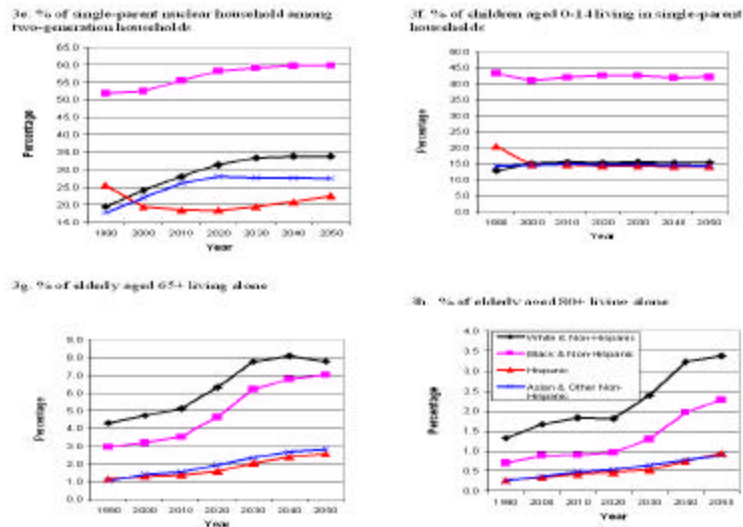
2. Illustrative Applications
2.1. Family Household Momentum and Enormous Racial Differentials in Family Households Dynamics

- ✸ Under the medium (constant) scenario with everything (marriage union formation and dissolution, fertility, mortality, migration, etc.) after 2000 assumed to remain the same as in 2000, the proportion distributions of household types/size and living arrangements of the elderly change considerably until 2020 or so and remain stable afterwards

- ✸ Why? Family household momentum (similar to population momentum) plays an important role: the older cohorts, who had more traditional family patterns, will be replaced by the younger cohorts with modern family patterns.

Figure 3.   Racial differentials of households and living arrangements based on medium forecasts

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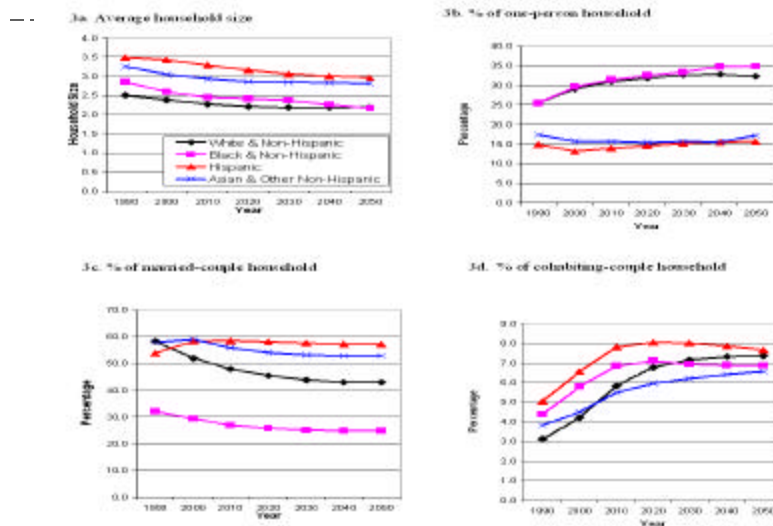
Figure 3.   Racial differentials of households and living arrangements based on medium forecasts--continued

3e. % of single-parent nuclear household among two-generation households

3f. % of children aged 0-14 living in single-parent households

3g. % of elderly aged 65+ living alone

3h. % of elderly aged 80+ living alone

2.2. Low and High Boundaries of Households and Living Arrangements Projections

* The smaller family scenario assumes that, as compared to the medium forecasts, the general rates of divorce and union break are higher by 15% in 2020 and 25% in 2050; the general rates of marriage and cohabitation are lower by 15% in 2020 and 25% in 2050; it employs the low fertility, low mortality, and high international net migration adopted by the Census Bureau.

* Such a combination of the demographic rates may result in the low boundaries of household size and percents of married or cohabiting couple households, and the high boundaries of percents of one-person households, single-parent households and children living with a single-parent, etc.

Low and High Boundaries of Households and Living Arrangements Projections (continued)

* The Larger family scenario assumes that, as compared to the medium forecasts, the general rates of divorce and union break are lower by 15% in 2020 and 25% in 2050; the general rates of marriage and cohabitation are higher by 15% in 2020 and 25% in 2050; it employs the high fertility, high mortality, and low net international migration adopted by the Census Bureau.

* This combination may result in the high boundaries of household size and percents of married or cohabiting couple households, and the low boundaries of percents of one-person households, single-parent households and children living with a single-parent, etc.

Figure 4. Low and high boundaries of households and living arrangements projection, based on medium forecasts and the smaller and larger family scenarios
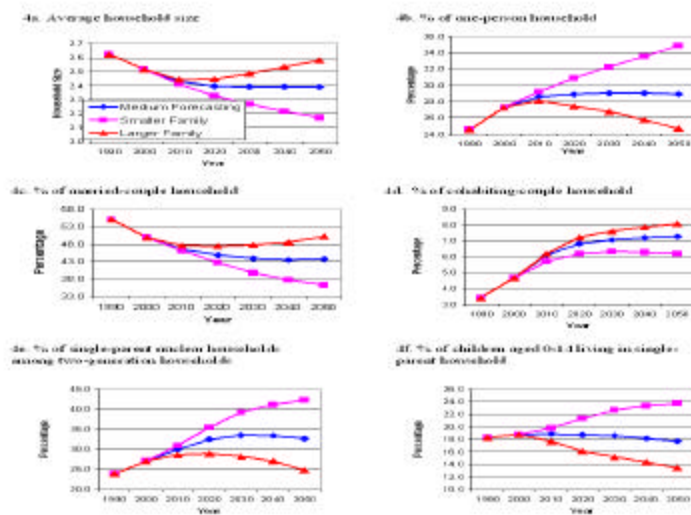
Figure 5. Low and high boundaries of households and living arrangements projection, based on medium forecasts and the smaller and larger family scenarios -continued
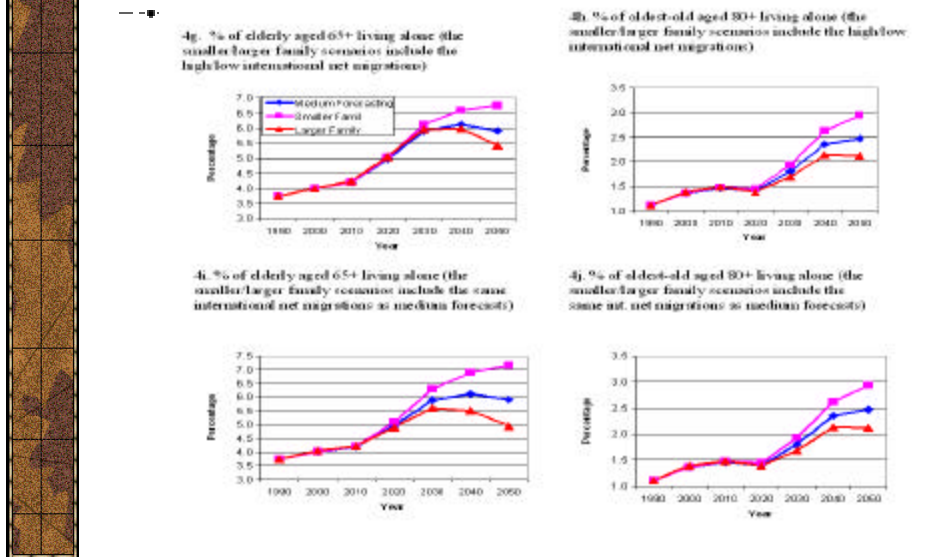

Table 5. Projected possible ranges of the numbers of households by types as well as total numbers of elderly living alone and children living in single-parent households (unit: million)

Year	Number of households					Elderly living alone		Children living in single-parent households
	Total	One-person	Single-parent	Cohabiti ng-couple	Married-couple	Age 65+	Age 80+	
1990	92	22.6	9.5	3.1	50.7	9.3	2.8	9.8
2000	106	28.9	12.3	4.9	53.0	11.0	3.7	11.0
2010	118-123	33.2-35.7	13.7-15.2	6.9-7.4	56.3-56.5	12.6-12.7	4.4-4.5	10.8-12.1
2020	127-140	34.9-43.3	14.7-18.8	8.7-9.3	59.9-61.0	16.2-16.9	4.6-4.8	10.9-13.8
2030	134-158	35.7-50.9	15.3-22.6	10.0-10.5	62.8-65.3	20.4-22.6	6.3-6.8	11.2-15.3
2040	139-175	35.7-58.7	15.9-25.6	10.9-11.6	661.-70.0	21.7-26.5	8.6-9.9	11.4-16.3
2050	145-193	35.7-67.1	15.5-28.0	11.7-12.6	69.8-75.9	21.0-29.3	9.3-11.7	11.7-17.4

2.3. Housing Consumption Forecasts for NC state ,Triangle area and city of Chapel Hill

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The basic demographic of NC State, Orange and Chatham counties and Chapel Hill, 2000

	population	households
● Chapel Hill	48,715	17,807
▮ Orange county	118,227	45,863
▮ Chatham county	49,329	19741
NC State:	8,049,313	3,132,013

2. Recent trend of housing markets in NC State

- 1990-2000, NC gained 0.46 million homeowners (an increase of 27%) and 0.15 million renters (an increase of 20%).
 ---- The increases in both owned and rented housing units from 1990 to 2000 rank among the top five in the nation.

- Homeownership rate for Orange and Chatham counties in 2000 : 63.5% growth rate in 1990s higher than NC statewide

- Homeownership rate for Chapel Hill Town in 2000 was 42.9%, gained more than a 36% increase in 1990-2000, nearly 10% more than the state average. The rental housing units in 2000 had a 24% increase over 1990, 4% more than the state average.

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3. Analyses of housing survey data in the U.S. have consistently shown the close relationship of household characteristics such as age, race/ethnicity, and household type/size/income with housing consumption (e.g., Berson and Neely, 1997; Berson et al., 2005; JCHSHU, 2004; Smith, 2005; U.S. Census Bureau, 2005).

---- demographic structure and magnitude of the population and households could reshape the housing market

Some approaches used in the literature

--- Most existing housing forecasts are based on the classic headship-rates and population projection disaggregated by age-gender. ***The headship-rate method is not linked to demographic rates and projects a few household types without size.***

--- very few previous studies have attempted to forecast future housing consumption by detailed household characteristics.

New methods in household forecasting

■ **ProFamy method:**

--- Demographic rates as input and projects more detailed household characteristics of type, size, age, race, etc. (Zeng, Vaupel, and Wang, 1997; 1998; Zeng, Land, Wang, and Gu, 2005a; 2005b).

--- Methodological background, accounting equations, validations (Zeng et al., 1997; 1998; Zeng et al., 2005a; 2005b) .

Table 7. A comparison of the main indices of households between our forecasts from 1990 to 2000 and census observations in 2000, North Carolina and Triangle Area

	North Carolina				Triangle Area		
	Census	ProFamy	Diff.%		Census	ProFamy	Diff.%
Total number of household	3,132,013	3,153,855	0.7	Total number of household	214,363	216,945	1.2
Average Household Size	2.48	2.49	0.3	Average Household Size	2.42	2.44	0.9
Percent of				Percent of			
1 person only	25.39	26.41	4.0	1 person only	27.69	28.15	1.7
2 -3 persons household	52.78	51.24	-2.9	2 -3 persons household	52.21	50.12	-4.0
4-5 persons household	19.08	19.67	3.1	4+ persons household*	20.10	21.73	8.1
6+ persons household	2.75	2.69	-2.1				
couple household	57.12	56.66	-0.8	couple household	52.02	50.68	-2.6
Total population size	8,049,313	8,097,882	0.6	Total population size	541,922	551,162	1.7
Group quarter residents	253,881	253,646	-0.1	Group quarter residents	23,235	21,252	-8.5

Notes: * Due to the sample size limitation of the census 5% micro data, we currently group households of size 4,5,6+ into one category of size 4+ for the small areas.

Data, estimates and assumption to forecast housing consumption in this study

--- Age: <35, 35-64, 65-79 and 80+.

--- Sex:

--- Race: White-NH, Black-NH, Hispanic, Others-NH (see census bureau)

--- Household type/size
   (1) single-man only; (2) single-woman only; (3) a single-man & children/other, size 2-3; (4) a single-man & children/other, size 4+; (5) a single-woman & children/other, size 2-3; (6) a single-woman & children/other, size 4+; (7) a couple only; (8) a couple and children/other, size 3-4; (9) a couple and children/other, size 5+; (10) men living in group quarters; (11) women living in group quarters.

--- Household income (top 25%, middle I 25%, middle II 25%, bottom 25%)

Data, estimates and assumption to forecast housing consumption in this study (cont'd)

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Homeownership rates and home-renter rates: classified by income, household type/size and age/race of the householder, with exactly the same categorization as that for the households.

Homeownership rates by housing units: 0-2 bedrooms (0 bedrooms means that the bed is in the living room), 3 bedrooms, and 4+ bedrooms.

Base-year Data: 2000 census and ACS data are used to estimate age-race-sex-household type/size-income specific homeownership rates in the future years.

Assumptions: Age-sex-race-household type/size-income-specific homeownership rate constant—medium forecast

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Mainly results for housing forecasts

Forecasted numbers of owned-housing units by the number of bedrooms in 2015, and the increases in 2015 as compared to 2005

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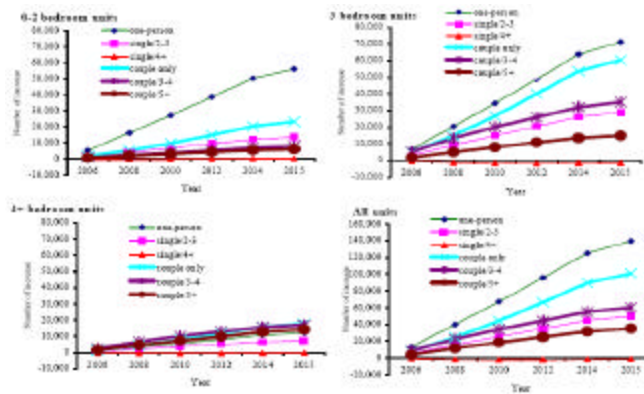|	All		0-2 bedrooms		3 bedrooms		4+ bedrooms	
	Number	%	Number	%	Number	%	Number	%
NC								
2005	2,349,556	100.0	557,089	23.7	1,355,798	57.7	436,670	18.6
2015	2,734,112	100.0	664,810	24.3	1,564,289	57.2	505,013	18.5
# Inc.	384,556	100.0	107,721	28.0	208,491	54.2	68,343	17.8
% Inc.	16.4		19.3		15.4		15.7	
Orange & Chatham Counties								
2005	43,233	100.0	9,354	21.6	23,684	54.8	10,195	23.6
2015	50,583	100.0	11,161	22.1	27,462	54.3	11,957	23.6
# Inc.	7,347	100.0	1,807	24.6	3,778	51.4	1,762	24.0
% Inc.	17.0		19.3		16.0		17.3	
Chapel Hill								
2005	8,246	100.0	NA	NA	NA	NA	NA	NA
2015	9,662	100.0	NA	NA	NA	NA	NA	NA
# Inc.	1,416	100.0	NA	NA	NA	NA	NA	NA
% Inc.	17.2							

Note: (1) # Inc. and % Inc. refers to the number and % of increase in owned-housing units in 2015 as compared to 2005. (2) Forecasted numbers of owned-housing units are also available for each of the years between 2005 and 2015, but they are not presented in the tables due to space limitations. (3) NA: baseline data are not available.

Forecasted total numbers of rental housing units in each year 2005-2015 and the percent of cumulative increase as compared to 2005

Year	NC		Orange & Chatham Counties		Chapel Hill	
	Number	% Inc.	Number	% Inc.	Number	% Inc.
2005	1,031,567	--	29,226	--	12,176	--
2006	1,050,522	1.8	29,683	1.6	12,299	1.0
2008	1,088,436	5.5	30,755	5.2	12,650	3.9
2010	1,129,870	9.5	31,993	9.5	13,109	7.7
2012	1,171,921	13.6	33,226	13.7	13,595	11.7
2014	1,211,131	17.4	34,311	17.4	13,995	14.9
2015	1,231,127	19.3	34,822	19.1	14,176	16.4

Note: % Inc.: % of cumulative increase as compared to 2005.

Forecasted cumulative increase of owned-housing units as compared to 2005 by household type/size, NC

Note: Single/2-3 and single/4+ refer to single-parent households of size 2-3 and 4+; couple/3-4 and couple/5+ refer to couple-households of size 2-3 and 5+.
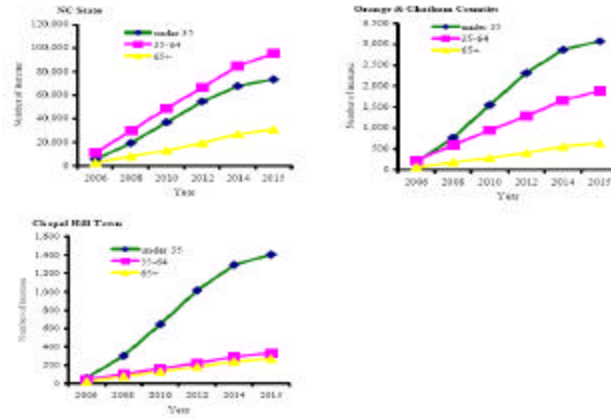
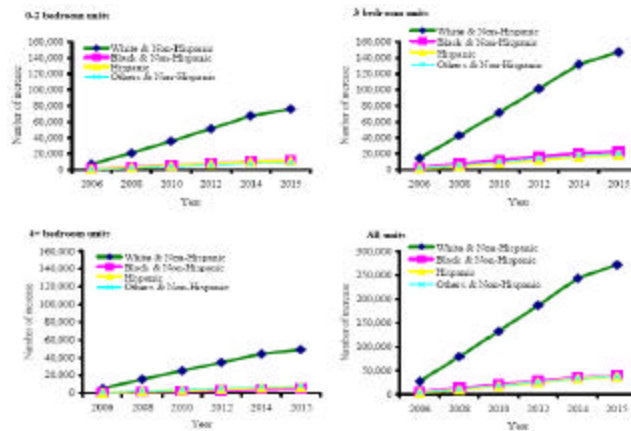Forecasts of cumulative increase in rental housing units by household type/size, as compared to 2005
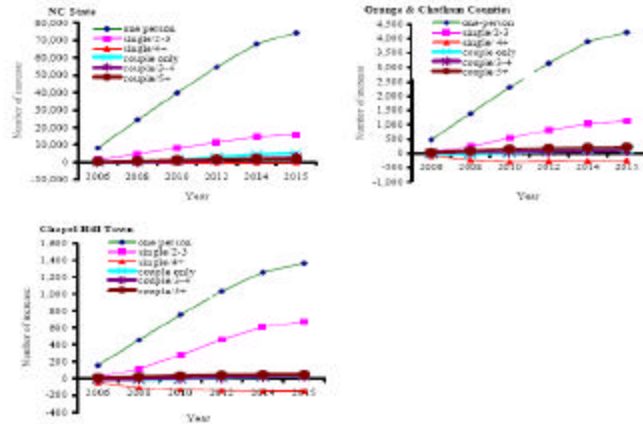
Forecasts of the cumulative increase in owned-housing units by the age of the reference person, as compared to 2005
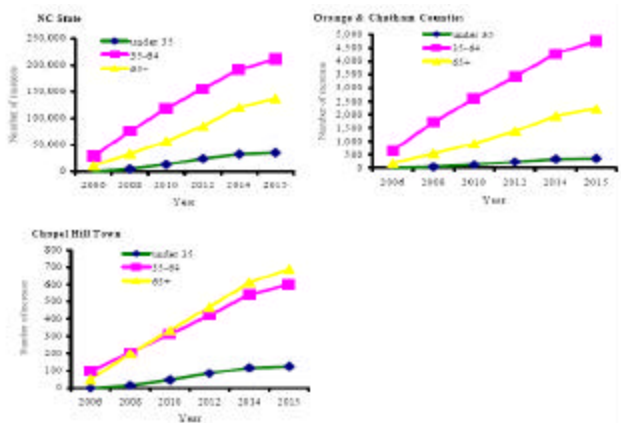
Forecasts of the cumulative increases in rental housing units
by the age of the household reference person, as compared to
2005

Forecasts of the cumulative increase in owned-housing units
by race as compared to 2005, NC State

Forecasts of the cumulative increases in owned-housing units by household income in 2015, as compared to 2005

	Total		0-2 bedrooms		3 bedroom		4+ bedrooms	
	# Cum. Inc.	%	# Cum. Inc.	%	# Cum. Inc.	%	# Cum. Inc.	%
NC								
High income	118,171	30.7	14,540	13.5	63,767	30.6	39,864	58.3
Medium income	192,402	50.0	59,695	55.4	109,694	52.6	23,013	33.7
Low income	73,983	19.3	33,486	31.1	35,031	16.8	5,466	8.0
Total	384,556	100.0	107,721	100.0	208,492	100.0	68,343	100.0
Orange & Chatham Counties								
High income	2,584	35.2	240	13.3	1,168	30.9	1,176	66.7
Medium income	3,952	53.8	1,186	65.6	2,207	58.4	559	31.7
Low income	811	11.0	381	21.1	402	10.7	28	1.6
Total	7,347	100.0	1,807	100.0	3,777	100.0	1,763	100.0
Chapel Hill								
High income	637	45.0	NA	NA	NA	NA	NA	NA
Medium income	684	48.3	NA	NA	NA	NA	NA	NA
Low income	95	6.7	NA	NA	NA	NA	NA	NA
Total	1,416	100.0	NA	NA	NA	NA	NA	NA

Note: (1) # Cum. Inc.: cumulative increases in housing units in 2015 as compared to 2005. (2) NA: baseline data for the forecasting are not available.

SUMMARY & CONCLUDING REMARKS of housing forecasts

- This study has conducted a projection for household and housing consumption for NC State, its two counties, and one town from 2005 to 2015 using ProFamy method.

- 16-17% increase in owned-housing units and 16-19% increase in rented housing units from 2005 to 2015 for NC.

- Growth of owned housing units with 0-2 bedrooms is faster than that of units with 3+ bedrooms.

- Number of low income households will grow slightly faster than those of high and medium income households.

- Increase in owned-housing units in NC will be dominated by White & Non-Hispanics (70% of the total increase), but Hispanics is the fastest (80% increase).

## SUMMARY & CONCLUDING REMARKS of housing forecasts

- Largest increases in smaller housing units will be from single-person-only households.

- Increase in rental housing units is almost exclusively consumed by one-person-only households and non-couple households of size 2-3.

- "aging of owned-housing market" is striking

- Headship-rate method will substantially bias the forecasts of both the owned-housing market and rental housing market

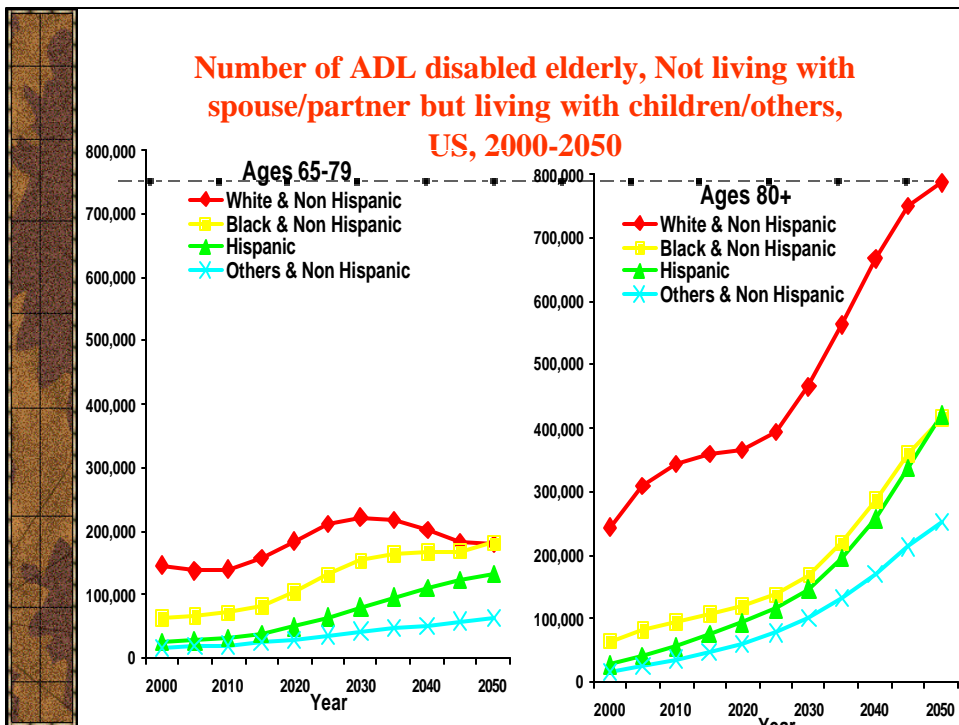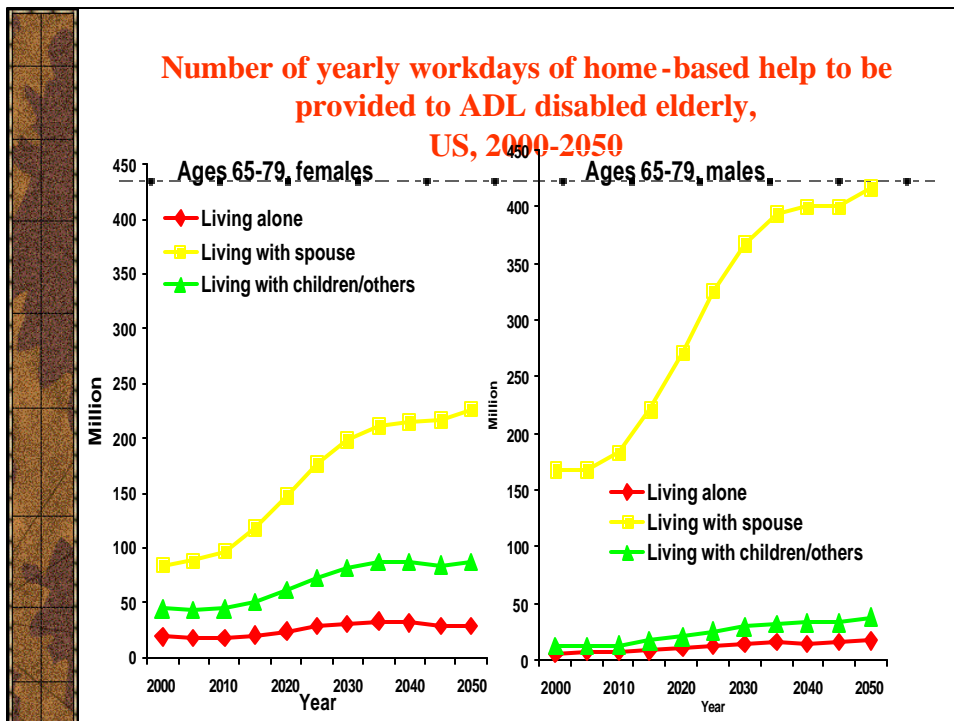## 2.4. Forecasts of ADL disabled elderly for US and the state of Minnesota

Number of ADL disabled elderly Living alone, US, 2000-2050

Ages 65-79

Ages 80+

White & Non Hispanic
Black & Non Hispanic
Hispanic
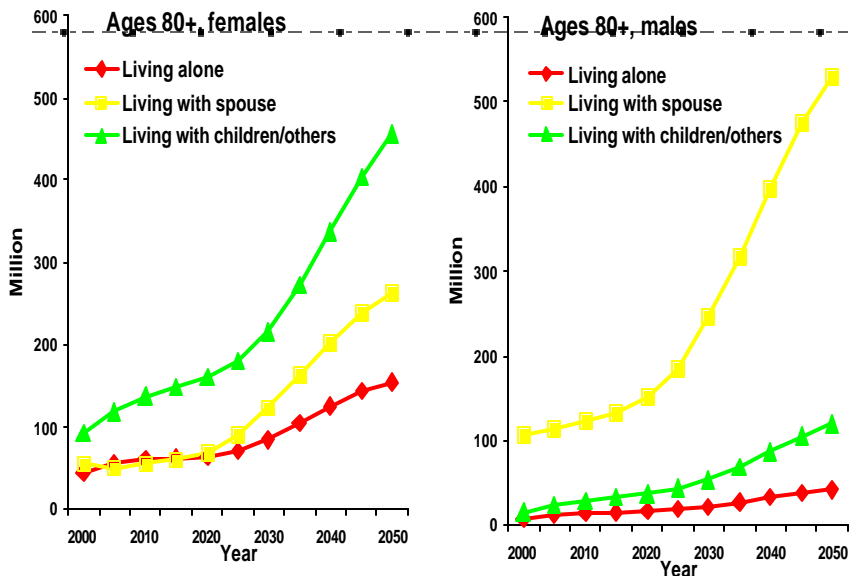Others & Non Hispanic
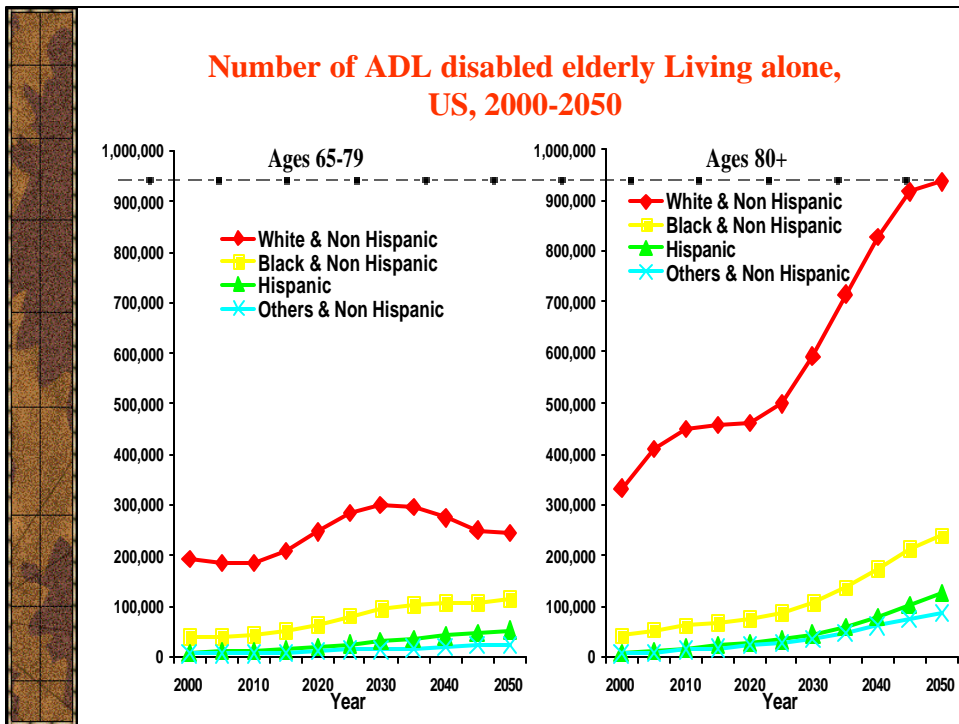
Number of ADL disabled elderly, Not living with spouse/partner but living with children/others, US, 2000-2050

Ages 65-79

Ages 80+

White & Non Hispanic
Black & Non Hispanic
Hispanic
Others & Non Hispanic

Number of ADL disabled elderly, Living with spouse/partner/other, US, 2000-2050

Ages 65-79 / Ages 80+

Legend: White & Non Hispanic; Black & Non Hispanic; Hispanic; Others & Non Hispanic

Number of yearly workdays of home-based help to be provided to ADL disabled elderly, US, 2000-2050

Ages 65-79, females / Ages 65-79, males

Legend: Living alone; Living with spouse; Living with children/others

Number of yearly workdays of home-based help to be provided to ADL disabled elderly, US, 2000-2050

Ages 80+, females

- ◆ Living alone
- ■ Living with spouse
- ▲ Living with children/others

Million

600 500 400 300 200 100 0

2000 2010 2020 2030 2040 2050

Year

Ages 80+, males

- ◆ Living alone
- ■ Living with spouse
- ▲ Living with children/others

Million

600 500 400 300 200 100 0

2000 2010 2020 2030 2040 2050

Year

Total yearly payments of home-based help to be provided to ADL disabled elderly, US, 2000-2050

Ages 65-79, females

Million

$3,000 $2,500 $2,000 $1,500 $1,000 $500 $0

2000 2010 2020 2030 2040 2050

Year

Ages 65-79, males

- ◆ Living alone
- ■ Living with spouse
- ▲ Living with children/others

Million

$3,000 $2,500 $2,000 $1,500 $1,000 $500 $0

2000 2010 2020 2030 2040 2050

Year

27

Total yearly payments of home-based help to be provided to ADL disabled elderly, US, 2000-2050

Thank you!

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