Projections of Elderly Disability, Care Needs, and Care Costs for the States of California, Florida Minnesota, and North Carolina- A Pilot Study

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Abstract: Based on available demographic data and data on disability and care needs derived from the 2000 and 1990 censuses micro datasets and using the ProFamy method/software for households and consumption forecasting, we present projections of number of self-care disabled elderly and care needs by age, race and living arrangement from 2000 to 2050 for California, Florida, North Carolina, and Minnesota. These four states are chosen since they represent four typical types of regions with different race compositions, degree in population aging and economic development levels. Three scenarios (high, medium and low) of disability trends have been conducted based on the medium scenario of household projection. While there are many similarities in the future trend of care needs across the states, the cross-state differentials are notable. Discussion for such cross-state similarities and differentials are presented. We also discuss the policy implications on socioeconomic planning of future elderly care needs.

Key words: Elderly, Disability, Home-based Care, Care Need, Care Cost, Projection

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INTRODUCTION

It is projected that the old Americans aged 65 and over will climb to 86.7 million in 2050, 2.5 times larger than in 2000 and much faster than population as a whole. The most significant growth will be among the oldest seniors aged 85 or older who have the greatest probability of using long-term care. The share of the oldest-old among population will hit 5.0% in 2050, tripling than in 2000(Census Bureau 2004). This surge will probably produce a similar increase in the demand for long-term care (LTC) services, i.e., the personal assistance that enables people who are unable to perform basic activities of daily living (ADL) such as eating, bathing, and dressing (Congressional Budget Office 2004). This trend, accompanied by the decline in informal care resources resulted from reduced family size and increased proportion of women in the labor force (Boaz and Muller 1992), raises doubts about sustainability of the current distribution of LTC financing and the incentives for the increased demand for long-term care without heightening budgetary strains (CBO 2004). According to CBO projection, the total LTC expenditures for seniors (including government and private spending but not the value of donated care) in 2000 was about $125.5 billion in 2000 (1.3 percent of GDP), or roughly $15,000 per impaired senior, and it will climb to $346 billion (in 2000 dollars) in 2040.

Although the growth in the aged population may have the most powerful demographic effect on future demand for LTC and on LTC spending, other trends could also play a role. For example, a decline in the prevalence of ADL disability could slow the growth of LTC spending. Indeed, the prevalence of disability among American seniors has fallen with six percent per decade from 1910-1980 and one percent per year since 1980s (Costa 2000; Manton and Gu 2001). However, one recent study projects that the currently declining trend in the prevalence of impairment among seniors will reverse in the future, leading to greater rates of institutionalization than those that prevail today (Lakdawalla et al. 2003). These conflicting trends suggest that projecting the prevalence of impairment in future years and thus LTC care needs and costs are both difficult and subject to a high degree of uncertainty.

Yet, despite that uncertainty, the expected increase in the number of seniors as the baby boomers age is so great that spending on LTC is likely to rise over time because the number of impaired seniors will grow even if the prevalence of impairment declines. Spending could be even higher if, as some researchers believe, the prevalence of impairment actually increases in the future.

Providing the fact that geographic diversity in demographic dynamic changes and trends in the Unites States is substantial, and the fact that the some LTC programs and policy formulations are heavily rely on local conditions, environments, and profiles of the targeted population in each state, projections for the disability, care needs, and care costs of the elderly by state would be more informative to both state governmental planning and business marketing strategies. This study aims to project number of elderly population in disability, their care needs and costs by California, Florida, Minnesota, and North Carolina in the United States from 2000 to 2050.

LITERATURE REVIEW

Growing evidence has shown that functioning disability in ADL among old Americans has steadily declined since 1990s although the number of old population in ADL disability is increasing (Freedman et al. 2004). Research further shows that about three of fourth of those disabled elders living community in the U.S. receive long-term care (LTC). The average of number of hours of receiving caregiving was 21.6 hours per week in 1994 with 58% receiving less than 24 hours, 10%

receiving more than 57 hours, 15% having needs but never receiving any service (Liu, Manton, and Aragon 2000).

Care needs vary across individual demographics, socioeconomic status. For instance, elderly women, regardless of their marital status, receive 60% of hours provided by family that elderly men receive, but no gender difference is observed in receiving social services (Katz, Kabeto, Langa 2000). Although the African Americans have more care needs on average and receive more family cares than their White counterparts, they receive much less social services (Mui and Burnette 1994; Chadiha et al. 1995). According to the NLTCS, Hispanic and Asia Americans also receive more family cares than the White (Gu, Wang, and Zeng 2005a). Amount of care needs is highly associated with functional status. Those who are disabled in instrumental activities of daily living receive 12 hours per week, while those who are disabled in five ADLs receive 60 hours per week (Liu et al. 2000). Although the low cognitive function increases the use of social services (Kemper 1992), there is no clear-cut pattern between cognitive functions since such care needs are more likely determined by living arrangement (Bass, Looman, and Ehrlich 1992) and availability of family caregiving resources (Lawton et al.1992). The care needs are also related to program services available, requirements, and region (Kenney and Dubay 1992).

Out of $135 billion of the total expenditure of LTC for the elderly in the US in 2004, $92.4 billion was for nursing home and $42.5 billion for home-based and community-based services (CBO 2004). The average health care expenditure among Medicare enrolees in 2001 was $10,000 with the black consuming the highest. The nursing home expenditure reached $47,000, five times more than those living in community. Some research further reports that the total health care expenditure in the rest of life for a person aged 65 is around $19,000, equal to 60% of whole life-time healthcare expenditure; and the healthcare expenditure in for a persons aged 85 is $11,000, equal to 35% of his/her lifetime expenditure (Alemayehu and Warner 2004). The monthly home-based care costs in 1994 was $250 for an old person aged 65, while it is $272 for a person ages 75, $260 for an elderly women, $320 for an old person living alone, $255 for a senior living in urban, and $578 for those who have 3 or more ADL disabled. Around 60% of those elderly paid full or partial cost by themselves (Liu et al. 2000).

There is a decline trend in both care needs and care costs. For example, the weekly home-based caregiving hours was reduced from 28.7 in 1989 to 21.6 in 1994 (Liu et al. 2000) and to 18.1 in 1999 (Gu et al. 2005a). In spite of decline in care needs, the care costs increase steadily. Some studies have reported that the average care cost per disabled elderly increased from $396 in 1995 to $445 in 2000 (Gibson, Gregory, and Pandya 2003). The out-of pocket care costs for those whose ADL were severely impaired increased from 1989 to 1994 (Liu et al. 2000) although the average out-of-pocket cost was declined in the same periods (Liu et al. 2000). Indeed, the proportion of out-of-pocket is increasing since 1980s, and the numbers of elder persons needing care is increasing. Home health care costs grew 90.7% from 1990 to 1995, in contrast to a 33.4% increase for institutional care costs (Stallard 2000). Thus, the mix of home-based and institutional care has been rapidly shifting towards home health care, especially for the oldest elderly (Cutler and Meara 1999). Lakdawalla and Philipson (2002) show that the faster increase of male elders will relatively reduce the need for institutional elder care as the supply of spousal care increases.

Various nationwide surveys and census show large variations of the prevalence of disability among elders across states (e.g., decennial population census and annual American Community Survey, Census Bureau 2004). The difference in population aging trend across states is substantial (Census Bureau 2005). State variations in home health care are also well-documented (e.g., Cohen and Tumlinson 1997). Thus, state-specific projections for disability, care needs and costs are preferable whenever possible.

In perspective of forecast methodology of elderly disability, some studies based on population projection in combination of using the assumed age-sex-specific (or age-sex-race-specific) disability rate, as most actuarial models do (Bhattacharya et al. 2004), while others used cohort methods combining with regressions. For example, Bhattacharya et al. (2004) used estimated age-specific disability incidence rate projected the elder population with disability at each age. On the other hand, Lakawalla et al. (2003) forecasted the nursing home population after considering effects of gender, ethnicity, marital status, education, number of surviving children, health practice, and diseases obtained from regressions. One study incorporates information about disability among today's younger generations in cost forecasts since the disability among the future elderly may increase (Bhattacharya et al. 2004). Some scholars used structural models for disability as a function of demographic characteristics, lifestyle behaviors, and risk factors to forecast the future disability status of the elderly (see Manton, Singer, and Suzman 1993). However, performance such forecasts needs to develop forecasts first for factors that affect the disability, which is very complicated and thus not feasible and might lead to forecast instability (Lee and Miller 2002). Some recent studies attempt to include the possible effects of policy/programs on the future expenditure forecast (e.g., Heffler et al. 2005). Some authors also used stochastic forecasting to project Medicare spending in future years based on probabilistic population projection and estimated Medicare spending (Lee and Miller 2002).

However, one shortcoming in existing forecasting models is ignorance of living arrangements of the elders. A bulk of empirical research has established that living arrangement is the major determinant of the amount and type of long-term care for the elderly (e.g., Chappell 1991; Morris Caro, and Hansan 1998; Soldo, Wolf, and Agree 1990). In particular, the use of institutional long-term care has been shown to vary by family status (Breeze, Sloggett, and Fletcher 1999; Freedman 1996). It follows that more accurate and reasonable forecasts of disability, and care needs/costs should integrate living arrangements in addition to other basic demographic characteristics.

The ignorance of living arrangement or household structure of the elderly population is due to lack of reliable household projection methods. Currently, the classic headship-rate method is the most commonly used approach for households and living arrangement forecasting since it is the simplest. However, the classic headship rate method only produces very limited household types without size, which could not well-adequately meet the requirement for the study of care needs and costs. Zeng and colleague (1997; 1998; 2005; 2006) developed a new method/software known as ProFamy that requests only the conventional data that are available from ordinary surveys, vital statistics, and censuses. In contrast to the other household projection macro-models, which select the household as the basic unit, ProFamy method selects the individual as the basic unit of the household projection model. All individuals of the starting population derived from a census are grouped and projected forward by age, sex, race (optional), marital/union status, parity, number of co-residing children and parents, rural or urban (optional), and whether living in a private or institutional household. ProFamy uses demographic rates as input and forecasts much more detailed household types and sizes, and living arrangements for all members of the population (Zeng et al. 2005; 2006). The testing projection from 1990 to 2000 using ProFamy and based on observed U.S. demographic rates before 1990 shows the discrepancies between the projections and census observations in 2000 for nation, three states, and one small area are reasonably small, which validates the new method (see Zeng et al. 2005; 2006).

To date, with the looming retirement of the baby boom generation in the United States in the coming years, the number of Medicare beneficiaries will increase substantially (Moon 1999). Equipped with new household projection method, this study attempts to forecast the number of elders with disability, their care needs and costs by California, Florida, Minnesota, and North Carolina from 2000 to 2050. This study is another application of the ProFamy method in addition to

previous applications in automobile (Zeng et al. 2005), housing (Wang, Gu, and Zeng 2006), and energy consumptions (Dalton et al. 2005).

METHODS

1. Data

We conduct the projection of disability, care needs and costs for the elderly for four states based on 2000 census 5% micro dataset, the annual American Community Survey from 2000 to 2004, and the National Long Term Care Survey in 1999. The age-sex-race-specific household distribution including marital status at base-year is adjusted to the 100% distribution according to the corresponding 100% aggregated census data for each state. To make household projection using ProFamy method/software, we need following standard schedules and summary measures. Standard schedules include race-sex-age-specific marriage/union formation and dissolution, children leaving parental home, domestic out-migration o/e rate, domestic in-migration and international net migration frequencies, and race-age-parity-specific marital and non-marital fertility o/e rates. Summary measures consist of total fertility rate, life expectancy at birth, the number of migrants, mean age at first marriage, mean age at birth, general marriage rate, and general divorce rate. The following sections discuss how we estimate standard schedules and summary measures and set other assumptions in this study.

2. Household forecast assumptions

2.1. Assumptions for race-sex-age-specific standard schedules of demographic rates

Data for estimating race-sex-age-specific standard schedules of occurrence/exposure (o/e) demographic rates are not available at state level. We, therefore, employ the national race-sex-age-specific standard schedules of occurrence/exposure (o/e) rates of marriage/union formation and dissolution, race-age-parity-specific o/e rates of marital and non-marital fertility, and race-sex-age-specific net rates of leaving the parental home, race-sex-age-specific international net migration frequencies, as model standard schedules, for our households forecasting in four states. The national standard schedules are estimated from the pooled data sets of NSFH, NSFG, CPS, and SIPP surveys conducted in the 1990s and the early years of the first decade of the 21st century, which has been described elsewhere (Zeng et al. 1997; 1998; 2005; 2006), therefore, they are not presented here. Using national schedule for each state is well justified, because the demographic summary measures are crucial, but the age-specific model standard schedules are not substantially sensitive to the forecasting results as long as it reveals the general age pattern of the demographic process of the population. Please see relevant validation for this assumption else where (e.g., Zeng et al. 2005; 2006).

Based on the 2000 census 5% micro data sets, we estimate race-sex-age-specific probabilities of domestic emigration to other states for each state and race-sex-age-specific frequencies of immigration from other states for each state. These rates are assumed to be unchanged in the forecasting period.

2.2. Assumptions for summary measures

Given that the NCHS releases life expectancy at birth for each state only for a limited race category, we apply a ratio of state versus nation to the national race-specific life expectancy to estimate the race-specific life expectancy at birth for each state. For life expectancy at birth in years of 2025 and 2050, we borrow them from the Census Bureau (Census Bureau 2004). But only medium scenario parameters are used in the present study and assume each state has the same growth

rate from 2000 to 2025 and from 2025 to 2050 as the whole nation. Life expectancies at birth for all other years are linearly interpolated.

TFR from 2000 to 2002 by state is estimated from state-race-specific TFR derived from the National Vital Statistics Reports (Sutton and Mathews 2004). TFR from 2003-2050 is proportionally estimated based on the medium assumptions of the Census Bureau population projection (Census Bureau 2004). More specifically, we first calculate the race-specific relative change of TFR from 2000 to 2050 based on Census Bureau medium projection. We then use this race-specific rate of change and the observed race-specific TFR in 2000 for four states to get the race-specific-TFR in year 2050 in each state. TFR for the year of 2025 is estimated using the same procedure. TFR for other years is estimated from linear interpolation. We assume the each state shares the same structure in parity-specific TFR. Although this assumption may not be very accurate, our validation using the ACS survey supports that such assumption works quite well in most of cases, especially for those states with large population size.[1]

The sex-specific mean age at first marriage for each state is estimated by multiplying a nationwide ratio of the mean age at first marriage versus the median age at first marriage for the United States to the state-sex-specific median age at the first marriage. The national data for median age at first marriage is obtained from Census Bureau (2006), while the state-specific median age at first marriage is obtained from (Johnson and Dye 2005). The national data for sex-race-specific mean age at first marriage is from Gu, Wang, and Zeng (2005b). Race-specific data for each state is estimated by multiplying a national ratio. Mean age at first marriage for forecast years is extrapolated based on regression model.

We multiply a nationwide ratio of the mean age at birth for all births combined versus the mean age at first birth for the United States to the mean age at first birth by state to obtain the state-specific mean age at birth for all births combined. The national state data are obtained from national vital statistics report (Mathews and Hamilton 2002). By assuming that each state shares the same national race-specific ratios over all races, we obtain the race-specific mean age at birth for all births combined. The mean age at birth for all births combined for forecast years are estimated from regression as for mean age at first marriage. [2]

To obtain the race-specific general marriage/divorce rates by state in 2000 and all forecast years, we first run regression for national race-specific general marriage/divorce rates with time from 1970 to 2000 from Gu (et al. 2005b). After getting the race-specific rates from 2000 to 2020 (we assume parameters constant for years beyond), we multiply state-specific ratio of marriage rate per 1000 population versus the nation to the national general marriage rate to estimate general marriage rate for each state. We assume that each race has a same ratio in all states. The same procedure is adopted to obtain the general divorce rate for each state.[3] The state-race-specific general rates of cohabitation and union dissolution rates are estimated from regressions using national data from 1970 to 2000 between general marriage rate and general rates of cohabitation and union dissolution.[4]

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[1] The relative difference between such assumption and the estimates in the ACS is less than 5% for first and second parity TFR and less than 10% for higher parity TFR. Given the unreliable estimates in some states due to small sample size in the ACS (even if we combined 5 years ACS), such an assumption is more practical.

[2] We used data from 1984 to 2000 to for mean age at first marriage and data from 1975 to 2000 for mean at birth for all birth combined linearly model their correlations with the time. The goodness of fit for regression models was quite good with R^2 larger than 0.97 in most of cases. The results based on the ratio method are very close to regression estimates.

[3] We ran regressions for general marriage/divorce rates from Gu et al (2005b) with marriage/divorce rates per 1000 population from NCHS from 1970s to 2000, we find all R^2 are larger than 0.95, indicating the validity of using marriage/divorce rate per 1000 population in estimating the general marriage/divorce rate.

[4] R^2 of all regression are larger than 0.95, indicating the consistent relationships between general marriage and general rates of cohabitation and union dissolution.

The sex-race-specific numbers of domestic immigrants and emigrants as well as the international net migrants for each state from 2000 to 2005 are derived from the ACS. The annual in- and out- domestic migration and net international migration from 2005-2050 are assumed to be the average of 2000-2005.

In order to make the study succinct, only medium household projection is conducted. The assumed demographic summary measures in the future years for four state household forecasting are not presented in the text but are available upon request.

3. Assumptions for disability, care needs and care costs

The ADL disability in the NLTCS is measured by six separate questions on six ADL items including bathing, dressing, eating, indoor transferring, toileting, and continence. According to the NLTCS definition, a person is classified as ADL disabled if he/she needs help in any one of six items for three month. In the ACS, a single question regarding these six items is used. According to the question in the ACS, a person is considered as ADL disabled if he/she have difficulty in doing dressing, bathing or getting around inside the home for six months. Although the sample size is much larger in ACS than in the NLTCS, unavailability of care needs and costs prohibits us to fully rely on the ACS. Instead, the NLTCS gathered data on number of hours of assistance relevant to ADL care per week received by ADL disabled elderly and monthly payment paid to each of helper who provided ADL care for the disabled elderly who live in community. The NLTCS also includes institutionalized persons and their care costs. However, the NLTCS didn't gather data on payment of each helper received if such a payment was included in the monthly fee for an assisted living community. Therefore, the cost of home-based care is somewhat lower than the real costs. Yet, in any case, these data provide a basic picture of care needs and care costs of current old Americans. Indeed, many crucial indicators released by governmental sectors are mainly from the NLTCS (e.g., FIFARS 2000; 2004). Therefore, we use the NLTCS as a basis to project disability and care needs and costs.

However, one shortcoming in the NLTCS is that there is no state code in released dataset to estimate state-specific disability rate, care needs and costs for each state. We, thus, have to use indirect method to estimate such data for each of four states. We first turn to the ACS and estimate a ratio of disability prevalence rate for each state versus the nation. This ratio is estimated based on logistic regressions after adjusting for demographic factors and living arrangement in the pooling dataset of ACS from 2000 to 2004. We then apply this ratio to the NLTCS data to obtain the age-sex-race-living arrangement disability rate for each state.[5] All national data on age-sex-race-living arrangement-specific disability, care needs, and care costs are borrowed from Gu et al. (2005a). By applying state ratio to the national disability data, we obtain the state-age-sex-race-living arrangement-specific disability prevalence rate. Since the ratios of state versus the nation in care needs and costs are not unavailable, we assume the care hours, and care costs for each disabled elder in four states are the same as the national figure. In the present study, care hours are converted into yearly workdays, while care costs are converted into yearly payment.

Three scenarios of disability trend in forecast years are designed. The low scenario assumes an annual decline in disability by 1% from 2000 to 2050; the medium scenario assumes an annual decline in disability by 1% from 2000 to 2020 but constant after 2020; the high scenario assumes an annual decline in disability by 1% from 2000 to 2101 but increase by 0.5% after 2010. The annual decline in disability by 1% reflects recent research outcomes (e.g., Freedman et al. 2004; Manton and

[5] Although the definition in these two surveys are different, we find that the national disability rate in the NLTCS in 1999 and the ACS in 200 are close, suggesting applying the state ratio in the ACS to the NLTCS will not cast a big bias on the estimates.

Gu 2001), while the annual increase trend by 0.5% reflects results of some studies (see Freedman, Martin, and Schoeni 2002). Please refer Table A5 in the appendix for the age-sex-race-living arrangement-specific distribution of disability prevalence rates, care needs, and care costs for each state at the base-year.

We will focus on projections of the medium scenario by various major demographic characteristics followed by brief comparisons of number of disabled elders, amount of care needs and costs across four states under three different scenarios. Unless indicated, all results and discussions in the text are from the medium scenario.

4. Categories for age, race, and living arrangement

The output of ProFamy in current version is arranged by 5-year age groups for each forecast year. To ease the discussion, we regrouped them into two broader age groups: young elders aged 65-79 and the oldest-old aged 80+. The number of race category used in our state-specific household projection is determined by the sample size in the 5% census micro dataset in 2000. To produce more reliable parameters in the projection in ProFamy, only those races with more than 10, 000 population in the 5% micro dataset are coded into a single category, otherwise, they are merged. According to this criterion, California, Florida, and North Carolina have four race categories (i.e., White Non-Hispanic, Black Non-Hispanic, Hispanic and Others Non-Hispanic), while Minnesota only has two races(i.e., White Non-Hispanic and Others) in the present study. Excluding group quarter, ProFamy produces 14 categories of household types and more than 60 categories if plus difference size. To simplify our analysis, however, we merge them into three broader types of living arrangements for the elderly living in the community: living alone, living with spouse/partner may or may not living with children/others, and not living with spouse/partner but with children/others.

5. Validation of ProFamy method

The accuracy of ProFmay in forecasting household structure has been proved to be rather good (see Zeng et al. 2006; Wang et al. 2006). This study also validates the accuracy of household projection for four states. We used parameters in 1990 census with some parameters in 1990s to "project" the household and population in 2000. After comparison with the 2000 census, we found that our projection model is good (see Table A1-A4 in Appendix).

FINDINGS

1. Growth of the elderly population

Our projections show that the numbers of total population will reach 62.2 million in California, 38.6 million in Florida, 7.4 million in Minnesota, and 16.6 million in North Carolina, respectively. The corresponding numbers in four states are 11.6 million, 8.3 million, 1.5 million, and 2.9 million for the elderly aged 65+, and 4.4 million, 3.0 million, 0.6, and 1.0 million for the oldest-old aged 80+, respectively. The annual growth rates for total population from 2000 to 2050 are around 1.2%, 1.8%, 0.8%, 1.5%, respectively; whereas the corresponding number are 2.3%, 2.2%, 1.8%, and 2.2% for the seniors aged 65+, and 3.2%, 2.8%, 2.4%, and 2.9% for persons aged 80+, respectively. Figures 1a and 1b present the proportions of the elderly aged 65+ and aged 80+ for all races combined for four states from 2000 to 2050. Both figures show that Florida has the highest proportions of the elderly aged 65+ and the oldest-old aged 80+ from 2000 to 2050 than other three states. But the difference between Florida and California and Minnesota will be narrowed in the next few decades, especially for the proportion of the oldest-old, while the difference between Florida and North Carolina will keep unchanged. Both figures further show that the proportion of the elderly population

will speedup between 2010 and 2030 when the baby boomers enter age 65 and the proportion of the oldest-old aged 80 will speedup from 2025 to 2040 when the baby boomers enter age 80.

-- Figures 1a and 1b about here--

Figure 2a shows that elderly living arrangements are similar and future growth patterns are also more or less the same across four states. In the next few decades for all four states, the proportion of elders who live alone will slightly increase, while proportions of other two living arrangements will slightly decrease. Figure 2b reveals that the racial composition among the elders across four states is different and a dramatic change will occur in the next few decades. California will experience the biggest change in racial composition among four these states. For example, White Non-Hispanic elders shared 70% of total elders in California in 2000, but it will drop down to only 33% in 2050; On the other hand Hispanic accounted 13% of total elders in California in 2000, and it will climb to 38% overtaking the White Non-Hispanic. Among four races, the share by Black Non-Hispanic elders is projected to have a minor change across states. The dramatic change in racial composition will affect the future growth of number of elders with disability, their care needs and costs in these four states.

--- Figures 2a and 2b about here--

2. Trend of number of disabled elderly

According to Table A5 there is a clear-cut difference in prevalence of disability across living arrangements among elders. Those living alone have the lowest disability rate while those living not with spouse/partner but with children and/or others have the highest rate. This pattern is the same for home-based care hours received by each of disabled elder. However, those living alone are likely to pay more for their home-based care. Racial difference in disability, care needs and costs are also noticeable. Black Non-Hispanic elders have much higher disability rate as compared to other three races; White Non-Hispanic elders are likely to have fewer care needs but their unit care payment is the highest; Others Non-Hispanic elders have the lowest disability and their unit care payment is the lowest. The institutional care costs for both Black Non-Hispanic and Hispanic elders are relatively lower than those White Non-Hispanic and Others Non-Hispanic elders. Female elders have a much higher rate in disability, higher care needs, and higher care payments than their male counterparts. On average, older elders are accompanied by the higher rate in disability, more care needs, and higher care payment. However, for institutional care cost, the differences across sexes and ages are small.

Table 1 summarizes the annual growth rate of the number of ADL disabled elders by age, sex, and living arrangement for four states from 2000 to 2050. As compared to other three states, Minnesota will witness a fastest increase among disabled elders who live in institutions, while it will have a lowest growth rate among disabled elders who living in community from 2000 to 2050 although Minnesota has the much smaller numbers in the absolute term. The state differentials in the growth pattern of the number of disabled seniors are the same across sexes and ages for both institutionalized elders and community-residing elders. However, such state differences vary across different living arrangements. Among those who live alone, California has the lowest growth rate, while Minnesota has the highest rate. Among those who live with spouse/partner and/or children/others, Minnesota has the highest growth rate, while Florida has the lowest. Among those who do not live with spouse but with children and/or others, North Carolina has the lowest growth rate, whereas California has the highest among males and Florida has the highest among females.

Table 1 also reveals several clear-cut trends from 2000 to 2050. For example, except in the case of living with spouse, elderly males will witness a higher growth rate in term of number in disability

though their number is much smaller than elderly females across four states. The disabled oldest-old will face a higher growth rate than those young disabled elders over the period of 2000-2050 for both males and females across four states; and the number of disabled male oldest-old is smaller than the number of disabled male young elders in 2000, but the former will excess the latter in 2050 for all four states.[6] The growth rate of the disabled persons who live in institutions is higher than those who live in community from both sexes and across states. The growth rate in number of disability among those living with spouse/partner is lower than other two living arrangements across sexes and states.

--- Table 1 about here--

Figure 3 shows that although there are some variations in the growth of number of disabled elderly by race across states, there is a clear consistent trend, i.e., the growth rate for White Non-Hispanic is smaller than all other races, and the growth rate is larger for Hispanic and Others Non-Hispanic than for Black Non-Hispanic in all four states. White Non-Hispanic is still dominant among the disabled population in California, Minnesota, and North Carolina in 2050, while it will not be the case in Florida in 2050 where Hispanic shares the almost same number of disabled elders as White Non-Hispanic and Others Non-Hispanic also shares more than half of the number of White Non-Hispanic.

-- Figure 3 about here--

3. Trend of Home-based Care Needs

Table 2 provides the number of yearly workdays of home-based help to be provided to the disabled elders living in community by age, sex, and living arrangement for four states. Comparisons of number of care needs across four states show that California ranks the highest in both number and growth rate while Minnesota occupies the lowest in terms of the total number of yearly workdays. The projection reveals that although female elders consume majority shares of number of yearly workdays of help due to their greater number and higher prevalence rate in disability, male elders will have a higher growth rate from 2000 to 2050 for all four states. This gender pattern is true even under consideration of age and living arrangements across states with few exceptions (among those who live with spouse/partner in CA, FL, and NC). For both sexes, the oldest-old account more number of workdays of assistance than younger elders for both sexes across four states, and this pattern is projected to continue and the shares for the oldest-old is projected to increase in the future.

-- Table 2 about here--

There is no clear consistent growth pattern in care needs across states for living arrangements. But within each living arrangement, state variation in growth is clear. Among those who live alone, North Carolina will have the highest growth rate for care needs, while Minnesota will have the lowest rate. Among those living with spouse/partner, California will witness the highest growth rate for care needs, while Florida will rank the lowest. Among those who not live with spouse/partner, California will again have the highest growth rate, and Minnesota will have the lowest rate. This state pattern within each living arrangement is valid for both males and females.

[6] According to our projection, the turning point for each state is between 2030-2035 for California, 2035-2040 for Minnesota and North Carolina. The number of disabled male oldest-old aged 80+ already exceeded the number of disabled young elders aged 65-79 in 2005.

Figure 4 shows that the racial differentials in the growth of number of yearly workdays of home-based help to be provided the disabled elders across four states are similar to that of disability. However, because the disabled Hispanic and Others Non-Hispanic receive more hours of home-based care services per disabled elder, their needs of yearly workdays of help grows much faster than the number of White Non-Hispanic. California is a good example for this trend. The number of yearly workdays of home-based help for White Non-Hispanic will be overtaken by Hispanic around 2035 and by Others Non-Hispanic in 2050.

-- Figure 4 about here--

4. Trend of Home-based Care and Institutional Care Costs

Our projection assuming same payment rate for per workday of home-based help across states from 2000 to 2050 under the medium scenario reveals that the total number of payments in California, Florida, and North Carolina will have an annual growth rate 1.9-2.1%, while Minnesota will have a relative low annual growth rate with 1.7% (see Table 3). The total amount of home-based care payment consumed by the oldest-old is larger than that by young elders, and the annual growth rate is higher among the oldest-old than young elders across four states. Although male elders share a lower proportion in total home-base care payment, they will have a higher annual growth rate for all four states.

Across four states, White Non-Hispanic elders share a much higher proportion in the payment currently due to their larger population size. However, this situation will be different in California in the future. Hispanic elders will overtake White Non-Hispanic in 2050 due to the higher growth rate of Hispanic elders and higher use of home-based care services. The annual growth rate of total home-based care payment for Hispanic and Others Non-Hispanic is much higher than those for White Non-Hispanic and Black Non-Hispanic from 2000 to 2050 with White Non-Hispanic ranks lowest across four states.

The total costs for institutional care are much higher than home-based care regardless age, sex, and race for all four states. In general, the future growth patterns are more or less similar as those projected for home-based care. The total institutional care payments grow faster than total home-based payment in any cases.

-- Table 3 about here--

5. Variations in number of disability, care needs and costs across scenarios by state

As indicated earlier, we forecast the number of elders with ADL disability, their home-based daily care needs, and costs under three different scenarios. Table 4 compares the projected results across scenarios for four states. The projections show that if the age-sex-race-living arrangement-specific prevalence rate of disability decreases 1% each year (low scenario), the number of disabled elders in 2050 will reduce by 43-45% for California, Florida, and North Carolina and by 30% in Minnesota as compared to the case if the age-sex-race-living arrangement-specific prevalence rate of disability increases 1% annually after 2005 (high scenario). As compared to the high scenario, the low scenario should reduce both the number of workdays of home-based help to be provided to the disabled elders and the amount of home-based care cost by 97%.

Compared to the medium scenario, the low scenario in 2050 projects 16-17% less disabled elders for California, Florida, North Carolina, and 11% less disabled elders for Minnesota. The low scenario also produce 35% less amount yearly workdays of home-based help to be provided to the disabled elders and 35% less amount home-based care costs for each of four states. In the case of comparison between the high scenarios and the medium scenario, the corresponding figures are 24-

25% for California, Florida, North Carolina, 17% for Minnesota for the disabled elders, and 46% in both care needs and care costs in each of four states.

-- Table 4 about here—

CONCLUDING REMARKS

Applying the ProFamy method/program, we have projected future trajectories of number of elderly in disability, their care needs and costs for California, Florida, Minnesota, and North Carolina by integrating living arrangements and demographic rates into forecast model. Our study shows that although four states share many similarities in the future trend of the elderly population with disability and the growth of care needs and costs, the cross-state differentials are notable. Population aging will increase the future number of elders with disability, thus raise the home-based care needs and payment. This is an evitable trend for each of four states. More specially, for four states by age and sex: California will witness the largest growth in number of elderly population with disability and home-based care needs/costs followed by Florida, North Carolina, and Minnesota. However, such patterns vary across four states by living arrangements and race. Although the growth of institutional care payment across four states is different from that of home-based care payment, four states have similar growth patterns for age and sex from 2000 to 2050. But such patterns are not consistent across races and living arrangements. Living arrangements and race are two important factors in determining the unique features of each state in the future trends of the number of elderly population with disability, care needs, and care costs. Furthermore, the living arrangement among different races varies. According to the literature, Hispanic and Others & non-Hispanic elderly are more likely to live with children than White Non-Hispanic and Black Non-Hispanic (Himes Hogan, and Eggebeen 1996; FIFARS 2004), whereas White Non-Hispanic are more likely to prefer living alone if they are single, or with a spouse if they are married (e.g., Treas and Torrecilha 1995). In our projection, such racial differences in living arrangement in each state will continue to hold in the future (not shown). In summary, given the same level of disability, differentials in living arrangement, racial composition, and their interactions are likely to make the distinct feature for each state although each state will face the some aging problem.

Our three scenarios for disability trajectories indicate that postpone of the onset of disability could reduce substantial care needs among the elders thus to save a huge of amount of expenditure. This is very crucial for offsetting the long-term care budget constrains for the U.S. federal and state governments and saving the LTC expenditure for those families with disabled elders. In other words, if the elderly population with disability will follow an increased trajectory in coming decades, then initiatives and development of more home-based care programs to meet the need are necessary, especially when the baby boomers enter oldest-old ages after 2025. This is particular important for California, Florida, and North Carolina given these three states will face more growth in disabled seniors than Minnesota.

By integrating living arrangements of the elderly into forecast for disability, care needs, and costs, our study will provide relative rich information for planning and marketing for both public and private sectors in each of four states. More detailed projection outputs for living arrangements of the elderly are the basis to estimate the long care and are more concrete information for problem solving, and modification of social and economic policy. These results could also provide more accurate information on care needs and guidance for planning and targeting particular community formal and informal care services. The ProFamy model and its associated software produce a large number of

living arrangements of the elderly including marital status (including cohabitation) and the number of co-residing children by race, sex, and age in each forecasting year. The detailed living arrangements produced by ProFamy are also in line with the proposal of extending the living arrangements among elderly people initiated by several studies (e.g., DeVos 2003; Zimmer 2003). We, however, have presented only the main outcomes of the general trends for each of four states in this paper mainly due to space limitations. Probabilistic forecasting in population projection to better address the future uncertainties has gained considerable attentions recently (e.g., Lutz ,Vaupel, and Ahlburg 1998; Lutz and Goldstein 2004). To our knowledge, such probabilistic projections for disability with living arrangement of the elderly, care needs and care costs are not yet available, because it includes more demographic dimensions and is much more complicated than stochastic population projection. Based on population probabilistic projection, Lee and Miller (2002) conducted stochastic forecast for health care expenditure for the United States. However, they are unable to integrate living arrangement in the model. Indeed, in their model, they only performed forecast for all races combined. These two factors are very important in forecast the health expenditure. We believe that our study based on the ProFamy software for disability forecast, care needs and care costs using conventional demographic input parameters can capture a more realistic profile of disability of the elderly in the future, which improves our knowledge of the future trend in disability of old adults, care needs and costs that are one of the central strategic plans for governmental developments to improve the quality of life of its senior citizens while do not place much jeopardy on its financial budget.

While we have integrated living arrangement of the elderly in the disability forecasts, we are aware that there are some important limitations to this study. First, our forecasts didn't distinguish the care needs and costs by state, mainly due to unavailability of data in the NLTCS. We believe that there are some stat variations in care needs and costs as indicated in some other studies (e.g., Wiener and Stevenson 1998). Based on this pilot study, we plan to add such state-specific care needs and costs into forecast model in our future more sophisticated projections. Furthermore, not all data on care costs are not collected in the NLTCS as indicated earlier, which underestimates payments for home-based care. To obtain accurate data on payment for home-base care is also a challenge in study of LTC. Second, when we design different scenarios for the future trend of disability among the old Americans, we just borrowed data before 2000 from previous empirical studies, which may not the case in the future. We will seek more scenarios for possible trajectories of disability change in the future years. Third, we didn't distinguish the impairment level of ADL disability nor distinguish its corresponding care needs/costs. Previous empirical research has established that care needs/costs vary among elders with different ADL impairment (Bhattacharya et al. 2004; Liu et al. 2000). It is likely to produce some biases into projection if we didn't distinguish the care needs/costs by the grade of ADL disability might. But we speculate such biases will not substantial since lower impairment and high impairment will offset each other. Fourth, we didn't consider the effect of changes in long-term care policy/programs. Although it is extreme difficult in forecasting economic and policy factors with reasonable accuracy (Hendershott and Weicher 2002), these factors are important in the forecasting care needs and expenditure (Heffler et al. 2005).

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Figure 1 Projected Proportion of the Elderly in Population by Age in Four States, 2000-2050

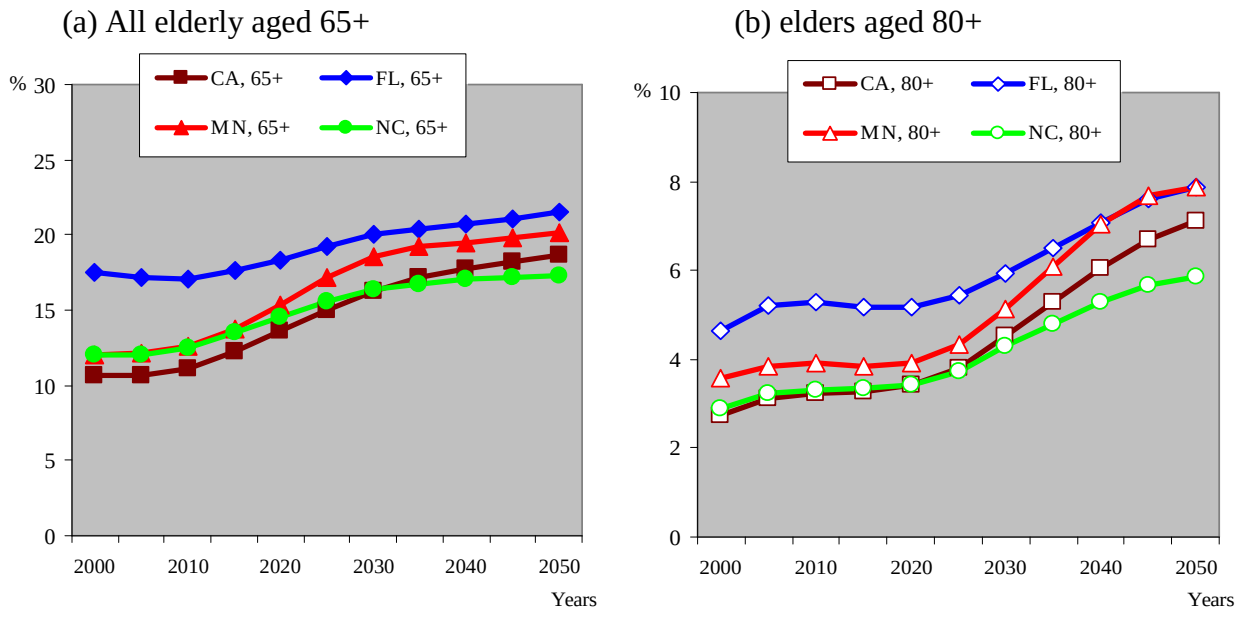
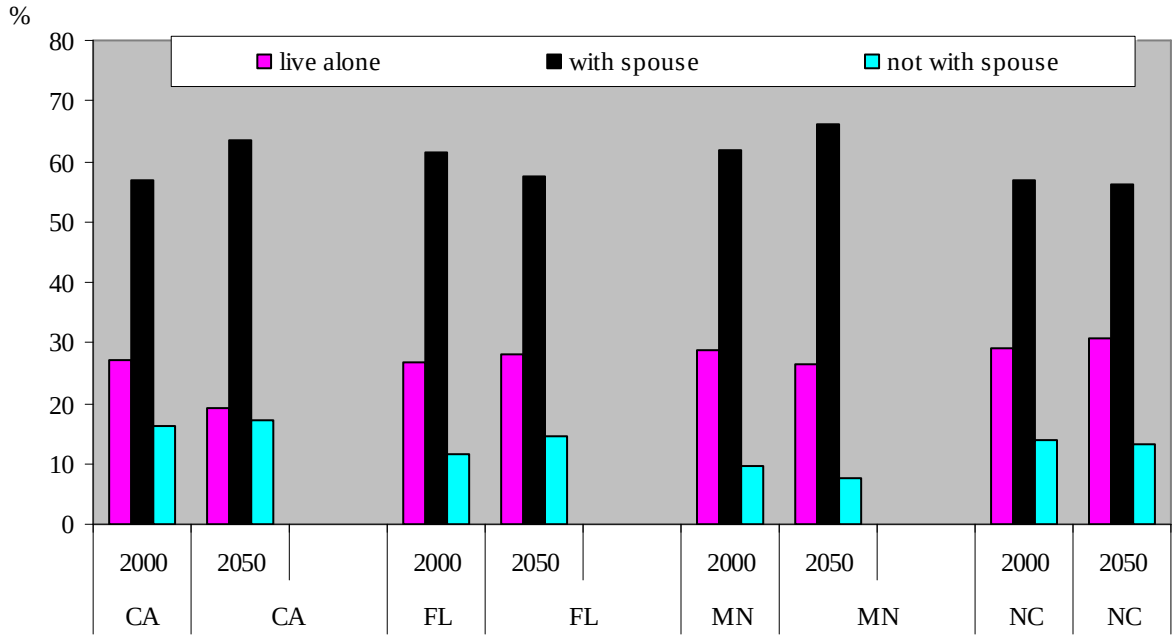
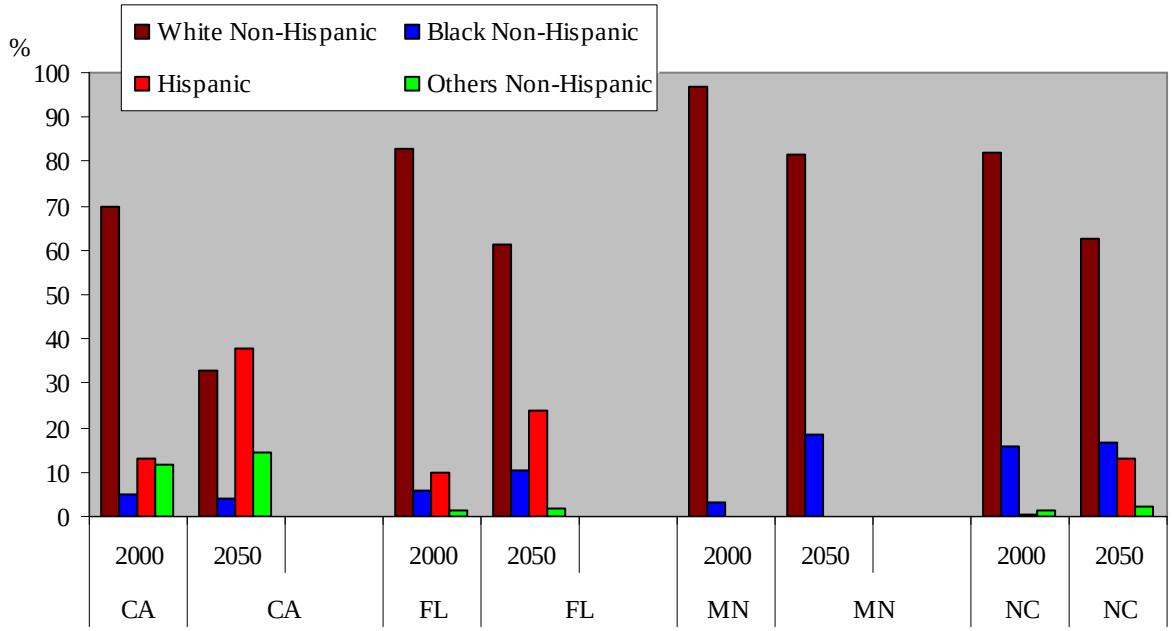


Figure 2 Comparisons of Living Arrangement and Racial Composition among the Elderly Population in Four States, 2000-2050

(a) Living Arrangements



(b) Racial Composition



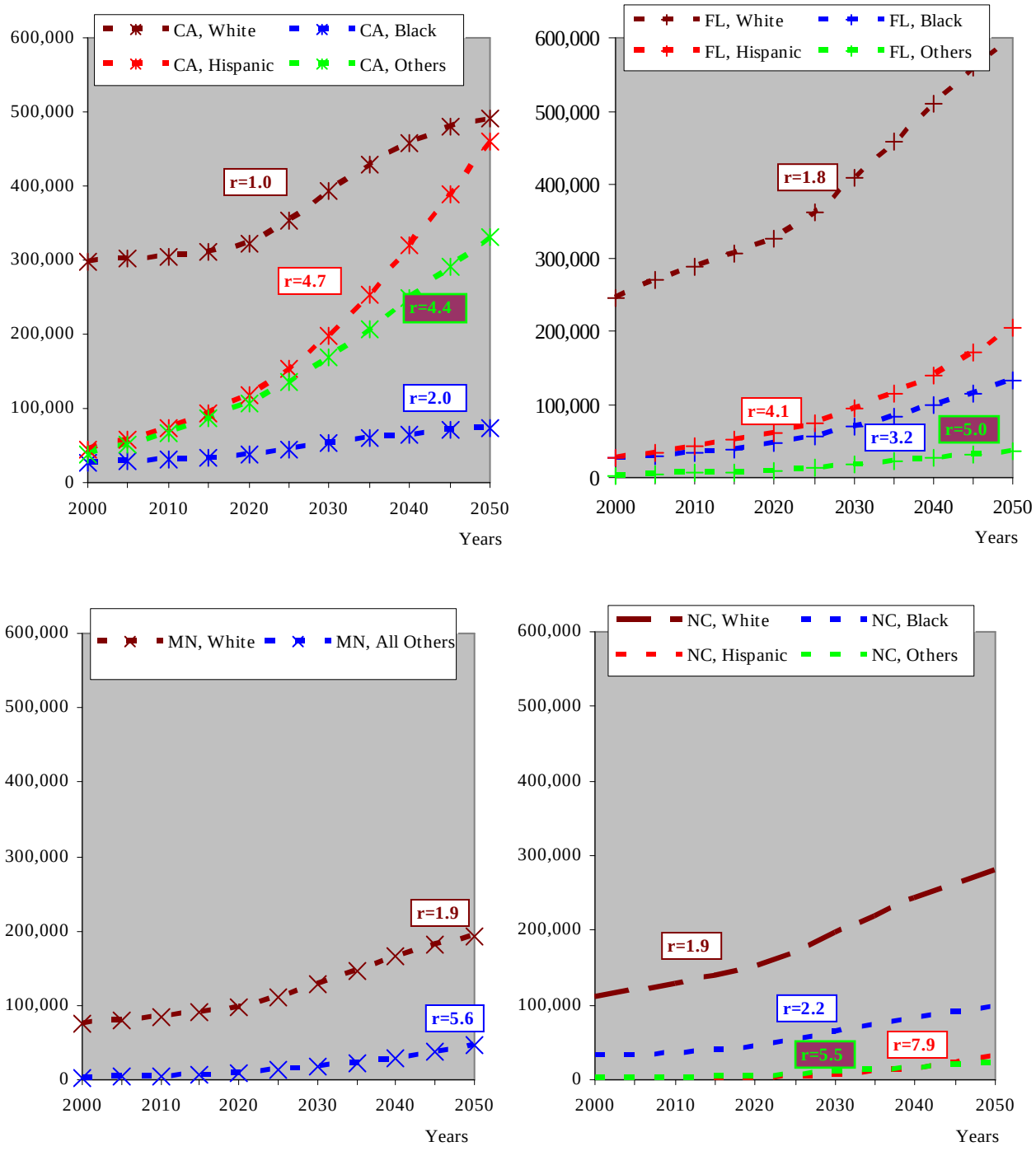
Note: Only two race categories are distinguished in Minnesota: White Non-Hispanic versus all others.

Table 1 Number of ADL Disabled Elderly and Annual Increase Rate by State, Living Arrangement, Age, and Sex, 2000-2050

	Males			Females		
	2000	2050	Ann. inc. %	2000	2050	Ann. inc. %
Community-dwellers						
Total disabled community-dwelling elders						
CA	132,930	486,466	*2.59*	273,306	869,722	*2.32*
FL	108,205	348,054	*2.34*	193,656	628,901	*2.36*
MN	15,117	41,241	*2.01*	26,334	61,203	*1.69*
NC	44,774	145,992	*2.36*	99,272	286,649	*2.12*
Age 65-79						
CA	75,234	181,681	*1.76*	114,816	230,628	*1.39*
FL	59,243	137,551	*1.68*	79,682	174,719	*1.57*
MN	8,356	17,791	*1.51*	11,190	22,302	*1.38*
NC	27,896	66,089	*1.73*	43,456	92,323	*1.51*
Age 80+						
CA	57,696	304,784	*3.33*	158,490	639,094	*2.79*
FL	48,962	210,503	*2.92*	113,974	454,181	*2.77*
MN	6,762	23,451	*2.49*	15,144	38,901	*1.89*
NC	16,878	79,903	*3.11*	55,816	194,326	*2.49*
Living Alone						
CA	9,178	28,570	*2.27*	39,547	75,720	*1.30*
FL	7,996	32,804	*2.82*	30,250	75,939	*1.84*
MN	1,464	7,727	*3.91*	6,775	13,173	*1.94*
NC	3,036	14,065	*3.07*	15,422	39,410	*1.88*
Living with spouse/partner may or may not with children and/or others						
CA	64,334	188,874	*2.15*	66,327	215,080	*2.35*
FL	61,521	143,749	*1.70*	55,817	134,068	*1.75*
MN	10,681	28,138	*2.63*	11,003	27,479	*2.69*
NC	22,861	56,676	*1.82*	22,913	56,876	*1.82*
Not living with spouse/partner but with children/others						
CA	14,064	59,578	*2.89*	55,063	167,813	*2.23*
FL	9,514	37,539	*2.75*	33,117	107,645	*2.36*
MN	1,775	4,523	*2.55*	5,097	9,322	*1.83*
NC	4,852	14,001	*2.12*	19,552	45,330	*1.68*
Institutionalized elders						
CA	45,354	209,444	*3.06*	112,368	411,108	*2.59*
FL	29,174	133,962	*3.05*	74,472	311,249	*2.86*
MN	11,534	49,455	*4.29*	30,821	99,459	*3.23*
NC	14,026	61,251	*2.95*	41,384	145,033	*2.51*

Note: Results are based on the medium scenario for disability.

Figure 3 Number of ADL Disabled Elderly and Annual Increase Rate by State and Race, 2000-2050 (Medium Scenario)



Note: numbers in small rectangular are annual increase rate (%).

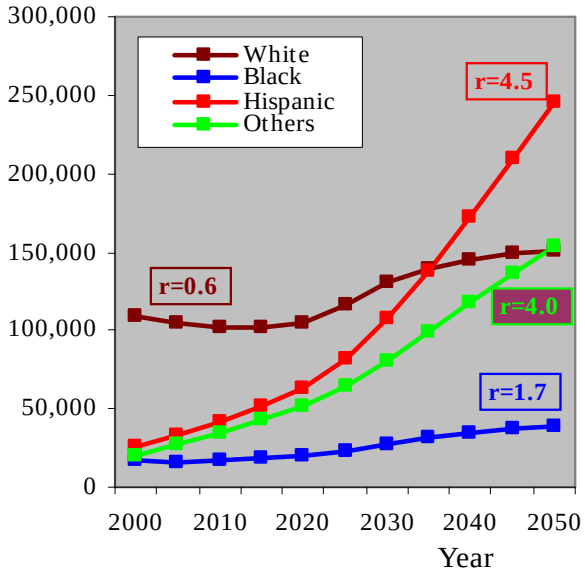
Table 2 Number of Yearly Workdays of Home-based Help to Be Provided to the Disabled Elderly by State, Living Arrangement, Age, and Sex, 2000-2050

	Males			Females		
	2000	2050	Ann. inc. %	2000	2050	Ann. inc. %
Total						
CA	66,435	234,999	*2.53*	106,258	355,183	*2.41*
FL	59,041	167,496	*2.09*	76,698	225,480	*2.16*
MN	10,090	29,001	*2.11*	13,894	34,316	*1.81*
NC	22,941	65,257	*2.09*	37,641	96,831	*1.89*
Age 65-79						
CA	34,584	85,257	*1.80*	43,640	100,036	*1.66*
FL	29,979	65,095	*1.55*	31,322	71,183	*1.64*
MN	5,143	11,960	*1.69*	5,405	12,169	*1.62*
NC	13,044	28,810	*1.58*	15,607	32,984	*1.50*
Age 80+						
CA	31,851	149,742	*3.10*	62,618	255,147	*2.81*
FL	29,062	102,401	*2.52*	45,376	154,297	*2.45*
MN	4,946	17,041	*2.47*	8,489	22,147	*1.92*
NC	9,897	36,447	*2.61*	22,034	63,847	*2.13*
Living Alone						
CA	3,413	12,369	*2.58*	14,348	32,252	*1.62*
FL	2,947	13,335	*3.02*	10,909	30,374	*2.05*
MN	525	2,277	*2.93*	2,448	5,251	*1.53*
NC	1,132	5,947	*3.32*	5,591	15,879	*2.09*
Living with spouse/partner may or may not with children and/or others						
CA	50,372	163,697	*2.36*	45,588	163,572	*2.56*
FL	47,537	118,337	*1.82*	37,560	95,982	*1.88*
MN	8,027	22,505	*2.06*	7,214	20,818	*2.12*
NC	17,425	46,163	*1.95*	15,344	39,830	*1.91*
Not living with spouse/partner but with children/others						
CA	12,650	58,933	*3.08*	46,322	159,359	*2.47*
FL	8,556	35,823	*2.86*	28,229	99,125	*2.51*
MN	1,537	4,218	*2.02*	4,231	8,248	*1.34*
NC	4,383	13,147	*2.20*	16,705	41,123	*1.80*

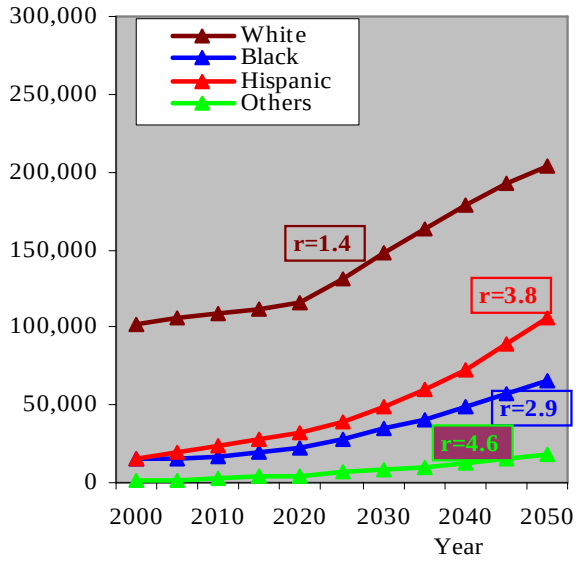
Note: Results are based on medium scenario for disability.

Figure 4 Number of Yearly Workdays of Home-based Help to Be Provided to the Disabled Elderly by State and Race, 2000-2050 (Medium Scenario)

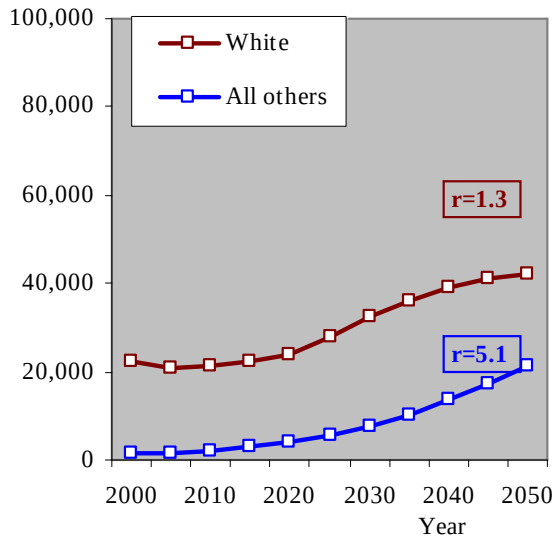
(a) California



(b) Florida



(c) Minnesota



(d) North Carolina

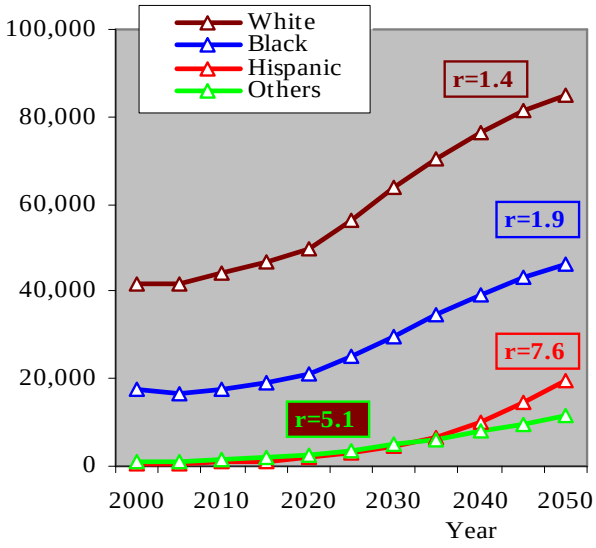


Table 3 Number of Payments of Home-based Help and Institutional Care to Be Provided to the Disabled Elderly by State, Age, and Sex, 2000-2050 (million dollars)

	Home-based			Institution		
	2000	2050	Ann. inc. %	2000	2050	Ann. inc. %
Total						
CA	563	1,606	*2.10*	5,791	22,760	*2.74*
FL	452	1,255	*2.04*	3,792	16,225	*2.91*
MN	90	208	*1.67*	1,567	5.518	*2.52*
NC	197	517	*1.93*	2,022	7,550	*2.64*
Age 65-79						
CA	195	367	*1.26*	2,093	4,596	*1.57*
FL	158	316	*1.39*	1,221	3,195	*1.92*
MN	30	56	*1.26*	488	1,129	*1.83*
NC	73	144	*1.35*	782	1,982	*1.86*
Age 80+						
CA	368	1,239	*2.43*	3,698	18,164	*3.18*
FL	294	938	*2.32*	2,571	13,030	*3.25*
MN	60	152	*1.84*	1,080	4,301	*2.76*
NC	124	373	*2.21*	1,240	5,567	*3.00*
Males						
CA	133	423	*2.31*	1,591	7,321	*3.05*
FL	123	372	*2.21*	1,020	4,672	*3.04*
MN	23	64	*2.08*	408	1,756	*2.92*
NC	45	137	*2.25*	488	2,142	*2.96*
Females						
CA	430	1,183	*2.02*	4,199	15,439	*2.60*
FL	329	883	*1.97*	2,772	11,553	*2.85*
MN	67	143	*1.51*	1,160	3,762	*2.35*
NC	152	379	*1.83*	1,534	5,408	*2.52*
White Non-Hispanic						
CA	432	605	*0.68*	4,714	9,871	1.48
FL	380	810	*1.51*	3,225	11,003	2.45
MN	87	165	*1.28*	1,539	4,801	2.28
NC	159	343	*1.54*	1,659	5,601	2.43
Black Non-Hispanic						
CA	33	85	*1.91*	238	915	2.69
FL	29	139	*3.11*	276	1,788	3.74
MN*	3	43	*5.22*	28	717	6.45
NC	35	102	*2.11*	346	1,398	2.79
Hispanic						
CA	64	624	*4.57*	400	6,124	5.46
FL	40	272	*3.85*	258	2,833	4.79
MN	NA	NA	*NA*	NA	NA	NA
NC	1	49	*7.62*	3	237	9.09
Others Non-Hispanic						
CA	36	292	*4.20*	439	5,851	5.18
FL	3	34	*4.83*	33	602	5.80
MN	NA	NA	*NA*	NA	NA	NA
NC	2	23	*5.29*	14	314	6.22

Note: Results are based on medium scenario of disability. *, All other races are combined for Minnesota.

Table 4 Comparisons of Number of Disabled Elders, Number of Workdays of Home-based Help and Home-based Care Costs in 2050 Under Different Scenarios for Four States

	California	Florida	Minnesota	North Carolina
Number of elders with disability				
Low	1,164,702	838,542	215,858	373,720
Medium	1,356,187	976,954	239,419	432,641
High	1,691,103	1,219,043	280,628	535,695
High vs. Low (ratio)	1.45	1.45	1.30	1.43
Medium vs. Low (ratio)	1.16	1.17	1.11	1.16
High vs. Medium (ratio)	1.25	1.25	1.17	1.24
Number of workdays of home-based help to be provided to the disabled elders				
Low	436,557	290,684	46,835	119,897
Medium	590,181	392,976	63,317	162,088
High	858,875	571,887	92,143	235,883
High vs. Low (ratio)	1.97	1.97	1.97	1.97
Medium vs. Low (ratio)	1.35	1.35	1.35	1.35
High vs. Medium (ratio)	1.46	1.46	1.46	1.46
Number of payment of home-based help for the disabled elders				
Low (in million $)	1,188	928	154	382
Medium (in million $)	1,606	1,255	208	517
High (in million $)	2,337	1,826	302	752
High vs. Low (ratio)	1.97	1.97	1.97	1.97
Medium vs. Low (ratio)	1.35	1.35	1.35	1.35
High vs. Medium (ratio)	1.46	1.46	1.46	1.46

Appendix

Table A1. Comparison between projected and observed U.S. family household and population in 2000, California

	Households				Population		
	Census	ProFamy	Diff.%		Census	ProFamy	Diff.%
Total number of household	11,502,870	11,990,931	4.2	Total population	33,871,648	33,868,048	0.0
Average Household Size	2.87	2.76	-4.0	Group quarters	819,754	823,104	0.4
				% children age<18	27.31	27.73	1.5
% 1 person household	23.54	21.914	-6.9	% 65+	10.62	9.71	-8.5
% 2-3 person household	45.64	49.29	8.0	% 80+	2.74	2.58	-5.9
% 4+ person household	30.81	28.80	-6.5	Dependent ratio of			
				children	0.44	0.44	0.0
% Couple household	57.03	55.71	-2.3	old	0.17	0.16	-6.4
				children and old	0.61	0.60	-1.8

Table A2. Comparison between projected and observed U.S. family household and population in 2000, Florida

	Households				Population		
	Census	ProFamy	Diff.%		Census	ProFamy	Diff.%
Total number of household	6,337,929	6,528,064	3.0	Total population	15,982,378	16,254,779	1.7
Average Household Size	2.46	2.43	-1.2	Group quarters	388,945	394,061	1.3
				% children age<18	22.81	23.60	3.4
% 1 person household	26.62	26.859	0.9	% 65+	17.57	15.93	-9.3
% 2-3 person household	52.18	52.64	0.9	% 80+	4.62	4.32	-6.5
% 4+ person household	21.20	20.50	-3.3	Dependent ratio of			
				children	0.38	0.39	1.9
% Couple household	56.20	55.86	-0.6	old	0.29	0.26	-11.8
				children and old	0.68	0.65	-4.0

Table A3. Comparison between projected and observed U.S. family household and population in 2000, Minnesota

	Households				Population		
	Census	ProFamy	Diff.%		Census	ProFamy	Diff.%
Total number of household	1,895,127	1,880,518	-0.8	Total population	4,919,479	4,869,589	-1.0
Average Household Size	2.52	2.52	-0.1	Group quarters	135,883	133,763	-1.6
				% children age<18	26.16	26.22	0.2
% 1 person household	26.88	26.947	0.2	% 65+	12.08	12.16	0.7
% 2-3 person household	48.82	48.93	0.2	% 80+	3.57	3.61	1.0
% 4+ person household	24.30	24.12	-0.7	Dependent ratio of			
				children	0.42	0.43	1.5
% Couple household	59.03	55.78	-5.5	old	0.20	0.20	2.3
				children and old	0.62	0.62	0.1

Table A4. Comparison between projected and observed U.S. family household and population in 2000, North Carolina

	Households				Population		
	Census	ProFamy	Diff.%		Census	ProFamy	Diff.%
Total number of household	3,132,013	3,127,301	-0.2	Total population	8,049,313	7,997,153	-0.6
Average Household Size	2.49	2.47	-0.8	Group quarters	253,881	268,383	5.7
				% children age<18	24.40	24.33	-0.3
% 1 person household	25.39	25.396	0.0	% 65+	12.04	12.64	5.0
% 2-3 person household	52.78	53.27	0.9	% 80+	2.90	3.11	7.1
% 4+ person household	21.83	21.34	-2.2	Dependent ratio of			
				children	0.38	0.39	1.6
% Couple household	57.12	56.71	-0.7	old	0.19	0.20	5.6
				children and old	0.57	0.59	2.9

Table A5 Disability and Care Hours and Care Costs in 2000

	Males					Females				
Age	65-69	70-74	75-79	80-84	85+	65-69	70-74	75-79	80-84	85+
Disability (%)										
Living alone										
White Non-Hispanic	2.31	2.54	3.84	6.12	11.13	2.65	3.32	4.87	7.90	15.26
Black Non-Hispanic	3.93	4.33	6.48	10.16	17.92	4.51	5.62	8.15	12.91	23.88
Hispanic	2.19	2.41	3.64	5.81	10.59	2.51	3.14	4.62	7.50	14.55
Others Non-Hispanic	1.94	2.13	3.23	5.17	9.47	2.23	2.79	4.10	6.69	13.07
Living with spouse/partner, may (or may not) live with children/others										
White Non-Hispanic	4.32	4.76	7.11	11.10	19.44	4.95	6.17	8.92	14.06	25.74
Black Non-Hispanic	7.28	8.00	11.75	17.84	29.73	8.29	10.25	14.53	22.03	37.79
Hispanic	4.10	4.51	6.74	10.56	18.57	4.70	5.85	8.48	13.40	24.68
Others Non-Hispanic	3.64	4.00	6.00	9.44	16.74	4.17	5.20	7.56	12.03	22.42
Not living with spouse/partner but living with children/others										
White Non-Hispanic	6.14	6.75	9.98	15.31	25.99	7.01	8.69	12.41	19.09	33.52
Black Non-Hispanic	10.21	11.20	16.21	23.96	38.26	11.57	14.22	19.76	28.95	47.06
Hispanic	5.82	6.40	9.48	14.60	24.91	6.65	8.25	11.81	18.25	32.27
Others Non-Hispanic	5.18	5.69	8.46	13.11	22.61	5.92	7.36	10.58	16.48	29.57
Home-based care hours received by disabled elders per week										
Living alone										
White Non-Hispanic	9.95	11.36	12.43	14.57	17.27	7.99	9.20	10.71	12.01	21.21
Black Non-Hispanic	13.31	15.48	16.83	19.62	23.10	10.46	12.21	14.49	16.21	27.68
Hispanic	13.63	15.79	17.21	19.98	23.56	10.75	12.51	14.78	16.48	27.76
Others Non-Hispanic	12.15	14.11	15.36	17.95	21.19	9.57	11.15	13.21	14.81	25.74
Living with spouse/partner, may (or may not) live with children/others										
White Non-Hispanic	23.43	26.62	28.57	32.10	36.31	18.84	21.51	25.18	27.32	40.17
Black Non-Hispanic	29.32	32.57	34.69	38.34	42.39	24.22	27.04	31.17	33.28	45.72
Hispanic	29.74	33.09	35.30	38.64	42.77	24.62	27.41	31.39	33.33	45.30
Others Non-Hispanic	27.46	30.68	32.73	36.47	40.55	22.49	25.30	29.37	31.57	44.38
Not living with spouse/partner but living with children/others										
White Non-Hispanic	24.85	28.08	30.07	33.72	37.91	20.08	22.83	26.69	28.87	41.84
Black Non-Hispanic	30.78	33.98	36.12	39.84	43.81	25.61	28.44	32.69	34.80	47.18
Hispanic	31.24	34.55	36.77	40.18	44.23	26.04	28.84	32.93	34.87	46.78
Others Non-Hispanic	28.91	32.10	34.16	37.99	42.01	23.84	26.67	30.89	33.10	45.89
Care payment for home-based care per month ($)										
Living alone										
White Non-Hispanic	192.16	240.46	272.40	348.29	389.17	117.20	216.24	251.62	297.58	429.53
Black Non-Hispanic	117.27	146.27	167.61	223.70	259.53	71.66	131.54	154.62	190.83	285.12
Hispanic	169.40	209.93	238.58	304.40	342.06	104.23	190.73	222.54	263.17	381.74
Others Non-Hispanic	116.79	142.22	162.78	212.27	242.87	72.26	130.84	153.97	185.60	275.05
Living with spouse/partner, may (or may not) live with children/others										
White Non-Hispanic	67.56	87.98	101.73	133.42	160.46	95.98	178.16	207.62	253.40	372.39
Black Non-Hispanic	38.46	50.85	58.94	77.83	94.97	57.27	106.49	124.78	158.10	238.66
Hispanic	58.91	76.45	88.47	114.78	137.95	84.22	155.05	180.98	220.14	324.40
Others Non-Hispanic	38.87	49.43	57.28	75.26	90.62	56.76	103.51	121.67	149.94	224.73
Not living with spouse/partner but living with children/others										
White Non-Hispanic	114.03	147.11	169.18	222.55	262.30	102.75	190.82	222.75	270.83	397.03
Black Non-Hispanic	66.07	86.06	99.51	133.86	161.77	61.53	113.73	133.89	168.99	255.59
Hispanic	98.80	126.52	145.73	190.02	224.40	90.50	166.50	194.82	236.16	347.56
Others Non-Hispanic	65.38	82.04	94.78	125.31	149.00	61.51	111.73	131.75	161.72	242.45
Institutional care cost per month ($)										
White Non-Hispanic	3,089	2,833	2,858	2,977	3,010	3,466	2,770	2,957	3,169	3,194
Black Non-Hispanic	2,866	2,708	2,708	2,811	2,879	2,963	2,672	2,761	2,883	3,017
Hispanic	2,878	2,612	2,626	2,755	2,799	3,052	2,593	2,719	2,877	2,960
Others Non-Hispanic	3,286	2,962	3,007	3,134	3,138	3,983	2,871	3,136	3,430	3,355

Note: (1) All data in this table are for the whole nation, which is estimated from the NLTCS in 1999 using GLM (see Gu et al. 2005). (2) By applying state ratio of disability to the national data, we can obtain corresponding figures for each state. The state ratio is sex-specific adjusting for age, race, and marital status. The ratios for California, Florida, Minnesota, and North Carolina are 0.885, 0.960, 0.861, 1.168 for males and 0.930, 0.889, 0.826, 1.154 for females, respectively. (3) We assume four states have the same rate of home-based care hour/payment, and institutional care cost per disabled elders as the national figures in this pilot study.