Population Aging, Disability, and Housing Accessibility: Implications for Sub-national Areas in the United States

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Final formatted version published in *Housing Studies*, Volume 27, No. 2, pp. 252–266, March 2012. DOI: 10.1080/02673037.2012.649468

ABSTRACT

The older population in many countries is large and growing rapidly, raising the number of people with disabilities and driving up the need for accessible housing. In a previous study, we projected the number of households in the United States with at least one disabled resident and estimated the probability that a newly built single-family detached unit will house at least one disabled resident during its expected lifetime. In this study, we extend our analysis to the subnational level by constructing similar estimates and projections for four states that differ widely on two characteristics affecting the need for accessible housing: age structure and disability rates. The results vary from state to state, but all four display a substantial need for accessible housing. We urge homebuilders, planners, and policy makers to account for this need when building new homes and making modifications to the current housing stock.

Key words: Aging, disability, housing accessibility, housing policy, housing need, visitability.

Introduction

In 2000, there were more than 35 million persons aged 65 or older residing in the United States, comprising 12% of the total population. By 2050, this population is projected to exceed 87 million and account for almost 22% of the total population (United Nations, 2010). Because disability rates rise with age—with the largest increases occurring at the oldest ages—it is likely that population aging will bring large increases in the number of disabled persons. These increases will have major implications for homebuilders, planners, policy makers, and others concerned about the accessibility of the housing stock.

Disabilities often reduce physical mobility. A recent study in the United States reported that 10% of the civilian non-institutionalized adult population had difficulty walking and 9% had difficulty using stairs; among those aged 65 or older, the proportions were 32% and 30%, respectively (Brault, 2008). People with mobility limitations often need features like zero-step entrances and wide interior doorways in order to reside safely and comfortably in their homes. Unfortunately, such features are missing from more than 90% of the housing stock in the United States (Steinfeld *et al.*, 1998).

Federal law regarding housing accessibility is limited. The Fair Housing Act Amendment of 1988 requires that new multifamily buildings with four or more units must provide zero-step entrances, wide interior doorways, and several other access features in all ground-floor units and all upper-floor units accessible by elevator, unless exempted for topographical reasons. The Americans with Disabilities Act of 1990 covers public buildings but refers to residences only in special cases (e.g., presidential housing built by universities). Except for a small proportion of publicly-financed houses, neither single-family detached houses nor single-family attached houses (commonly called "town houses" or "row houses") are required by federal law to have access features. A handful of state and local laws require such features, but the large majority of single-family houses in the United States have steps at all entrances, narrow interior doorways, or other barriers to access for people with mobility limitations. Most new houses continue to be built with these barriers.

The lack of access features has serious consequences for people with disabilities and their caregivers. Architectural barriers in houses cause greater social isolation, elevated risk of injury, and reduced life satisfaction (Close *et al.*, 1999; Hammel, 2005; Heywood, 2005; Saville-Smith *et al.*, 2007). Falling is a particularly serious problem. It has been estimated that falling leads to more than 1.7 million injuries and almost 17,000 deaths per year among the older population of the United States (Albert & Freedman, 2010). Architectural barriers also limit the capability of people with disabilities to visit the homes of their friends and relatives (Maisel, 2006; Milner & Madigan, 2004). Although most older people want to continue living in their current homes for as long as possible (Pynoos *et al.*, 2009; Wagner *et al.*, 2010), many who become disabled are forced to move into nursing homes or other institutions because their homes lack suitable access features (Maisel *et al.*, 2008). Given the medical consequences of injuries caused by falling and the high cost of institutionalization (Chapell *et al.*, 2004; LaPlante *et al.*, 2007), the lack of access features inflicts high economic costs on individuals and on society as a whole.

In a previous study, we investigated the need for accessible housing in the United States (Smith *et al.*, 2008). We developed two disability measures, one reflecting the proportion of the population for whom access features would be highly beneficial for residing safely and comfortably in their homes and one reflecting the proportion for whom such features would be essential for doing so. Using the first measure, we projected that the number of households with at least one disabled resident would almost double between 2000 and 2050, rising from 17.1 million to 33.2 million. Using the second measure, the number would more than double, rising from less than 5.6 million to more than 11.2 million. We concluded that there was a large and growing need for housing with access features.

These projections provided a useful perspective on the need for accessible housing, but told only part of the story because most housing units are occupied by a number of different households over time. To account for this, we developed estimates of the probability that a newly built single-family detached unit will house at least one disabled resident over the expected lifetime of the unit. We calculated a 60% probability using the first disability measure and a 25% probability using the second. We concluded that the need for accessible housing is much greater when measured over the lifetime of a housing unit than when measured at a single point in time for a household.

Our previous study focused on the nation as a whole, but the need for accessible housing most likely varies from one place to another because of differences in demographic characteristics. Are these differences significant? Do some places exhibit a large need for accessible housing while others exhibit little or no need? In this study, we address these questions by analyzing data from Utah, Georgia, Florida, and West Virginia, states that differ considerably on two demographic characteristics affecting the need for accessible housing: age structure and disability rates.

Utah had a very young population in 2000, with the youngest median age and the second lowest proportion of older persons of any state in the nation (we refer to ages 65 and above as "older"). It also had relatively low age-specific disability rates, as its older population ranked sixth lowest on one disability measure and fourteenth lowest on the other (U.S. Census Bureau, 2003). Georgia also had a young population in 2000, with the sixth youngest median age and the third lowest proportion aged 65 or older, but its older population ranked in the top ten on both disability measures. Florida had an old population in 2000, with the highest proportion aged 65 or older of any state and the second oldest median age. Its older population had low disability rates, ranking among the four lowest on both disability measures. West Virginia also had an old population, with the oldest median age and the third highest proportion aged 65 or older in 2000, but had high disability rates, as its older population ranked among the top six states on both disability measures.

Our analysis thus covers one state with a young population and low disability rates (Utah), one with a young population and high disability rates (Georgia), one with an old population and low disability rates (Florida), and one with an old population and high disability rates (West Virginia). Using data specific to each state and techniques similar to those used in our previous study, we projected the number of households with at least one disabled resident and estimated the probability that a newly built single-family detached unit will house at least one disabled resident during its expected lifetime. We believe the results presented here complement those reported in our previous study and provide valuable insights regarding subnational differences in the need for accessible housing in the United States.

Disability Measures

A disability can be defined as "a physical or mental impairment that substantially limits one or more major life activities" (Brault, 2008, p. 1). As in our previous study, we focus here on physical disabilities that limit a person's ability to enter, leave, or get around safely and efficiently at home. When we use the terms "disabled" and "disability," we are referring to these types of mobility limitations. We do not consider vision or hearing impairments or cognitive, emotional, and other disabling conditions.

There are a variety of ways to define and measure the prevalence of disabilities within a population (Albert & Freedman, 2010). Measures are often based on activities such as bathing, dressing, eating, getting out of a chair or bed, walking across a room, and using the toilet (Freedman *et al.*, 2004; Lakdawalla *et al.*, 2003; Manton & Gu, 2001). In our previous study, we developed two disability measures based on the ability to perform such activities. Both were constructed using data from the 5% Public Use Microdata Sample (PUMS) file from the 2000 census in the United States (U.S. Census Bureau, 2003). We employed the same measures and data sources in the present study, but used data specific to each state rather than for the nation as a whole. For a more detailed description of the data underlying these measures, see Wang (2005).

Our first measure (HHDIS-1) was based on whether any resident of the household had a long-lasting condition that substantially limited one or more physical activities such as walking, climbing stairs, reaching, lifting, or carrying. Our second measure (HHDIS-2) was based on whether any resident of the household had a condition lasting six months or more that made it difficult to dress, bathe, or get around inside the home. We believe the first measure reflects the prevalence of households with at least one resident for whom access features would be highly beneficial for residing safely and comfortably in the home, and the second reflects the prevalence of households with at least one resident for whom such features would be essential for doing so.

For each state, we calculated household disability rates by dividing the number of households with at least one disabled resident by the number of households. Rates were calculated for each age group according to the age of the householder, but the incidence of disabilities covered everyone in the household regardless of age. Age groups were based on householders as defined in the ProFamy household projection model (Zeng *et al.*, 2006). Household disability rates by age of householder for each state in 2000 are shown in Table 1.

(Table 1 about here)

For both measures, disability rates for the total population were lowest for Utah, followed by Georgia, Florida, and West Virginia. A similar pattern can be seen in all age groups younger than 55. For groups aged 55 and older, however, disability rates for Florida were lower than those for Georgia, and for groups aged 75 and older, Florida's rates were lower than those for Utah as well. Florida's low disability rates for the older age groups were due to the large number of older persons who have moved into the state; these "in-migrants" generally have fewer disabilities than the older population as a whole (Smith & House, 2006). West Virginia had the highest disability rates in every age group except the oldest, in which Georgia had the highest rates.

How do these rates compare with those reported in other studies? We do not have comparable data for individual states, but using national data we found age/sex-specific rates for individuals using our two measures to be similar to rates measuring severe disabilities and needs for personal assistance, respectively, based on data from the Survey of Income and Program Participation (Steinmetz, 2006). Also, age-specific rates for individuals based on our second measure were similar to those reported for users of mobility devices such as wheelchairs, scooters, walkers, canes, and crutches (Kaye *et al.*, 2000). Given these similarities, we believe our measures provide useful indicators of the prevalence of severe, long-lasting mobility impairments. Moreover, they are available for subnational areas in the United States, providing a means for investigating state-to-state differences in the need for accessible housing.

Projections

How are household disability rates in the United States likely to change over the next several decades? Some analysts believe rates are likely to decline because of advances in biomedical and epidemiological research, aggressive public health programs, a growing awareness of the importance of regular exercise and good nutrition, and projected increases in educational levels (Freedman & Martin, 2000; Singer & Manton, 1998; Waidmann & Liu, 2000). Others are less optimistic, noting that several diseases have become more prevalent in recent years, disability rates have risen for young adults, obesity has become more prevalent in all age groups, and improvements in educational attainment have slowed. Because of these trends, a number of analysts have questioned the likelihood that disability rates will fall (Bhattacharya *et al.*, 2004; Spillman, 2004; Sturm *et al.*, 2004; Wolf *et al.*, 2005) and some have projected that rates will rise (Lakdawalla *et al.*, 2003).

Plausible arguments can be made for either rising or falling disability rates. Consequently, we based our medium projections on rates that remain constant at 2000 levels for each state; we refer to this as our medium scenario. To account for potential changes, we also constructed projections in which disability rates rise or fall by 5% per decade; we refer to these as our high and low scenarios, respectively.

We projected the number of households with at least one disabled resident for each state by applying age-specific disability rates to a set of household projections by age of householder. The household projections were based on the ProFamy model described in Zeng *et al.* (2006); in the present analysis, we used projections constructed in 2009. The U.S. Census Bureau does not produce household projections for states, but the ProFamy projections of total population for the states used in our analysis were similar to the most recent set produced by the U.S. Census Bureau (2005).

Projections of the total number of households and the number of households with a disabled resident are shown in Tables 2 and 3 for HHDIS-1 and HHDIS-2, respectively. Between 2000 and 2050, the total number of households was projected to grow by 134% in Utah and by 96% in Georgia. In Florida, it was projected to grow even more rapidly, especially after 2020. In West Virginia, the number of households was projected to grow slightly between 2000 and 2020 but to decline thereafter, resulting in a net loss of 20% by 2050.

(Table 2 about here)

Under the medium scenario in which disability rates were projected to remain constant, the number of households with a disabled resident (as measured by HHDIS-1) was projected to grow by 201% between 2000 and 2050 in Utah, by 151% in Georgia, and by 197% in Florida. In West Virginia, it was projected to grow by 16% between 2000 and 2020 but to decline thereafter. Similar changes were found for HHDIS-2. Over the 50-year period, the proportion of households with a disabled resident (HHDIS-1) was projected to increase by 28% in Utah and Georgia, by 14% in Florida, and by 20% in West Virginia. Again, similar changes were found for HHDIS-2.

(Table 3 about here)

Not surprisingly, projected increases were considerably larger under the high scenario. For both HHDIS-1 and HHDIS-2, the number of households with a disabled resident more than tripled between 2000 and 2050 in Georgia, Utah, and Florida. In West Virginia, it grew by more than 20%. Even under the low scenario, the number of households with a disabled resident grew rapidly in Utah, Georgia, and Florida, but declined in West Virginia.

These results show a substantial degree of variation among the four states. However, it is notable that the number of households with a disabled resident was projected to grow rapidly in three of the four states under all three projection scenarios, and that the proportion of such households was projected to increase under both the medium and high scenarios in all four states. We believe the relevant question for most places with stable or growing populations is not *whether* the number of households with a disabled resident will increase over the next several decades, but by *how much*. Furthermore, even for places whose populations are projected to decline (e.g., West Virginia after 2020), the *proportion* of households with a disabled resident is likely to increase.

Probability of a Disabled Resident

Most housing units are occupied by a number of different households over time, any one of which may have a disabled resident. To account for this, we estimated the probability that a newly built single-family detached unit will house at least one disabled resident during the expected lifetime of the unit. Our calculations are meant to illustrate the potential long-term need for units with access features, not to forecast the number of housing units with specific characteristics. Consequently, we assumed that all single-family detached units within a given state will have an equal probability of being occupied by a household with a disabled resident.

We focused on single-family detached units for two reasons. First, they constitute the majority of housing units in the United States. In 2007, 65% of all households and 69% of householders age 65 or older were living in single-family detached units (U.S. Census Bureau, 2008). Second, the Fair Housing Act Amendment of 1988 already requires several access features in new multifamily buildings with four or more units. Consequently, future policy changes will most likely be directed toward single-family homes. We note that the methodology presented here could be applied to other types of housing units as well (e.g., town houses or mobile homes).

In order to estimate the probability that a newly built single-family detached unit will house at least one disabled resident during its expected lifetime, we must project the proportion of households with at least one disabled resident for people living in single-family detached units; estimate the average length of time households reside in those units; and estimate the average lifespan of those units.

For the projected proportion of households living in single-family detached units with at least one disabled resident, we used the projected proportion of all households with at least one disabled resident, as shown in Tables 2 and 3. This proxy measure provides a reasonable projection because disability rates for residents of single-family detached units are very similar to disability rates for all households (not shown here).

We estimated the average length of residence in single-family detached units using the data shown in Table 4. The average length of residence for all householders in 2000 was 12.5 years in Utah, 12.0 years in Georgia, 10.7 years in Florida, and 16.7 years in West Virginia. For the nation as a whole, the average was 13.7 years (not shown here). Lengths of residence were shorter than the national average in Utah, Georgia, and Florida because those are rapidly growing states with large numbers of in-migrants; Florida in particular stands out in this regard. Lengths of residence were longer than the national average in West Virginia because it is a slowly growing state with relatively small numbers of in-migrants.

(Table 4 about here)

Not surprisingly, length of residence increases substantially with age. This pattern was found in all four states, but was not as pronounced in Florida as in the other three states because Florida receives large numbers of older in-migrants, reducing the average length of residence in the older age groups.

The lifespan of a housing unit (i.e., the period over which it provides dwelling services) is determined primarily by the quality of its design and construction, its exposure to hazards, and the extent of maintenance and renovation it receives. Theoretically, the lifespan of a unit could be extended almost indefinitely if sufficient resources were devoted to that end. In reality, that is seldom the case. Estimates of the average lifespan of single-family units in the United States generally range between 75 and 100 years (Baer, 1990). We used the midpoint of this range (87.5) as our estimate of the average lifespan of single-family detached units. Estimates for Europe are substantially higher than estimates for the United States (Bradley & Kohler, 2007; Johnstone, 2001).

If length of residence and disability rates were unrelated to each other, we could estimate the probability that a newly built single-family detached unit will house at least one disabled resident during its expected lifetime as:

$$PROB = 1 – [(1-r)^x]$$

where *r* is the proportion of households with at least one disabled resident and *x* is the average number of households occupying a single-family detached unit during its expected lifetime (we refer to *x* as "housing turnover").

We can illustrate this estimate using HHDIS-1 as the disability measure. The first term (*r*) is the medium projection of the proportion of households with at least one disabled resident in 2040, as shown in Table 2; we used 2040 because it is approximately the midpoint in the lifespan of a unit built in 2000. The second term (*x*) was obtained by dividing the average lifespan by the average length of residence for each state:

Utah: 87.5/12.5 = 7.00

Georgia: 87.5/12.0 = 7.29

Florida: 87.5/10.7 = 8.18

West Virginia: 87.5/16.7 = 5.24

That is, under these assumptions Utah would have an average of 7.0 different households occupying a single-family detached unit during its expected lifetime, Georgia would average 7.3, Florida would average 8.2, and West Virginia would average 5.2. Given these numbers, the probability that a single-family detached unit built in 2000 will house at least one disabled resident can be estimated as:

Utah: PROB = $1 – [(1-.168)^{7.00}] = 1 - .276 = .724$

Georgia: PROB = $1 – [(1-.200)^{7.29}] = 1 - .197 = .803$

Florida: PROB = $1 – [(1-.207)^{8.18}] = 1 - .150 = .850$

West Virginia: PROB = $1 – [(1-.290)^{5.24}] = 1 - .166 = .834$

These estimates will be valid only if length of residence and disability rates are unrelated to each other. However, as shown in Tables 1 and 4, disability rates and length of residence both increase with age. The rate of housing turnover is therefore lowest in the age groups with the highest disability rates. Because of this relationship, the estimates shown above overstate the probability that a single-family detached unit will house at least one disabled resident during its expected lifetime.

There is no perfect solution to this problem, but we can improve the estimates considerably by making an adjustment in which the length of residence for each age group in each projection year is weighted by the age distribution of households with at least one disabled resident in that year (using an average of the distributions for HHDIS-1 and HHDIS-2). The adjusted estimates are shown in Table 5. For each state, the weighted average length of residence in 2000 is considerably longer than the unweighted average shown in Table 4. Furthermore, because of population aging, the weighted average for each state is projected to increase over time. Both of these outcomes are consistent with the aging and disability trends noted previously.

(Table 5 about here)

We can develop adjusted estimates of housing turnover (x) by dividing the average lifespan of single-family detached units built in 2000 by the adjusted lengths of residence shown in Table 5. Again, we used the length of residence projected for 2040, approximately the midpoint in the expected lifespan of a unit built in 2000:

Utah: 87.5/20.1 = 4.35

Georgia: 87.5/19.1 = 4.58

Florida: 87.5/15.1 = 5.79

West Virginia: 87.5/22.4 = 3.91

Compared to the other states, Florida had the highest rate of housing turnover and West Virginia the lowest. These outcomes are consistent with the migration trends noted previously. We can now develop more realistic estimates of the probability that a single-family detached unit built in 2000 will house at least one disabled resident during its expected lifetime. Using the medium projection scenario and HHDIS-1 as the disability measure, we estimated the probabilities as:

Utah: PROB = $1 – [(1-.168)^{4.35}] = 1 - .449 = .551$

Georgia: PROB = $1 – [(1-.200)^{4.58}] = 1 - .360 = .640$

Florida: PROB = $1 – [(1-.207)^{5.79}] = 1 - .261 = .739$

West Virginia: PROB = $1 – [(1-.290)^{3.91}] = 1 - .262 = .738$

These estimates are lower than those shown previously, but are more realistic because they account for the relationship between disability rates and housing turnover.

Using the medium projection scenario and HHDIS-2 as the disability measure, we estimated the probabilities as:

Utah: PROB = $1 – [(1-.049)^{4.35}] = 1 - .804 = .196$

Georgia: PROB = $1 – [(1-.068)^{4.58}] = 1 - .724 = .276$

Florida: PROB = $1 – [(1-.065)^{5.79}] = 1 - .678 = .322$

West Virginia: PROB = $1 – [(1-.097)^{3.91}] = 1 - .671 = .329$

The probability that a newly built single-family detached unit will house at least one disabled resident varies from state to state. Using the first disability measure (HHDIS-1), we estimated that 55% of newly built single-family detached units will house at least one disabled resident in Utah, 64% in Georgia, and 74% in both Florida and West Virginia. Using the second measure (HHDIS-2), the probabilities were 20%, 28%, 32%, and 33%, respectively. To put these numbers in perspective, probabilities for the United States as a whole have been estimated as 60% for HHDIS-1 and 25% for HHDIS-2 (Smith *et al.*, 2008).

Utah had the lowest probabilities for both measures because of its low disability rates and young age structure. Georgia had higher probabilities than Utah primarily because of its higher disability rates. Florida and West Virginia had the highest probabilities, but for different reasons. Both states had old age structures, but Florida had low disability rates and a high rate of housing turnover, whereas West Virginia had high disability rates and a low rate of housing turnover. These two factors largely offset each other, leading to probabilities that were almost the same for those two states.

We followed the same procedures to construct probability estimates for the low and high projection scenarios. For HHDIS-1, we estimated a range of 47-63% for Utah, 56-72% for Georgia, 66-81% for Florida, and 65-82% for West Virginia. For HHDIS-2, the ranges were 16-23% for Utah, 22-32% for Georgia, 27-38% for Florida, and 28-39% for West Virginia. The probabilities under the high scenario were substantial for both measures in all four states. Even under the low scenario, probabilities were at least 47% in every state for HHDIS-1 and at least 16% for HHDIS-2.

These estimates show that the need for accessible housing is considerably greater when measured over the expected lifetime of a housing unit than when measured at a single point in time for an individual household. We believe the lifetime of a unit is the more relevant measure when considering housing policy because the vast majority of housing units are occupied by a number of different households over time.

Although most of the assumptions and techniques used in this study were identical to those used in our previous study (Smith *et al.*, 2008), the techniques used for calculating probability estimates differed slightly from those used before. In our previous study, we assumed that an average of exactly four households will occupy a single-family detached unit during its expected lifetime. Making this assumption simplified the probability calculations but resulted in a conservative estimate of the expected lifespan of a single-family detached unit (roughly 80 years). In the present study, we used the mid-point in the range of lifespan estimates (87.5 years) and applied unrounded estimates of housing turnover rather than rounding each estimate to the nearest integer. We used the latter approach in this study because it allows us to apply more precise estimates of housing turnover for each state.

Discussion

We found substantial state-to-state differences in projections of the proportion of households with a disabled resident and in estimates of the probability that a newly built single-family detached unit will house at least one disabled resident during its expected lifetime. Although these numbers do not represent absolute limits regarding disability estimates and projections, they do provide an indication of the range implied by different combinations of age structure, disability status, and rate of housing turnover. It is noteworthy that every state in our sample—even Utah, a state with a young population, low disability rates, and a moderate rate of housing turnover—was characterized by a substantial probability that a newly built single-family detached unit will house at least one disabled resident, using our first disability measure (HHDIS-1). Even using our second measure (HHDIS-2), the probabilities were non-trivial for every state.

Differences among local areas are likely to be greater than differences among states because local areas display a wider range of demographic characteristics. However, the results shown here suggest that most local areas will exhibit at least a modest need for accessible housing and many will exhibit a strong need. It should also be noted that uncertainty is greater for local areas than for states because local areas are subject to more rapid changes in population growth rates and demographic composition than states.

The estimates and projections presented here were based on a variety of assumptions regarding disability rates, housing turnover, population growth, and the lifespan of housing units. These assumptions were reasonable, but several may have led to an understatement of the need for accessible housing. For example, we calculated disability rates using disability status at a single point in time, thereby excluding the impact of persons who were previously disabled but had since recovered. Also, the disability rates were based on data that excluded residents of nursing homes, who often have very high disability rates. Furthermore, we did not consider “visitability,” or whether a housing unit can accommodate disabled visitors.

Different assumptions will lead to different outcomes, of course. Future research is likely to explore alternative assumptions regarding disability rates, housing turnover, and the lifespan of housing units; investigate additional factors that may affect the results (e.g., changes in racial/ethnic composition); analyze data for different geographic units (e.g., counties); and consider other types of housing (e.g., town houses or mobile homes). This research will deepen our understanding of the need for accessible housing.

We did not evaluate the costs of specific types of access features. Numerous combinations of features are possible, ranging from the zero-step entrance, bathroom or half bath on the entry level, and wide interior doorways espoused by the visitability movement (Maisel *et al*., 2008) to the much more extensive set of features and configurations associated with universal design (Pynoos *et al*., 2008). Costs of specific features differ considerably from each other and generally are much lower when those features are incorporated in the original design of a housing unit than when added as modifications after a unit has been built. An assessment of the full costs (and benefits) of various access features is a particularly important topic for future research.

Population aging is not unique to the United States, of course. The populations of England, Germany, Japan, China, and many other countries also are aging rapidly. According to recent calculations performed by the United Nations, about 8% of the populations of both the United States and Europe were aged 65 or older in 1950 (United Nations, 2010). By 2000, these proportions had risen to 12% and 15%, respectively, and by 2050 they are projected to reach 22% and 27%. Japan's population aged 65 or older rose from 5% of the total in 1950 to 17% in 2000 and is projected to reach a stunning 38% by 2050. China's population aged 65 or older is projected to rise from 7% of the total in 2000 to 23% in 2050 and to outnumber the older populations of the United States, Europe, and Japan combined.

Population aging is likely to raise the number of households with disabled residents in these and many other countries over the next several decades. Given the social isolation and risk of injury caused by architectural barriers, the desire of most people to live independently for as long as possible, and the high cost of institutionalization, these trends point to a substantial worldwide need for accessible housing. Unfortunately, suitable access features are missing from most of the housing stock not only in the United States but in England (Imrie, 2003), Spain (Alonso, 2002), New Zealand (Saville-Smith *et al.*, 2007), and other countries as well.

Conclusions

The evidence presented here suggests that although there are variations from one place to another, there is likely to be a strong need for accessible housing almost everywhere in the United States. Similar results likely would be found in many other countries as well. We urge homebuilders, planners, and policy makers to consider the implications of aging and disability as they develop and implement housing plans and policies. Raising the number of accessible homes will benefit currently disabled people, their caregivers, their families and friends, those who become disabled in the future, and society as a whole.

We believe public policy should be directed toward establishing and strengthening programs that promote the construction of accessible homes and the addition of access features to the current housing stock. As noted by Pynoos *et al.* (2008), a paradigm shift is needed in which society extends the concepts of inclusion and accessibility to the entire housing stock. The Fair Housing Act Amendment of 1988 has already established housing accessibility as a civil rights issue by recognizing people with disabilities as a protected class. Given the impact of the home environment on physical and mental well being, housing accessibility should be considered as an important healthcare issue as well (Sanford, 2010).

Housing accessibility is also a critical fiscal issue. Injuries caused by architectural barriers—especially injuries from falling—give rise to large medical expenditures and the lack of home access features often leads to institutionalization. In many instances, the resulting costs are paid from public funds (e.g., the Medicaid program in the United States). Providing assistive services at home is less costly than providing those services in an institutional setting (Chappell *et a*l., 2004; LaPlante *et al.*, 2007), but cost savings will not be possible if architectural barriers prevent people from remaining in their homes. Population aging will make the fiscal implications of an inadequate supply of accessible housing increasingly important.

There are some indications that housing policy may be moving in the direction of greater accessibility. Great Britain has mandated a set of access features in virtually all new homes (Imrie, 2003). In Sweden and several other countries, home modifications to meet the needs of disabled residents are accepted as medical interventions (Sanford, 2010). In the United States, the Inclusive Home Design Act would require a basic set of access features in all new single-family homes built using federal funds (Smith *et a*l. 2008). This act has been introduced in Congress but has not yet been passed. The public health benefits of home access features have been emphasized by the American Public Health Association (2009) and in the federal initiative *Healthy People 2020* (U.S. Department of Health and Human Services, 2011). These are promising steps. We hope more will be forthcoming.

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Table 1. Household disability rates by age of householder, by state, 2000

	HHDIS-1				HHDIS-2			
Age	**UT**	**GA**	**FL**	**WV**	**UT**	**GA**	**FL**	**WV**
<35	4.6	5.0	5.9	8.9	1.4	1.7	1.9	2.5
35-44	9.8	9.9	11.6	17.2	3.2	3.5	4.0	5.7
45-54	14.6	17.1	18.0	24.9	4.8	5.5	5.9	7.7
55-64	24.0	28.0	25.8	36.2	4.7	8.3	7.4	9.8
65-74	30.4	35.7	28.9	37.8	7.1	10.6	7.5	11.8
75-84	37.9	44.8	35.5	45.7	12.1	16.6	10.8	17.8
85+	56.7	61.4	50.1	59.8	23.8	29.8	21.7	29.3
Total	14.5	16.8	19.0	25.7	4.2	5.6	5.9	8.4

Source: U.S. Census Bureau, 2003.

Table 2. HHDIS-1 projections of households and households with at least one disabled resident, by state, 2000-2050

UTAH	**2000**	**2010**	**2020**	**2030**	**2040**	**2050**
All Households	701,280	891,971	1,039,426	1,227,450	1,427,373	1,643,365
Low	93,796	124,049	146,114	170,338	195,026	218,542
%	13.4	13.9	14.1	13.9	13.7	13.3
Medium	93,796	130,578	161,900	198,674	239,440	282,435
%	13.4	14.6	15.6	16.2	16.8	17.2
High	93,796	137,107	178,494	229,990	291,041	360,466
%	13.4	15.4	17.2	18.7	20.4	21.9

GEORGIA	**2000**	**2010**	**2020**	**2030**	**2040**	**2050**
All Households	3,006,368	3,678,062	4,070,710	4,636,311	5,233,407	5,882,760
Low	474,310	608,073	688,269	777,299	852,331	920,046
%	15.8	16.5	16.9	16.8	16.3	15.6
Medium	474,310	640,077	762,625	906,603	1,046,439	1,189,027
%	15.8	17.4	18.7	19.6	20.0	20.2
High	474,310	672,080	840,794	1,049,506	1,271,953	1,517,533
%	15.8	18.3	20.7	22.6	24.3	25.8

FLORIDA	**2000**	**2010**	**2020**	**2030**	**2040**	**2050**
All Households	6,337,930	7,893,954	9,591,333	11,756,482	14,096,392	16,499,724
Low	1,171,019	1,464,088	1,727,984	2,050,573	2,380,542	2,692,264
%	18.5	18.5	18.0	17.4	16.9	16.3
Medium	1,171,019	1,541,145	1,914,664	2,391,687	2,922,682	3,479,362
%	18.5	19.5	20.0	20.3	20.7	21.1
High	1,171,019	1,618,202	2,110,917	2,768,676	3,552,538	4,440,645
%	18.5	20.5	22.0	23.6	25.2	26.9

WEST VIRGINIA	**2000**	**2010**	**2020**	**2030**	**2040**	**2050**
All Households	736,472	760,609	782,972	743,400	673,383	590,679
Low	180,735	186,866	189,133	178,059	158,906	134,935
%	24.5	24.6	24.2	24.0	23.6	22.8
Medium	180,735	196,701	209,566	207,679	195,095	174,384
%	24.5	25.9	26.8	27.9	29.0	29.5
High	180,735	206,536	231,047	240,415	237,139	222,563
%	24.5	27.2	29.5	32.3	35.2	37.7

Sources: ProFamy (unpublished data) and author’s calculations.

Table 3. HHDIS-2 projections of households and households with at least one disabled resident, by state, 2000-2050

UTAH	2000	2010	2020	2030	2040	2050
All Households	701,280	891,971	1,039,426	1,227,450	1,427,373	1,643,365
Low	27,477	35,476	41,412	48,723	56,530	64,156
%	3.9	4.0	4.0	4.0	4.0	3.9
Medium	27,477	37,343	45,886	56,829	69,404	82,912
%	3.9	4.2	4.4	4.6	4.9	5.0
High	27,477	39,210	50,589	65,786	84,360	105,820
%	3.9	4.4	4.9	5.4	5.9	6.4

GEORGIA	2000	2010	2020	2030	2040	2050
All Households	3,006,368	3,678,062	4,070,710	4,636,311	5,233,407	5,882,760
Low	158,433	201,615	227,156	259,407	289,242	315,636
%	5.3	5.5	5.6	5.6	5.5	5.4
Medium	158,433	212,226	251,696	302,560	355,113	407,913
%	5.3	5.8	6.2	6.5	6.8	6.9
High	158,433	222,837	277,495	350,251	431,642	520,612
%	5.3	6.1	6.8	7.6	8.2	8.8

FLORIDA	2000	2010	2020	2030	2040	2050
All Households	6,337,930	7,893,954	9,591,333	11,756,482	14,096,392	16,499,724
Low	364,834	456,454	535,270	637,620	748,986	855,492
%	5.8	5.8	5.6	5.4	5.3	5.2
Medium	364,834	480,478	593,097	743,689	919,559	1,105,600
%	5.8	6.1	6.2	6.3	6.5	6.7
High	364,834	504,502	653,890	860,913	1,117,730	1,411,057
%	5.8	6.4	6.8	7.3	7.9	8.6

WEST VIRGINIA	2000	2010	2020	2030	2040	2050
All Households	736,472	760,609	782,972	743,400	673,383	590,679
Low	58,423	60,043	60,961	58,402	53,056	45,501
%	7.9	7.9	7.8	7.9	7.9	7.7
Medium	58,423	63,204	67,546	68,117	65,139	58,803
%	7.9	8.3	8.6	9.2	9.7	10.0
High	58,423	66,364	74,470	78,854	79,177	75,050
%	7.9	8.7	9.5	10.6	11.8	12.7

Sources: ProFamy (unpublished data) and author’s calculations.

Table 4. Average length of residence by age of householder and state, single-family detached units, 2000

Age	Utah	Georgia	Florida	West Virginia
<35	3.8	4.1	4.1	5.0
35-44	8.0	7.2	7.0	9.7
45-54	12.8	11.4	10.1	14.9
55-64	19.5	17.4	13.5	21.0
65-74	24.8	23.2	16.8	27.3
75-84	29.1	26.6	20.0	30.0
85+	31.9	30.3	23.9	30.0
Total	12.5	12.0	10.7	16.7

Source: U.S. Census Bureau, 2003.

Table 5. Average length of residence for single-family detatched units, weighted by the age distribution of households with a disabled resident

Year	Utah	Georgia	Florida	West Virginia
2000	17.0	16.0	13.8	19.7
2010	18.1	16.9	14.2	20.4
2020	18.8	17.7	14.4	21.0
2030	19.5	18.5	14.8	21.8
2040	20.1	19.1	15.1	22.4
2050	20.6	19.4	15.4	22.8

Source: U.S. Census Bureau, 2003.