Projections of Ohio's older disabled population : 2015 to 2050

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Dr. Shahla Mehdizadeh is the Director of Research for the Ohio Long-Term Care Research Project (OLTCRP) which is housed in the Scripps Gerontology Center, Miami University. Her research expertise is in estimating the prevalence of disability among the older population, and examining health and long-term care utilization patterns of older disabled persons. Her work at Scripps Gerontology Center includes a series of reports projecting the number of disabled older people in Ohio and their needs. She is the co-principal investigator of a eight-year longitudinal study in Ohio that tracks use patterns for home and nursing home care for the Ohio Department of Aging. She is also the principal investigator of two studies which examined health and long-term care use patterns of dual eligible persons in Ohio. Her interests are in designing and evaluating coordinated health and long-term care delivery systems for dual eligible persons.

Dr. Suzanne Kunkel is Director of the Scripps Gerontology Center and Associate Professor in the Department of Sociology, Gerontology, & Anthropology, Miami University, Oxford, Ohio. Her primary research is in the areas of consumer direction in long-term care, the measurement of health, and projections of health care needs for the older population. She has been involved in several large-scale studies projecting the future of long-term care needs for the nation, and for the state of Ohio and its counties. Her projections of population aging and the impact on long-term care needs have expanded to include a focus on global aging and the consequences of a rapidly aging society on less-developed regions of the world. Dr. Kunkel's long-term care research also includes foundation and federally funded projects designed to develop and evaluate innovations in home-care.

Dr. P. Neal Ritchey is an Associate Professor in the Department of Sociology at the University of Cincinnati. His research interests are diverse -- demography, high risk behaviors, prejudice and discrimination, and medical sociology. His research interest are linked by a strong focus on policy and specialities in research methodology, evaluation research, and simulations. He has been involved in several studies of the older population, including: estimating their number by age-sex in small areas over the future time horizon; estimating their disability over the future time horizon; estimating their drug use; studying their patterns of activities; and studying the relationship between weight and mortality among them.

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Executive Summary

Beginning with 2015, Ohio's older population will start a steady and significant increase for a 35 year period. Between now and the year 2015, the state has an opportunity to plan and prepare for this growing older population.

- Between 2015 and 2050, the older population in Ohio will nearly double, growing from 1.7 million to 2.9 million. Two-thirds of the growth will occur by 2030.

- The composition of Ohio's older population will be increasingly comprised of the oldest old–those age 85 and above. By the year 2050, over a million people in Ohio will be 85 years or older.

- The proportion of women in the older population increases by age. By the year 2050, 56 percent of all older people in Ohio will be female.

- Disability prevalence increases substantially with age. Slightly more than 3 percent of people age 65-69 have severe limitation in caring for themselves compared with 50 percent of people 95 years and older.

- A higher proportion of older women are disabled than older men at every age category. For example, 20 percent of women age 65-69 are disabled compared to 14 percent of the men of the same age category. The difference in proportion disabled is most evident in higher ages (85 percent of women and 64 percent of men 95 years or older).

- The number of older people with severe disability will more than double, increasing from less than 200,000 in 2015 to 450,000 in 2050.

- Older women are more likely than older men to live alone, to have inadequate economic resources, and to experience disability.

- Although the majority of people reaching age 65 will continue to live healthy, productive lives, a considerable number of older people grapple with disability and will be unable to care for themselves without assistance.

- The next fifteen years provide an important window of opportunity for Ohio to evaluate it's long-term care system, and to develop innovative and effective approaches to meeting the needs of the growing older population.

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Background

Aging has far-reaching implications at every level of our lives. Long life has a direct effect on individuals, families, communities, policy makers, planners, service providers, product designers, and state and federal governments. There are challenges that accompany the successes of long life, including decisions about health and long-term care, debates about allocation of resources, provision of services, and concerns about quality of extended life. The design and delivery of appropriate, accessible, and affordable long-term care services is a challenge for every society that is fortunate to have an aging population. With one of the largest older populations in our nation, Ohio is dealing with these challenges today. As the Baby Boom generation ages and the number of older people reaches unprecedented heights, the challenges and opportunities of an aging society will be magnified.

Because of the importance of these demographic changes for state policy, we present this report on the projected growth of the aged population in the state of Ohio between 2015 and 2050[1]. Our report focuses on the growth of the older population overall, and on growth among the segment of older people who will experience some limitation in their ability to perform basic activities of daily living such as bathing, dressing, and preparing meals. The tremendous growth of this latter

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[1]An earlier report published by the Scripps Gerontology Center in 1996 described the changes in Ohio's population between 1995 and 2010.

group requires careful examination of current approaches to long-term care, development and testing of innovative strategies for local and state response to the needs of the older population, and thoughtful long-range planning.

The design and delivery of appropriate, accessible, and affordable long-term care services is a challenge for every society that is fortunate to have an aging population.

Disability and Long-Term Care

The size of the older population experiencing disability has substantial policy and budget implications. Long-term care has become a major component of state and national budgets. National public expenditures (Medicare and Medicaid) for nursing homes and for home-based long-term care totaled over $100 billion in 1999. For states, the rapid growth of Medicaid--which was largely unanticipated when the program was enacted in 1965--has caused the program to become a major part of state general revenue expenditures. In 2000, national Medicaid expenditures for nursing homes, personal care, and home care was almost $68 billion. These long-term care costs represented 35% of total Medicaid expenditures for the year. Ohio's Medicaid costs for all long-term care were over $3.2 billion in 2000. About 85% of those dollars were spent on institution-based care. Ohio's Medicaid expenditures on nursing facilities rose from $1.8 billion in 1995 to over $2.7 billion in 2000. Spending on Ohio's Medicaid waiver programs for home and community based services increased from $195 million in 1995 to $474 million in 2000

(Burwell, 2001). Ohio's Medicaid expenditures for all long-term care in the year 2000 represented 42% of the total Medicaid budget for that year.

Because health and long-term care have become such important public programs with enormous budget implications, it is essential to understand and predict demographic changes that might affect those programs.

Ohio's increasing commitment to long-term care is made in the context of competing demands on state revenue dollars. All states have difficult policy decisions to make about how to spend tax revenues. Schools, highways, parks, and health and long-term care all compete for limited funds. Because health and long-term care have become such important public programs with enormous budget implications, it is essential to understand and predict demographic changes that might affect those programs. This report is designed to provide decision makers with population and disability projections to better plan for the challenges faced by our aging society.

Updated Projections

In 1990, Scripps Gerontology Center published a first report on the projected growth of Ohio's older population and the implications of that growth for long-term care needs, based on population estimates calculated from 1980 census data (the most up-to-date counts available at the time of the original report). We updated that work when 1990 census counts became available. The present report builds upon earlier work by using the most current national information on the prevalence of disability. Most importantly, these projections take us up through the year 2050, when the large Baby Boom cohort will all be in their eighties or older. This projection period from 2015 to 2050 maps the unprecedented increase in the numbers of older people and in the numbers who will need long-term care services. This report summarizes the methods used, and implications of these projections, and presents the population and disability projections for the state.

Projection Model

The research involved two primary steps: projecting the total older population, and projecting the disabled older population in Ohio. We first needed detailed projections of the population by age and sex, since women have greater life expectancy and higher rates of disability than men, and because disability increases with age. After obtaining these detailed population projections, we needed age and sex-specific rates of disability, which were held constant throughout the projection period although some researchers have suggested that these rates may change. These disability rates were then applied to the populations in each age and sex category to get an estimate of the number of older people with disability in Ohio for the years 2015 through 2050. An overview of each of these tasks is provided here; a more detailed discussion is included in the Technical Appendix at the end of this report.

Projections of Ohio's Older Population

a 46% increase. Two-thirds of the total predicted increase that we will see in the numbers of older people between 2015 and 2050 will occur during the first 15 years of the 35-year projection period. This "front-loading" of growth in the older population should encourage us to consider policy and planning implications now.
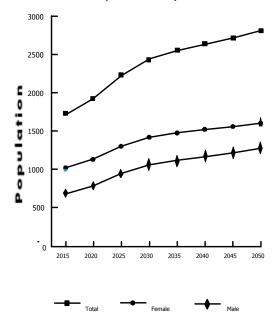
Between 2015 and 2050, the older population in Ohio will grow significantly, from 1.7 million to 2.9 million, an increase of 70%.

Beginning with 1990 census counts, the Office of Strategic Research at the Ohio Department of Development produced detailed population projections for the state for 1990 to 2015 (ODD, 1993). Our projections began with the base population in 2010 estimated by ODD[2]. Between 2015 and 2050, the older population in Ohio will grow significantly from 1.7 million to 2.9 million, an increase of 70%. This dramatic growth in the numbers of older people is mirrored by the growth in the number of disabled older people– from about half a million in 2015 to over a million in 2050 (an increase of almost 100%). Figure 1 shows the growth of the older population overall, and Figure 2 shows the near doubling of the disabled older population. While the overall increase in the numbers of older people and in the numbers of disabled older people is compelling, it is also important to note that the biggest jumps in these numbers will occur between 2015 and 2030. During that time the older population will increase from 1.7 million to 2.5 million,

The composition of Ohio's older population will be increasingly comprised of the oldest old. Those age 85 and above will increase from a quarter of a million in 2020 to over one million in 2050.
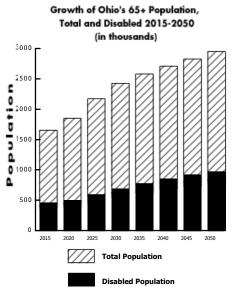
Figure 1

Projections of Ohio's Older Population by Sex: 2015-2050 (in thousands)

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[2]Data from the 2000 Census are not yet available in sufficient age and sex detail to be used in these projections.

Figure 2

**Growth of Ohio's 65+ Population,
Total and Disabled 2015-2050
(in thousands)**

Legend:
- Total Population
- Disabled Population

Figure 3

**Projections of Ohio's Older Population
by Age Categories: 2015-2050
(in thousands)**

Legend:
- 65-74
- 75-84
- 85+

The composition of Ohio's older population will be increasingly comprised of the oldest old--those age 85 and above. Figures 3 and 4 show the growth in numbers of older people in three age categories. The youngest group--ages 65 to 74--will increase and then level off; the middle group (ages 75-84) will grow quickly then drop as the Baby Boom generation reaches and passes through those ages. The 85+ group shows a very dramatic increase, from a quarter of a million in 2020 to over one million in 2050. (See Table A-1 in the Appendix.) This is the age group most likely to experience some need for long-term care services. Because the proportion of women in the older population increases with age, Ohio's older population will continue to be predominately female (56% in 2050). Older women are more likely than older men to live alone, to have inadequate economic resources, and to experience disability. These changes in the composition of the older population are likely to have policy implications as important as the sheer growth in numbers of older people.
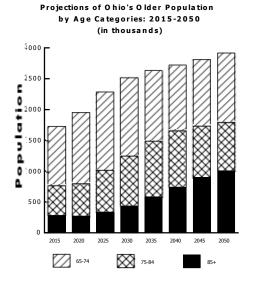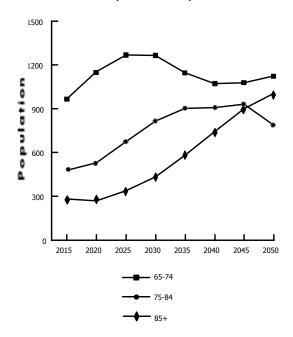
Figure 4

**Projections of Ohio's Older Population
by Age Categories: 2015-2050
(in thousands)**

Legend:
- 65-74
- 75-84
- 85+

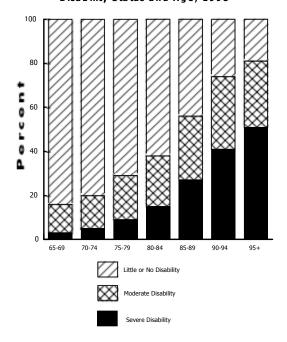# Projections of Disability Among Ohio's Older People

To refine the picture of the long-term care service needs of Ohio's older population, we projected the numbers of older people with disability. This involved two steps: the development of age and sex-specific rates of disability, and the application of those rates to the projected population. We defined disability as impairment in Activities of Daily Living and/or Instrumental Activities of Daily Living (ADL's and IADL's). We calculated disability rates for three levels of impairment: severe, moderate, and little or no disability. Individuals were classified as moderately disabled if they experienced a limitation in one of the following ADL's: eating, transferring in or out of bed or chair, getting to the toilet, dressing, bathing, remaining continent, or in at least one of the following instrumental tasks of daily living: walking, shopping, meal preparation, housekeeping, plus using transportation or telephone. Severe disability refers to limitation in at least two of the following ADL's: eating, bathing, transferring in or out of bed or chair, getting to the toilet, dressing, remaining continent, or having cognitive impairment. Limitation was defined as needing hands-on assistance with the task, help of another person, supervision or special equipment. The data sets which provided us with the necessary information about disability rates among the institutionalized and community-dwelling populations, and the methods we used to

combine disability rates for the two groups, are discussed in the Technical Appendix of this report.

Disability prevalence increases substantially with age. Slightly more than 3% of people age 65-69 have severe limitations, compared with 50% of people 95 and older.

Figure 5 shows how disability prevalence increases substantially with age. Slightly more than 3% of people age 65-69 have severe limitations, compared with 50% of people 95 and older. Figure 6 highlights the higher rates of severe disability among women of all ages, and the consistent increase in prevalence of disability with advancing age for both men and women.

Figure 5

Estimated Percentage Distribution of Total Population by Disability Status and Age, 1995

Little or No Disability

Moderate Disability

Severe Disability

Both moderate and severe disability are most prevalent among the oldest members of our population (those 85+). Figure 5 and Appendix Table A-2 show that about 56% of older people between the ages of 85 and 89 have moderate or severe levels of impairment; about three-fourths of the 90 to 94 year-olds fall into this category, and 80% of those who are 95 or older have some disability.

Figure 6 - female

Estimated Percentage Distribution of
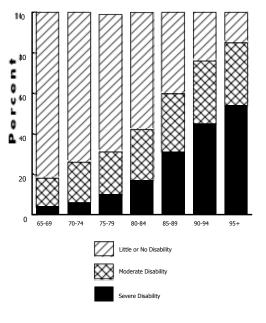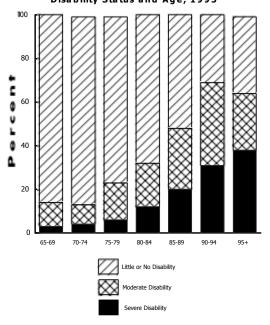Female Population by
Disability Status and Age, 1995

Little or No Disability

Moderate Disability

Severe Disability

Figure 6 - male

Estimated Percentage Distribution
of Male Population by
Disability Status and Age, 1995

Little or No Disability

Moderate Disability

Severe Disability

As was the case for the overall population, the size of the severely disabled population will increase dramatically between 2015 and 2050. The number of older people with severe disability will more than double in size, from less than 200,000 in 2015 to over 450,000 in 2050. The moderately disabled group will almost double in size, increasing from about 318,000 in 2015 to about 615,000 in 2050 (Table A-1).

The rate of growth varies, however, by age and sex. The number of severely and moderately disabled older people over the age of 85 will more than triple, from 177,000 in 2015 to 622,000 in 2050. The number of severely disabled older women will triple (Table A-3), and the number of severely disabled older men will more than quadruple over the thirty-five year projection period (Table A-4). Rates of increase are partly based on the size of the group in question; the

numbers of older men are lower at every age and at every stage of the projection period, so it takes fewer absolute numbers of people added to the group to achieve a higher rate of increase. Therefore, even though the rate of increase for disabled older men is higher than that for women, the number of older women with disability is much higher. While the differential rates of increase are of interest as we try to understand the changing demographics of the older population, the absolute numbers of older people needing assistance has a greater impact on service system design and planning. A detailed review of the projections of numbers of older people by age, sex, and levels of disability is provided in Appendix Tables A-1, A-3, and A-4.

The increasing number of disabled older women suggests that service utilization and cost patterns may be altered in the future.

The increasing number of disabled older women suggests that service utilization and cost patterns may be altered in the future. Many of the long-term care service use indicators such as living arrangements, marital status, and income vary by sex. For example, nationally 60% of women age 85 and older lived alone (AARP, 1999). Economic indicators for Ohio suggest that older women are more likely to have low incomes--80% of people age 75 and over who are poor are women. Thus, even though the overall increases in the growth of the disabled older population are compelling in themselves, the higher proportion of vulnerable older women could affect service use and cost patterns in the near future.

Summary and Conclusions

This report describes the dramatic growth that will take place in Ohio's older population over the next several decades. The number of Ohio citizens who are 65 and older will almost double, reaching nearly 3 million by the year 2050. Within this growing older population, the greatest increase will be among those who are 85 and older. Figure 4 showed that, by 2050, the number of people in the oldest age group will exceed the number who are 75 to 84. Figures 7 and 8 show this same pattern separately for women and for men. The number of women 85 and older surpasses those who are 75 to 84 and those who are 65 to 74. This unprecedented shift in the composition of the older population reflects the aging of the Baby Boom cohort. This shift has significant implications for the future of health and long-term care services in the state.

Figure 7

Projections of Ohio's Older Female Population by Age Categories: 2015-2050
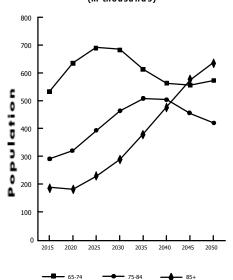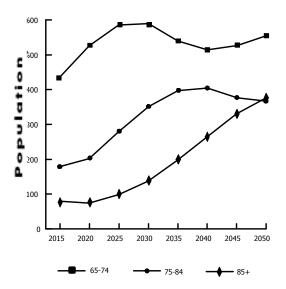(in thousands)

Figure 8

Projections of Ohio's Older Male Population
by Age Categories: 2015-2050
(in thousands)

The number of disabled older people will more than double, reaching nearly a projected 1.1 million by the year 2050. Certainly the magnitude of this group invites thoughtful consideration of the issues of where, by whom, and how long-term care services will be delivered, and how they will be financed.

Paralleling the growth of the total older population, the number of disabled older people will more than double, reaching nearly a projected 1.1 million by the year 2050. Certainly the magnitude of this group invites thoughtful consideration of the issues of where, by whom, and how long-term care services will be delivered, and how they will be financed.

These projections provide an impetus for long range planning and policy development. The next fifteen years provide the best window of opportunity for planning, innovation, and system redesign. Prior to 2015, the growth of the older population will be very slow (Mehdizadeh, Kunkel, Applebaum, 1996). After 2015, the increase in the population needing long-term care will proceed very rapidly. In fact, two-thirds of the dramatic growth described in this report will take place during the first fifteen years of the projection period (2015 to 2030).

As we think about the challenges of providing long-term care services to a rapidly growing older population, there are several points to keep in mind. First, there is a suggestion that future cohorts of older people will be healthier, so that disability prevalence rates may decline. There is some evidence that such a decline is beginning to occur (see for example Manton, 1997; Freedman, 1998) However, the magnitude, consistency, and predictability of a trend in disability rates are all unknown; this makes speculation about the future of disability prevalence quite risky. In addition, how disability is defined and measured has an impact on calculations of disability rates. For all of these reasons, our projections are based on a conservative assumption that, even if rates do vary at different points in time, the net result is no change in disability prevalence. Even if there is some improvement in disability status, the number of older Ohioans needing long-term care will still be staggering by the year 2050.

A second important factor for understanding the long-term care needs of future generations of older people is the composition of the older population itself. The fact that the oldest group--those 85 and above, who are most likely to need assistance--will

be more numerous than the youngest group has already been discussed. In addition, the older population will include a higher proportion of women than men, and older women are more economically vulnerable, are more likely to live alone, are more likely to be disabled, and therefore are more likely to need long-term care services. Women are the major consumers of formal long-term care. Over 70% of nursing home residents in Ohio as well as 80% of PASSPORT enrollees are women (Applebaum, Mehdizadeh, Straker, 2000).

The major demographic shifts that will be upon us in the near future, the changes that are already taking place within long-term care, as well as the financial strains on the current system, all certainly compel us to consider varied and innovative approaches.

Finally, the long-term care needs of our rapidly aging population should be seen as a call for thoughtful and creative thinking about how best to meet those needs. Ohio's long-term care system is already in transition. Nursing homes are increasingly providing short-term, rehabilitative, and post acute care. Other settings such as assisted living and individual private homes are more commonly the site where people receive long-term care services. Consumer direction, where the recipient of services is seen as the most important actor in the design and evaluation of care, is an important national trend in long-term care. This innovation is currently being tested in Ohio.

The major demographic shifts that will be upon us in the near future, the changes that are already taking place within long-term care, as well as the financial strains on the current system, all certainly compel us to consider varied and innovative approaches. The state of Ohio, the private sector, the research community, service providers, planners, and legislators have an opportunity over the next fifteen years to engage in planful and creative dialogue about how best to meet the needs of our aging population.

Appendix Tables

Table A-1

**State of Ohio, Projection of Older Population
by Age and by Levels of Disability, 2015-2050**

Year	Age Categories	Total Population	Population with No Disability	Population with Disability	
				Moderate[a]	Severe[b]
2015	65-74	965,482	792,855	131,895	40,732
	75-84	478,246	322,165	101,334	54,747
	85+	281,614	104,103	84,254	93,257
	Total	1,725,342	1,219,123	317,483	188,736

Year	Age Categories	Total Population	Population with No Disability	Population with Disability	
				Moderate	Severe
2020	65-74	1,154,271	948,234	157,399	48,638
	75-84	528,927	356,635	111,916	60,376
	85+	269,543	99,477	80,638	89,428
	Total	1,952,741	1,404,346	349,953	198,442

Year	Age Categories	Total Population	Population with No Disability	Population with Disability	
				Moderate	Severe
2025	65-74	1,267,278	1,041,777	172,224	53,277
	75-84	676,130	457,999	142,060	76,071
	85+	338,586	125,536	101,309	111,741
	Total	2,281,994	1,625,312	415,593	241,089

Year	Age Categories	Total Population	Population with No Disability	Population with Disability	
				Moderate	Severe
2030	65-74	1,264,655	1,039,998	171,554	53,103
	75-84	814,718	553,226	170,538	90,954
	85+	433,950	162,288	129,881	141,781
	Total	2,513,323	1,755,512	471,973	285,838

[a] Moderate disability is defined as experiencing limitations in at least one of the following activities of daily living: eating, transferring in or out of bed or chair, getting to the toilet, dressing, bathing, remaining continent; or in at least two of the following instrumental activities of daily living: walking, shopping, meal preparation, housekeeping, or using transportation.

[b] Severe disability is defined as experiencing limitations in at least two of the following activities of daily living: eating, transferring in or out of bed or chair, getting to the toilet, dressing, remaining continent, or having cognitive impairment.

(Table A-1 continued)

State of Ohio, Projection of Older Population
by Age and by Levels of Disability, 2015-2050

Year	Age Categories	Total Population	Population with No Disability	Population with Disability	
				Moderate[a]	Severe[b]
2035	65-74	1,146,065	942,921	155,097	48,047
	75-84	903,519	614,351	188,733	100,435
	85+	582,574	219,716	174,415	188,443
	Total	2,632,158	1,776,988	518,245	336,925

Year	Age Categories	Total Population	Population with No Disability	Population with Disability	
				Moderate	Severe
2040	65-74	1,071,958	882,686	144,459	44,813
	75-84	908,104	617,979	189,449	100,676
	85+	742,326	281,581	222,288	238,457
	Total	2,722,388	1,782,246	556,196	383,946

Year	Age Categories	Total Population	Population with No Disability	Population with Disability	
				Moderate	Severe
2045	65-74	1,078,348	888,677	144,717	44,954
	75-84	831,532	566,436	173,206	91,890
	85+	900,001	342,650	269,537	287,814
	Total	2,809,881	1,797,763	587,460	424,658

Year	Age Categories	Total Population	Population with No Disability	Population with Disability	
				Moderate	Severe
2050	65-74	1,122,453	925,550	150,201	46,702
	75-84	788,668	538,113	163,861	86,694
	85+	1,005,889	383,843	301,273	320,773
	Total	2,917,010	1,847,506	615,335	454,169

[a] Moderate disability is defined as experiencing limitations in at least one of the following activities of daily living: eating, transferring in or out of bed or chair, getting to the toilet, dressing, bathing, remaining continent; or in at least two of the following instrumental activities of daily living: walking, shopping, meal preparation, housekeeping, or using transportation.

[b] Severe disability is defined as experiencing limitations in at least two of the following activities of daily living: eating, transferring in or out of bed or chair, getting to the toilet, dressing, remaining continent, or having cognitive impairment.

Table A-2

**Estimated Percentage Distribution of Population by
Disability Status[a] and by Age, 1995**

Age Categories	Little or No Disability	Moderate Disability	Severe Disability
65-69	84	13	3
70-74	80	15	5
75-79	71	20	9
80-84	62	23	15
85-89	44	29	27
90-94	26	33	41
95+	19	30	51

[a] Number at a given disability status per 100 people.

Table A-3

**State of Ohio, Projection of Older Female Population
by Age and by Levels of Disability, 2015-2050**

Year	Age Categories	Total Population	Population with No Disability	Population with Disability	
				Moderate[a]	Severe[b]
2015	65-74	529,809	416,300	87,929	25,580
	75-84	299,140	190,721	68,510	39,909
	85+	202,398	67,473	60,352	74,573
	Total	1,031,347	674,494	216,791	140,062

Year	Age Categories	Total Population	Population with No Disability	Population with Disability	
				Moderate	Severe
2020	65-74	629,002	494,241	104,391	30,370
	75-84	327,422	208,752	74,987	43,683
	85+	194,995	65,005	58,145	71,845
	Total	1,151,419	767,998	237,523	145,898

Year	Age Categories	Total Population	Population with No Disability	Population with Disability	
				Moderate	Severe
2025	65-74	681,589	535,562	113,119	32,908
	75-84	396,627	252,875	90,837	52,915
	85+	240,457	80,160	71,701	88,596
	Total	1,318,673	868,597	275,657	174,419

Year	Age Categories	Total Population	Population with No Disability	Population with Disability	
				Moderate	Severe
2030	65-74	675,362	530,669	112,085	32,608
	75-84	463,917	295,777	106,248	61,892
	85+	297,384	99,138	88,675	109,571
	Total	1,436,663	925,584	307,008	204,071

[a] Moderate disability is defined as experiencing limitations in at least one of the following activities of daily living: eating, transferring in or out of bed or chair, getting to the toilet, dressing, bathing, remaining continent; or in at least two of the following instrumental activities of daily living: walking, shopping, meal preparation, housekeeping, or using transportation.

[b] Severe disability is defined as experiencing limitations in at least two of the following activities of daily living: eating, transferring in or out of bed or chair, getting to the toilet, dressing, remaining continent, or having cognitive impairment.

(Table A-3 continued)

**State of Ohio, Projection of Older Female Population
by Age and by Levels of Disability, 2015-2050**

Year	Age Categories	Total Population	Population with No Disability	Population with Disability	
				Moderate[a]	Severe[b]
2035	65-74	606,355	476,446	100,632	29,277
	75-84	505,914	322,553	115,866	67,495
	85+	384,927	128,322	114,779	141,826
	Total	1,497,196	927,321	331,277	238,598

Year	Age Categories	Total Population	Population with No Disability	Population with Disability	
				Moderate	Severe
2040	65-74	557,766	438,267	92,569	26,930
	75-84	503,188	320,815	115,242	67,131
	85+	477,961	159,336	142,521	176,104
	Total	1,538,915	918,418	350,332	270,165

Year	Age Categories	Total Population	Population with No Disability	Population with Disability	
				Moderate	Severe
2045	65-74	551,819	433,595	91,582	26,642
	75-84	454,881	290,016	104,179	60,686
	85+	569,725	189,927	169,883	209,915
	Total	1,576,425	913,538	365,644	297,243

Year	Age Categories	Total Population	Population with No Disability	Population with Disability	
				Moderate	Severe
2050	65-74	567,697	446,071	94,217	27,409
	75-84	422,336	269,266	96,725	56,345
	85+	629,942	210,001	187,839	232,102
	Total	1,619,975	925,338	378,781	315,856

[a] Moderate disability is defined as experiencing limitations in at least one of the following activities of daily living: eating, transferring in or out of bed or chair, getting to the toilet, dressing, bathing, remaining continent; or in at least two of the following instrumental activities of daily living: walking, shopping, meal preparation, housekeeping, or using transportation.

[b] Severe disability is defined as experiencing limitations in at least two of the following activities of daily living: eating, transferring in or out of bed or chair, getting to the toilet, dressing, remaining continent, or having cognitive impairment.

**State of Ohio, Projection of Older Male Population
by Age and by Levels of Disability, 2015-2050**

Year	Age Categories	Total Population	Population with No Disability	Population with Disability	
				Moderate[a]	Severe[b]
2015	65-74	435,673	376,555	43,966	15,152
	75-84	179,106	131,444	32,824	14,838
	85+	79,216	36,630	23,902	18,684
	Total	693,995	544,629	100,692	48,674

Year	Age Categories	Total Population	Population with No Disability	Population with Disability	
				Moderate	Severe
2020	65-74	525,269	453,993	53,008	18,268
	75-84	201,505	147,883	36,929	16,698
	85+	74,548	34,472	22,493	17,583
	Total	801,322	636,348	112,430	52,549

Year	Age Categories	Total Population	Population with No Disability	Population with Disability	
				Moderate	Severe
2025	65-74	585,689	506,215	59,105	20,369
	75-84	279,503	205,124	51,223	23,156
	85+	98,129	45,376	29,608	23,145
	Total	963,321	756,715	139,936	66,670

Year	Age Categories	Total Population	Population with No Disability	Population with Disability	
				Moderate	Severe
2030	65-74	589,293	509,329	59,469	20,495
	75-84	350,801	257,449	64,290	29,062
	85+	136,566	63,150	41,206	32,210
	Total	1,076,660	829,928	164,965	81,767

[a] Moderate disability is defined as experiencing limitations in at least one of the following activities of daily living: eating, transferring in or out of bed or chair, getting to the toilet, dressing, bathing, remaining continent; or in at least two of the following instrumental activities of daily living: walking, shopping, meal preparation, housekeeping, or using transportation.

[b] Severe disability is defined as experiencing limitations in at least two of the following activities of daily living: eating, transferring in or out of bed or chair, getting to the toilet, dressing, remaining continent, or having cognitive impairment.

(**Table A-4 continued**)

Projection of Older Male Population
by Age and by Levels of Disability, 2015-2050

Year	Age Categories	Total Population	Population with No Disability	Population with Disability	
				Moderate[a]	Severe[b]
2035	65-74	539,710	466,475	54,465	18,770
	75-84	397,605	291,798	72,867	32,940
	85+	197,647	91,394	59,636	46,617
	Total	1,134,962	849,667	186,968	98,327

Year	Age Categories	Total Population	Population with No Disability	Population with Disability	
				Moderate	Severe
2040	65-74	514,192	444,419	51,890	17,883
	75-84	404,916	297,164	74,207	33,545
	85+	264,365	122,245	79,767	62,353
	Total	1,183,473	863,828	205,864	113,781

Year	Age Categories	Total Population	Population with No Disability	Population with Disability	
				Moderate	Severe
2045	65-74	526,529	455,082	53,135	18,312
	75-84	376,651	276,420	69,027	31,204
	85+	330,276	152,723	99,654	77,899
	Total	1,233,456	884,225	221,816	127,415

Year	Age Categories	Total Population	Population with No Disability	Population with Disability	
				Moderate	Severe
2050	65-74	554,756	479,479	55,984	19,293
	75-84	366,332	268,847	67,136	30,349
	85+	375,947	173,842	113,434	88,671
	Total	1,297,035	922,168	236,554	138,313

[a] Moderate disability is defined as experiencing limitations in at least one of the following activities of daily living: eating, transferring in or out of bed or chair, getting to the toilet, dressing, bathing, remaining continent; or in at least two of the following instrumental activities of daily living: walking, shopping, meal preparation, housekeeping, or using transportation.

[b] Severe disability is defined as experiencing limitations in at least two of the following activities of daily living: eating, transferring in or out of bed or chair, getting to the toilet, dressing, remaining continent, or having cognitive impairment.

Technical Appendix

There were three steps in the projection of Ohio's disabled older population: 1) projection of Ohio's older population from 2010 to 2050; 2) estimation of age and sex specific disability rates for the older population; and 3) application of the disability rates to the survived population.

Projection of Ohio's Older Population

We projected the population using the cohort component method. The cohort component method uses a beginning age-sex count of the population and applies age-sex specific rates of each component of change – births, deaths, and migration – to estimate the future population. We projected population every 5 years between 2010 and 2050 for the next 10 to 50 years using 10 years age grouping for 65 to 84 cohorts and grouped 85 and older to a single group. Since there has been an observed change in the migration patterns of the 85 and older population and additional changes may be forthcoming in the next 50 years we did not attempt to break the over 85 population to smaller age categories. However, in calculating the projected population we applied age and sex specific 5-year survival rates to the beginning population to calculate the population that survived to the end of the 5-year period. The 5-year age-groupings were then aggregated to 10-year age groupings after the projections of the population to the year 2050 were completed.

To calculate projected population in each 5-year period, the age and sex specific net migration rates were applied to the survived population to calculate the net numbers of survivors leaving or joining Ohio's population during the period. The population at period's end becomes the beginning population for the next 5-year period and the procedure is repeated over the desired time horizon. In order to project the youngest group, those between ages 65-69, in 2050, we began in 2010 with ages 25-29; this cohort, of course, ages as they are projected forward. The projected population for 2010 came from the Office of Strategic Planning, Ohio Department of Development. Since the 25-29 age group in 2010 were 5 to 9 years old in 1990 (the base year for the 2010 projections) we did not need to apply birthrates and compute births for this cohort. Although we did not need birth rates for projecting the size of the older population in this study, we needed the other two components, survival rates and migration rates to complete our projections.

Survival Rates. We combined national survival rates with mortality information for Ohio to develop Ohio specific survival rates by age and sex for the period 2010-2050. The Census Bureau national projections uses 5-year survival rates for 5-year age-groups by sex which are trended to reflect slow improvements in survivorship from 1995-2050. We used the most recent mortality information for Ohio--1990 life-tables for males and females and the corresponding 1990 U.S. life-tables. From these life-tables, we calculated age-sex specific, 5-year survival rates for Ohio and the U.S., and then computed age-sex specific ratios of Ohio to U.S. survival rates for 1990. These ratios were applied to the Census' national survival rates for 1995-2050 to compute corresponding survival rates for Ohio. The survival rates for Ohio, then, track the improvement in national rates, but maintain the deviation from the nation that Ohio displayed in 1990. Thus, we

are assuming that future mortality declines in Ohio parallel those of the nation, but the 1990 deviation of Ohio's from the nation's is maintained.

There are several observations in the mortality assumption worth noting. First, mortality among the older population is assumed to decline over time, as the average age of males and females increases in Ohio and in the nation from 1990 to 2050, of course, Ohio rates parallel the national rates by construction. Second, and perhaps most notable, Ohio survival rates for both males and females are more favorable than those among their national counterparts. Both Ohio males and females show higher average ages than U.S. males and females for each period. Third, while female survivorship is more favorable than that of their male counterparts in each period for both Ohio and the U.S., the female advantage narrows over the future time horizon. While the average age of older females exceeds that of their male counterparts in each period for Ohio and the nation, this gap between female and male average ages narrows between 1990 to 2050.

Migration Rates. Our projections assume that the age-sex specific rates of net migration occurred in Ohio in 1985-90 remain constant for the periods 2010-2015 through 2045-2050. These rates are computed from actual, historical age-sex specific rates of in- and out-migration for Ohio. Counts of Ohio in-migrants, out-migrants, and non-migrants by age and sex were extracted from the 1990 Census and the 1985-90 county to county migration tally. We aggregated the data over counties and individual characteristics to derive the necessary age-sex specific counts. Net migration rates equal in-migration minus out-migration rates. While the net migration rates applied to each period are constant, the number of net migrants changes because the number is driven by the trend in population change over the time horizon. We chose to use

the 1985-90 historical rates because the migration rates by age among the older population follows the conventional pattern for mid-western states.

Estimation of Age and Sex Specific Disability Rates

Disability in this study is defined as a measure of impairment in activities of Daily Living (ADL) and Instrumental Activities of Daily Living (IADL). Three levels were assigned to this measure: Severe Disability; Moderate Disability; and Little or No Disability. Disability rates were calculated for the entire population regardless of residence. To achieve this objective, the disability rates for the institutionalized and community based older population were calculated separately, weighted by their respective proportions in the population, and then combined.

The community disability rates are calculated based on the community portion of the 1994 National Long-Term Care Survey (NLTCS). The particular survey that we used to measure the point estimate of chronic disability for the community residents is part of the ongoing surveys of the entire U.S. aged population that exhibited difficulties performing any of the Activities of Daily Living or the Instrumental Activities of Daily Living. The survey originally (in 1982) was designed to provide nationally representative data on the patterns of functional limitations; medical conditions; and recent medical problems among the 65 and older non-institutionalized population. The study also examined the demographic, educational level, health insurance status and the ability of the older person or his/her family to pay for care. The follow up surveys in 1984, 1989, and 1994 are intended to examine not only the prevalence of disability among certain age and sex but also the trends in disability among the older population. Since this survey has

become a longitudinal study, by including the surviving members in each survey year in the following survey, while supplementing the sample by the newly aged population and replacing those in advance ages who died, by necessity an institutional component has been added to the survey.

However, we used the 1995 National Nursing Home Survey (NNHS) to calculate the institutional disability rates for several reasons: 1) the NNHS survey is a stratified two stage random sample of nursing home population and has a larger sample size than the institutional component of the NLTCS, therefore, better representing the nursing home population; 2) in a study by Scripps Gerontology Center entitled *DeJa-Vu All Over Again, --,Or Is It? Nursing Home Use in the 1990's,* we found that the characteristics, length of stay and discharge rate of the nursing home residents in this sample closely resemble Ohio's nursing home population; 3) in previous studies as we predicted the disability rates among the older population we used the NNHS, using the same survey would allow us to compare the newly calculated rates with our previous rates.

The 1995 National Nursing Home Survey is a stratified two-stage probability design sample representing the nursing homes in the co-terminous United States. The first stage in the sample design is the selection of facilities and the next stage is the selection of residents within those facilities. The goals of this survey were to understand residents' characteristics, their care needs, reasons for admission, diagnosis, chronic conditions, services received, impairments in ADLs, payment sources and the outcome of care.

We used individual ADL-IADL item scores to determine disability status. Sample participants were identified as either dependent in performing Activities of Daily

Living or independent in order to assign disability status to each individual. Two criteria were used in selecting individual ADL or IADL items to include in the disability scale: 1) items must have similar wording, content, and time span in both surveys; and 2) the scale, and the items used in creating the scale, must be as similar as possible to the items used in calculating the disability measure that we created in our earlier studies of projecting the disabled older population of Ohio.

The prevalence of disability we found in the non-institutional population is slightly higher than the similar measure calculated by others using the same data[3]. When we searched for the reasons for the observed differences we found that the disability scale is sensitive to the ADL/IADL items included in the measure. Further, there are philosophical differences in how researchers define disability. For example, some studies consider any impairment lasting less than 90 days not chronic; however, we viewed any inability to perform an ADL/IADL as impairment irrespective of duration. Since we are measuring the proportion of the older population that would need assistance in any given day, duration of impairment is not an issue of concern in this study. Another source of discrepancy is the use of assistive devices that could enable a person to become independent. Whether a person is considered impaired or not is a matter of judgement and agenda. In this study we considered an individual impaired, even if he/she could be independent with the help of assistive devices, while other studies might not. Taking the more conservative approach might have made our disability rates slightly higher than some

[3] Manton, K., Corder, L., Stallard, E. (1997). *Chronic Disability Trends in Elderly United States Populations: 1982-1994*. Medical Sciences, Vol 94. Pp. 2593-2598.

other approach. However, the purpose of these projections is to assist policy makers in their planning process as the Baby Boomers age and would require assistance and care.

Another dilemma we faced in calculating disability rates was deciding how to incorporate recent information about declining trends in disability among the older population.

Even though the longitudinal nature of the NLTCS examined trends in disability among the older population residing in community, a similar measure was not available for the nursing home population, where those with highest care needs reside. In addition, the nature of the long-term care industry has changed considerably since the NNHS started in 1973. For these reasons, trends in disability rates of the nursing home population do not reflect changes in the disability status of all of the institutionalized population. There are now many other settings for receiving long-term care, such as assisted living, home and community based care, as well as, some innovative managed long-term care plans that utilize a combination of long-term care settings, in addition to nursing home care. Therefore, for the purposes of these projections, we assumed that the proportion of the population at each age and sex group who will become disabled will remain constant from 1995 (the two survey dates) to the year 2050, acknowledging that there are studies that suggest it could be otherwise[4]. If there is a decline in the proportion of older people who are disabled, our projections will represent a conservative, "worst-case" scenario for planning. Given the many unknowns that will shape the need for, nature of, and delivery of long-term care services, we chose to err in the direction of overstating

rather than understating the numbers of older people who will be disabled.

In order to arrive at a single disability rate to apply to Ohio's older population, it was necessary to combine the community and the institutionalized disability rates. This was accomplished by weighting the information on the two subgroups according to their representation in the total population. Of note, the community-based weights for each age and sex were calculated as "1 minus the rate of institutionalization" for that specific age-sex.

The disability rates were first calculated for each single year of age and sex, then smoothed by calculating a five years moving average (the five years consisted of two years above and two years below each specific age). Finally the smoothed disability rates were used to calculate the weighted average for the five years age groups. This was accomplished by weighting the disability rates for each year of age by the proportion of U.S. population that falls in that age within that age group.

Application of the Disability Rates to the Survived Population

The final step in generating the disabled older population of Ohio was to apply the ten-year weighted average disability rates to the projected population.

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[4] Ibid.

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