

Health Affairs

At the Intersection of Health, Health Care and Policy

Cite this article as:
David M. Cutler
Declining Disability Among The Elderly
Health Affairs, 20, no.6 (2001):11-27

doi: 10.1377/hlthaff.20.6.11

The online version of this article, along with updated information and services, is available at:

<http://content.healthaffairs.org/content/20/6/11.full.html>

For Reprints, Links & Permissions:

http://healthaffairs.org/1340_reprints.php

E-mail Alerts : <http://content.healthaffairs.org/subscriptions/etoc.dtl>

To Subscribe: <http://content.healthaffairs.org/subscriptions/online.shtml>

Health Affairs is published monthly by Project HOPE at 7500 Old Georgetown Road, Suite 600, Bethesda, MD 20814-6133. Copyright © 2001 by Project HOPE - The People-to-People Health Foundation. As provided by United States copyright law (Title 17, U.S. Code), no part of *Health Affairs* may be reproduced, displayed, or transmitted in any form or by any means, electronic or mechanical, including photocopying or by information storage or retrieval systems, without prior written permission from the Publisher. All rights reserved.

Not for commercial use or unauthorized distribution

Declining Disability Among The Elderly

Today's elderly Americans are less disabled than their peers in earlier generations—a fact that could be the “bright side” of an aging population.

by David M. Cutler

ABSTRACT: This paper analyzes evidence on changes in disability among the elderly and considers its implications. Disability among the elderly has declined by 1 percent or more per year for the past several decades. Strong evidence relates these changes to improved medical technology and to behavioral changes. Changes in socioeconomic status, disease exposure, and use of supportive aids are likely important as well, although their magnitude is difficult to gauge. Should disability improvements continue, the projected increase in medical spending resulting from technological changes in health care would be moderated, but not eliminated. Disability change also may facilitate an increase in age of retirement.

POPULATION 11
CHANGE

EXISTING EVIDENCE GENERALLY SUGGESTS that disability among the elderly is falling over time. Declining disability can have enormous implications for the elderly's quality of life if they are better able to engage in enjoyable activities and work to later ages. Disability is also closely tied to medical spending, so that reductions in disability can lead to an offset in public and private medical costs. In an economy that already spends \$250 billion annually, or 2.5 percent of gross domestic product (GDP), on medical care for the elderly, this too can be important.

This paper analyzes the evidence on disability change among the elderly and considers its implications. The paper has three parts. First, I summarize the evidence on disability change over time. I focus on disability in the elderly population because disability is concentrated in that age group and because the elderly use the most publicly funded medical care and other resources. Second, I articulate and weigh potential explanations for declining disability. Understanding why disability is falling is crucial if we expect to make predictions about further changes in disability and their implications for well-being and medical spending. Third, the paper consid-

David Cutler is a professor of economics in the Department of Economics, Harvard University, in Cambridge, Massachusetts, and is a research associate with the National Bureau of Economic Research in Cambridge.

ers the public policy implications of declining disability, including effects on overall health spending, Medicare financing, and effects on the elderly's work and societal contributions.

Changing Disability Among The Elderly

Before I discuss trends in disability, it is necessary to define terms. The literature has not always been clear about what constitutes disability, and thus a variety of different measures have been used.¹ The disability process begins with a *pathology*, a cellular or tissue change caused by disease, infection, or other agents. An example of a pathology is hypertension, a condition in which blood pressure is sufficiently high that artery walls are stretched and damaged. In the case of hypertension, the pathology can be detected medically, but that is not the case for all pathologies.

Some pathologies lead to *impairment*, a loss or abnormality in physical or mental functioning. In the case of hypertension, potential impairments include occluded blood flow to the brain (an occlusive stroke) or heart (a heart attack) and chest pain on exertion (angina). Impairments generally refer to abnormalities at the level of the tissue or organ affected, rather than to impaired action by the person as a whole.

Functional limitations entail the inability to perform specific physical or mental tasks used in daily life. Functional limitations are usually measured with reference to specific tasks—for example, whether the person can walk a quarter mile, lift a ten-pound object, or grasp an object such as a pencil. Continuing the example, a person who has had a stroke, for example, may have difficulty with all of these activities.

Finally, *dependence* is defined as health-related difficulty undertaking activities that are typical or expected of a person. Dependence is closely related to functional limitations but is generally situated in a social context. A functional limitation in something that is not expected to be done would not lead to dependence. In practice, dependence is usually measured along two dimensions: whether the person has difficulty with basic activities of daily living (ADLs) such as eating, bathing, dressing, and getting around or difficulty with instrumental activities of daily living (IADLs) such as doing light housework, shopping, and preparing meals. These tasks are basic activities, in comparison to the more complex functional limitations that are usually measured. Thus, in most surveys more elderly persons suffer from functional limitations than are dependent.

I term a person *disabled* if he or she either has functional limitations or is dependent. Disability defined this way is related to, but not exactly the same as, the conventional definition of *health*. The

most widely accepted definition is that of the World Health Organization (WHO): “a state of complete physical, mental, and social well-being, and not merely the absence of disease or infirmity.” In practice, though, researchers use the term *health* in a much looser framework.

■ **Trends in overall health.** Examining trends in health as a whole sets the baseline for specific consideration of changes in disability. The most obvious indicator of health is mortality. In recent decades mortality among the elderly has been falling rapidly, as it has among the population as a whole. Since 1950 the decline in mortality has been nearly 1 percent per year.² By this measure, the elderly are vastly healthier than they used to be.

Falling mortality may translate into rising or falling disability. Consider, for example, mortality reductions that are attributable to better treatment of strokes. Such interventions would likely increase disability among the living population, because stroke survivors are frequently quite disabled. But mortality reduction also may be due to better control of hypertension and thus to fewer people having strokes in the first place. In that case, disability would fall along with mortality. A priori, it is not clear which scenario is more accurate, and each may be operating at different points in time.

Over the past century it is clear that health among persons still alive has improved, even as mortality has declined. Dora Costa and Richard Steckel estimate declines in many measures of physical impairment of about 0.5 percent per year over the twentieth century as a whole.³ But this rate need not necessarily apply to all subperiods of the century. Some research suggested that disability was rising in the 1970s and early 1980s, as medical care kept more marginal survivors alive.⁴ This finding was not universally accepted, though, as the measures of disability employed were not great.⁵ The debate was never completely resolved, but it sparked a series of studies designed to measure disability much more carefully. Convincing data on disability are now available for the past two decades; I thus confine my analysis to that time period.

■ **The nursing home population.** A relatively straightforward measure of disability is residence in a nursing home. Persons living in nursing homes as a matter of course receive help with basic ADLs and functional tasks. Further, most elderly persons do not want to live in a nursing home, so nursing home residents are generally fairly disabled. On the other hand, changes in nursing home residence may reflect factors beyond health such as changing state policies toward formal long-term care or increased income of the elderly. Thus, nursing home residence is not the perfect measure of disability.

The share of the elderly living in a nursing home has fallen over

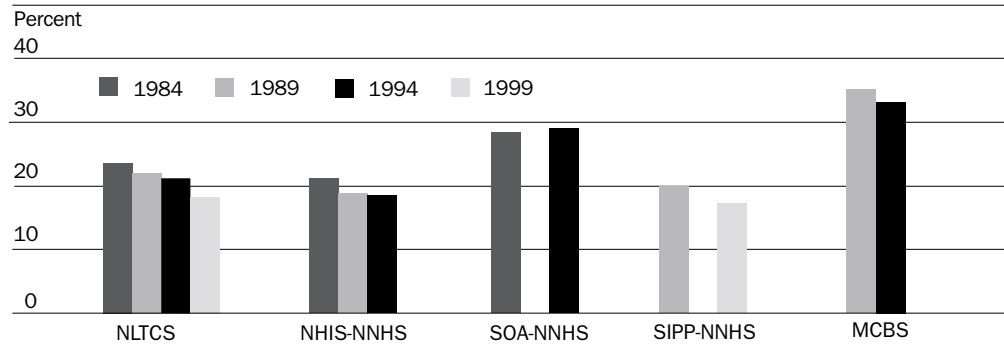
time. On an age-adjusted basis (all data in the paper are adjusted for age and sex changes in the population over time), 5.4 percent of the elderly were in nursing homes in 1985 and 4.6 percent were in 1995, for an annual decline of 0.7 percent per year.⁶ This decline has been an enormous boon to state governments, which pay for large amounts of nursing home care through the Medicaid program. In the mid-1980s state governments put tight restrictions on nursing home beds to lower Medicaid spending, and nursing homes were nearly full. Today the occupancy rate is only 85 percent even with little increase in supply, and the pressure on Medicaid has eased.⁷

■ **Changes in dependence over time.** A number of surveys have measured dependence over time. The surveys are fairly consistent in defining dependence as limitations in either ADLs or IADLs.⁸ But the surveys differ somewhat in what precisely a limitation involves. Some surveys ask about difficulty in performing these tasks, others ask whether the person receives help with the task, and still others ask whether the person is able to perform the task at all. Further, some surveys require that the limitation has occurred for a minimum period of time (generally ninety days), while others do not. Most of the results I present define *dependence* as receiving help with an activity, but there are subtle wording changes across surveys that affect the level of disability reported. Changes in disability rates, though, do not appear particularly sensitive to the definition used.

Exhibit 1 shows a summary of measures of dependence. The first bars report data from the National Long-Term Care Survey (NLTCs), a survey of the elderly population in 1982, 1984, 1989, 1994, and 1999.⁹ The NLTCs data reveal significant reductions in dependence over time. Whereas 25 percent of the elderly were dependent in 1984, only 19 percent were dependent in 1999, an annual decline of nearly 2 percent.

The NLTCs data indicate declines in dependence for all age groups (Exhibit 2). While the younger elderly population has a much lower rate of dependence than the older population (10 percent versus 60 percent), the rate of decline in dependence is actually somewhat greater for the younger population (1.8 percent annually for persons ages sixty-five to seventy-four) than for the older population (1.1 percent annually for persons age 85 and older).

The second set of bars in Exhibit 1 shows data from the National Health Interview Survey (NHIS). The NHIS, a sample of the community-dwelling population, asks general questions about ADL and IADL limitations. The NHIS questionnaire changed in 1982 and 1997; I thus present results for 1984–1994 only.¹⁰ The limitation of the NHIS to the community-dwelling population is an important

EXHIBIT 1**Changes In Dependence Among The Elderly, As Measured In Different Surveys, Selected Years 1984–1999**

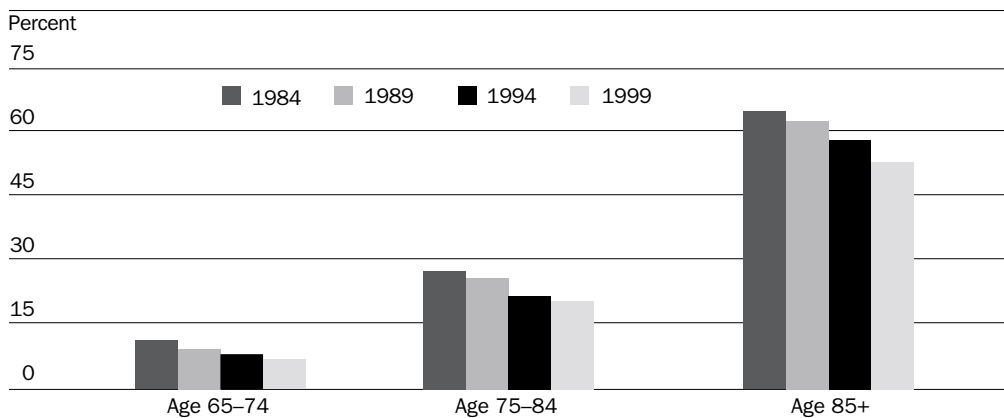
SOURCES: National Long-Term Care Survey (NLTCs), National Health Interview Survey (NHIS), National Nursing Home Survey (NNHS), Supplement on Aging (SOA), Survey of Income and Program Participation (SIPP), and Medicare Current Beneficiary Survey (MCBS), various years as shown. See text for more explanation.

NOTES: Each bar is the percentage of people in the given survey and year who need help with either activities of daily living or instrumental activities of daily living. All years are exact except for the second year of SOA data (1995), the first year of SIPP data (1990), and the MCBS data (1992 and 1996).

one, since the rate of nursing home residency has been falling so rapidly. To form a sample of the elderly as a whole, I supplement the NHIS data with data from the 1985 and 1995 National Nursing Home Surveys (NNHS).¹¹ This implicitly assumes that all persons in a nursing home are dependent. This may overstate the situation somewhat, but probably not a great deal. Dependence rates in the NHIS-NNHS fell 0.9 percent per year—not as rapidly as in the NLTCs (2 percent per year).

Special disability supplements to the NHIS, termed the Supple-

POPULATION CHANGE 15

EXHIBIT 2**Changes In Dependence Among The Elderly, By Age, Selected Years 1984–1999**

SOURCE: National Long-Term Care Survey, various years as shown.

NOTE: The data show the dependence rate (percentage who are dependent) by age.

ments on Aging (SOA), were conducted in 1984 and 1994–1995.¹² The SOAs only consistently measure dependence in the population above age seventy, but as Exhibit 2 shows, this restriction is not material. Data from the SOA surveys, again augmented with data from the NNHS, are presented in the third set of bars in Exhibit 1. Disability as measured in the SOA was relatively constant, with a slight increase over the decade. The explanation for the discrepancy between this and the other surveys is not clear, despite papers and conferences devoted to the issue.¹³ It may result from differences in sampling in the two surveys, differences in use of proxy responses, or specific questionnaire design.

Results from the Survey of Income and Program Participation (SIPP) are presented in the next set of bars in Exhibit 1. SIPP is also a community-based survey, which I augment with the NNHS. SIPP asked about dependence several times in the 1990s. Dependence fell greatly over that decade—an annual decline of 1.4 percent per year.

Finally, results from the Medicare Current Beneficiary Survey (MCBS) are reported in the last set of bars.¹⁴ Like the NLTCs, the MCBS is a survey of the elderly population as a whole, including both community and nursing home residents. The MCBS has a more limited time horizon than the other surveys, with current tabulations only from 1992 through 1996. Still, dependence declined rapidly over this short interval, by 2 percent per year.

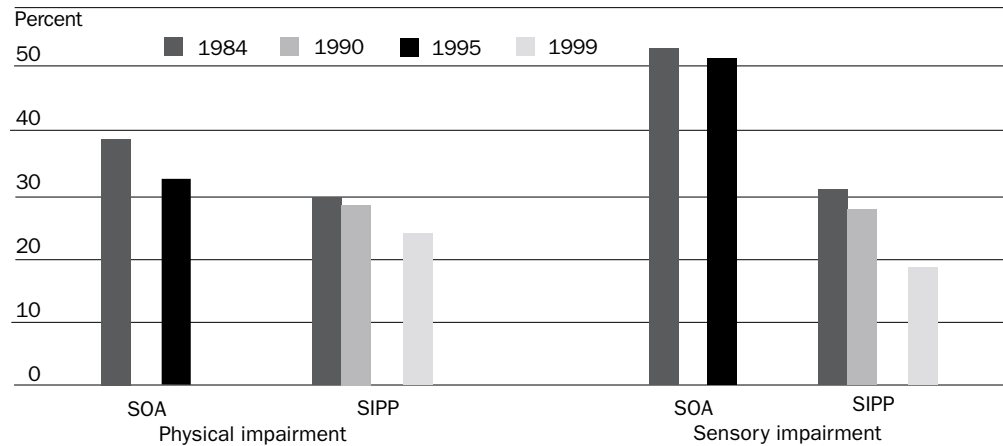
■ **Measures of functional impairment.** Only two of the surveys measure functional limitations: the SOA-NNHS and SIPP-NNHS.¹⁵ Exhibit 3 reports limitations in two measures of functioning: physical impairment, including the ability to walk three blocks, climb a flight of stairs, or grab an object such as a pencil; and sensory impairment, including difficulty seeing and hearing, even with aids.

Both surveys show rapid declines in functional limitation, from 0.5 to 3.2 percent per year depending on the measure and survey. Even functional limitations measured by the SOA-NNHS (the survey that showed no change in dependence) fell. Thus, all of the surveys show a healthier elderly population by at least one measure.

In addition to these surveys, various measures of disability have been reported by the Framingham Heart Study.¹⁶ In approximately 1977 and again in approximately 1994, this study measured disability among the original study participants and their offspring. Although the measures of disability are not exactly the same as those presented here, they are close. Disability rates in the Framingham data declined by 2–3 percent per year.

Explanations For Falling Disability

Understanding why disability has changed is more difficult than is

EXHIBIT 3**Measures Of Functional Limitations Among The Elderly, In Different Surveys, Selected Years 1984–1999**

SOURCES: Supplement on Aging (SOA) and Survey of Income and Program Participation (SIPP), various years as shown.

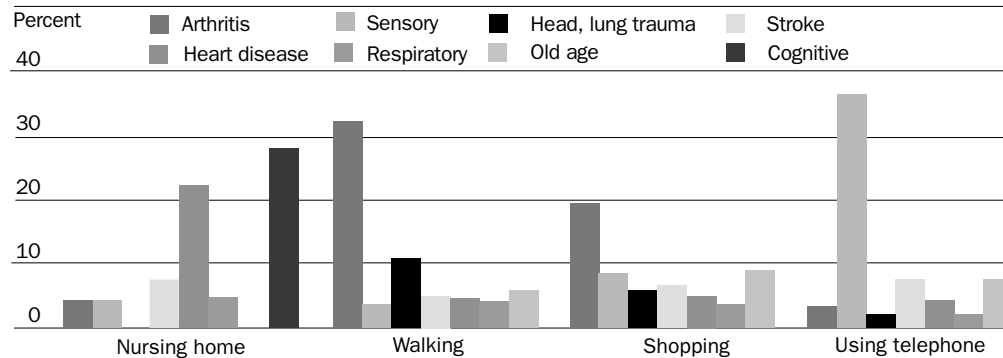
NOTE: The data are the share of the population with impairments in either physical functioning (walking, climbing stairs, or lifting objects) or sensory functioning (seeing and hearing).

measuring the changes themselves. There are a wealth of possible explanations, not all of which can be examined empirically.

Exhibit 4 shows some first evidence on the conditions associated with disability. The first bars consider the nursing home population and show the medical conditions that residents of nursing homes or their caregivers report as being most important in necessitating the nursing home stay. Cognitive impairment is the primary reason for about 30 percent of the sample. Another 20 percent cite complica-

**POPULATION
CHANGE**

17

EXHIBIT 4**Diseases Associated With Disabilities Among The Elderly, 1984**

SOURCES: See below.

NOTES: Each bar is the share of elderly persons with the indicated impairment who cite the relevant condition as a cause. The first bars show the conditions most important for persons in a nursing home, using data from the National Nursing Home Survey. The subsequent bars are for persons living in the community who have difficulty walking, shopping, or using the telephone, respectively, and are taken from the Supplement on Aging.

tions from heart disease. Less quantitatively significant but still important are conditions such as stroke (note that the cognitive impairments from stroke are included in the cognitive category) and musculoskeletal problems including hip fractures.

The remaining bars of Exhibit 4 look at the factors most associated with various measures of dependence among the community-dwelling population.¹⁷ The SOA, from which these data are drawn, does not ask about cognitive impairment as a reason for disability, but severe cognitive impairment is generally not very prevalent in the community.¹⁸

Arthritis is a leading cause of difficulty for about 20–30 percent of persons who have difficulty walking and shopping. Nearly three in five elderly persons report having been diagnosed with some form of arthritis, and minor arthritis might be present in many more. Sensory problems, particularly hearing, impede telephone use and contribute to other impairments as well.

These rough data suggest a number of possible explanations for falling disability. In what follows, I discuss the possible explanations and attempt to crudely weigh their relative importance. The ideal, of course, would be to have a complete decomposition of the sources leading to reduced disability. But this is difficult, for two reasons. First, data on many of the theories are not available. Second, there are important interactions among the theories that need to be disentangled, but this has not been done in the literature. Thus, I indicate where the evidence is most and least compelling.

■ **Medical care improvements.** Changing medical technology is one factor in reduced disability. The major debilitating conditions above suggest several types of technologies that could be important, including joint replacement surgery and cataract surgery.

Several pieces of evidence suggest that changes in medical technology are important. Disability change has been noted in the literature to result much more from reduced disability for those who develop conditions than from reduced onset of conditions in the first place.¹⁹ Medical care is likely to be particularly important in treating established cases of disease.

Analysis of particular conditions also suggests a potentially large effect. The number of joint replacement procedures performed annually roughly doubled from the 1980s to the 1990s.²⁰ Most of those who have had such surgery report not being disabled, while those without the surgery but in the same health as those who receive it usually are disabled. Rough calculations suggest that the increase in use of joint replacement surgery could explain a half percentage point or more decline in disability.²¹ The share of persons having cataract surgery doubled as well, although vision problems are

rarely the sole cause of disability.²²

Pharmaceutical use is important as well. Use of nonsteroidal anti-inflammatory drugs (NSAIDs), a common arthritis treatment, doubled from the 1970s to the 1980s and is generally believed to have risen further into the 1990s.²³ This could account for why disability for persons with arthritis has fallen so greatly in recent years.²⁴ Likewise, use of antihypertension medication rose markedly in the 1970s and early 1980s.²⁵ This may help to explain the decline in incidence of strokes observed in recent decades.

Both the arthritis and the hypertension examples highlight the role of medical knowledge as well as treatments. New medications are one factor in improved treatment of these conditions, but so is expanded use of existing treatments. As the knowledge base about appropriate use of therapies grows, the therapies get applied to many more patients.

■ **Health behavior.** The most important behavioral change in this time period is the decline in smoking. In 1960, 40 percent of adults were regular smokers. Today, about 25 percent are.²⁶ Smoking is a leading risk factor for heart disease, stroke, and respiratory disease, all of which are important precursors for disability. Rough calculations suggest that the decline in smoking could account for as much as one percentage point lower disability through these conditions alone.²⁷

Trends toward lower-salt and reduced-fat diets have reduced the incidence of atherosclerosis and hypertension, while increased obesity works in the opposite direction. There are no firm estimates of how changes in these risk factors translate into changes in disability, but it is known that the incidence of cardiovascular disease has fallen by about 1 percent per year for several decades.²⁸

■ **Increased use of aids.** A wealth of technological innovations have been developed to help people cope with impairments. Some technologies are personal, including canes, walkers, handrails in bathrooms, and the use of walk-in showers instead of bathtubs. Other technologies such as microwave ovens and telephones with bigger keys were developed for the population as a whole but may reduce dependence among disabled elders. Even environmental changes such as street ramps instead of curbs and elevators instead of stairs increase the mobility of persons with physical impairments.

No systematic data exist on the availability or use of all of these technologies. What is known is that use of personal assistive devices specially designed for the impaired has risen over time. The share of persons who are dependent in one or more ADLs and who use some form of special equipment (canes, walkers, handrails, and the like) increased from 76 percent in 1984 to more than 90 percent

**POPULATION
CHANGE** **19**

in 1999.²⁹

While these innovations reduce true disability, their impact on reported disability is more complex. A person who once used the toilet with some difficulty but now has a handrail will report himself as receiving assistance with ADLs where previously he would not. Measured dependence may thus rise. Thus, it is difficult to determine the quantitative effect of increased aid use on changes in disability.

■ **Socioeconomic status.** Persons with more education are much less likely to be disabled than are those with less education, as are those with higher incomes and who worked in white-collar jobs.³⁰ The differences are large; more-educated persons have up to a 50 percent lower disability rate than do the less educated. There are many reasons why this may be the case. White-collar workers were exposed to less dust, fumes, and gases during their working lives than were blue-collar workers. White-collar workers also suffer fewer musculoskeletal injuries. In addition, persons performing more cognitive tasks have a later onset of Alzheimer's disease, potentially as a result of increased brain stimulation.³¹

20 **DECLINING
DISABILITY**

The education and work histories of the elderly have changed markedly in recent years. The share of the elderly with some college, for example, more than doubled from the early 1980s to the late 1990s, and white-collar work has also increased.³² Thus, this explanation could be important in reduced disability.

The difficulty with quantifying this explanation, though, is that some of the effect of socioeconomic status on disability is likely to occur through the other factors noted above. Better-educated people know more about good health behavior and use more medical services. One would need to separate out the direct and indirect reasons why socioeconomic status affects disability to have a quantitative estimate of the importance of this factor. The literature has not yet done this, however. As a result of the uncertainty, I do not present a quantitative estimate of the importance of this factor.

■ **Disease exposure.** Exposure to disease throughout the lifespan can have a major influence on late-life disability. Some of these links were discussed above, such as the less healthy environments of blue-collar workers. But disease exposure happens outside of work as well. Rheumatic fever in childhood damages the heart's valves and can lead to valvular problems later in life.³³ Infectious diseases such as typhoid fever, syphilis, and measles can affect cardiac functioning and possibly lead to atherosclerotic buildup and subsequent disease. Infectious disease rates declined rapidly in the first half of the twentieth century, a time when the current elderly were relatively young, so that this factor could contribute to ob-

served declines in disability in recent years. But data on exposure rates to infectious diseases many years ago are lacking. Thus, it is difficult to evaluate this theory quantitatively.

■ **Social support.** A person's social network may affect the degree of his or her disability in several ways. Help that is received in the normal course of life, such as shopping with a spouse or having a spouse cook meals, is frequently not counted as reducing disability, even though it reduces dependence. But this factor does not seem quantitatively important; marriage rates among the elderly have been steady or slightly falling over this time period.

Some literature suggests that persons with better social networks become sick less often and recover from illness more rapidly than do persons with poorer ones.³⁴ Rationales for this effect include the impact of social engagement on cognitive functioning and a reduced susceptibility to stress among those with strong social networks. It is difficult to know how to measure these types of social interactions. The measures that are available have not changed greatly. The share of the elderly who get together with family and friends, talk on the telephone, or go out socially was relatively constant over the 1980s and 1990s.³⁵ Thus, this explanation does not seem to be a major source of changes in disability.

Without knowing more about why disability is declining, it is difficult to make specific forecasts about the future. But the diversity of potential contributing factors is in many ways good news. It suggests that even if some of the contributors to falling disability do not continue, the overall trend toward a healthier population should not cease. This could have important consequences for medical care spending, and for society at large.

An Aging Society: Curse Or Blessing?

Among many analysts, mortality declines are seen as a curse as much as a blessing. Much hand-wringing accompanies the aging society and the demands that an increased elderly population will place on the public sector. By modifying what the elderly need and what they can contribute to society, however, declines in disability can affect the burden of the elderly considerably. I sketch two dimensions in which the financial pressures of an aging society could diminish.

■ **Disability and medical spending.** Medical spending rises with age. While this fact is a truism, it is misleading in an important respect. Old age itself is not associated with increased medical spending. Rather, it is the disability and poor health associated with old age that are expensive. As a result, as people age in a healthier way, medical spending should not increase as rapidly.³⁶

This fact is not captured in standard forecasts of medical spend-

POPULATION CHANGE	21
----------------------	----

ing. These forecasts start by assuming that relative spending by age and sex will remain constant over time. They then assume or estimate a rate of intrinsic medical care cost growth resulting from technological change in the treatments available. This intrinsic cost growth is the applied to the constant age- and sex-specific spending values. As the population is increasingly healthy, however, age- and sex-specific spending needs will decline, and thus forecast cost increases should be less rapid.

Exhibit 5 shows evidence that age itself is not the major factor in explaining why older persons use more medical services than younger persons do. I present regression estimates explaining medical spending among the elderly, using data from the MCBS. I pool the MCBS for 1992 through 1994; each observation is a person in a given year. To avoid censoring problems, I include in the sample only persons who lived during the entire year.

The first column shows a standard regression model of medical spending, considering only its relation to age and sex. Older persons spend much more than younger persons spend. Compared with the young elderly, for example, the oldest elderly average nearly \$3,500 more per year in medical spending.

The second column adds measures of disability to the regression. I include the number of ADL impairments, IADL impairments, and functional limitations the person had in the year before medical spending is measured. Thus, these coefficients indicate how being in worse health at one period of time affects future spending.³⁷ Second, I include a dummy variable for whether the person died in the year

22 DECLINING DISABILITY

EXHIBIT 5 Effect Of Age And Disability On Medical Spending Among The Elderly, 1992–1994

Independent variable	Traditional model (N = 20,368)	Expanded model (N = 20,368)
Reference group (male, ages 65–69)	\$3,895	\$2,922
Female (relative to male)	–\$190	–\$499
Age (relative to base)		
70–74	\$ 515	\$ 411
75–79	1,288	605
80–84	2,334	850
85 and older	3,444	272
Disability level		
Number of ADLs	–	653
Number of IADLs	–	1,191
Number of functional limitations	–	874
Die in next year	–	7,469

SOURCE: See below.

NOTES: Regressions are based on data from the Medicare Current Beneficiary Survey. All regressions include dummy variables for the year of observation.

after the medical spending was measured. While not entirely exogenous to medical spending, this measure indicates how sick the person was during the relevant year.

All of the health status measures are related to spending. Each ADL impairment raises spending by \$650; each IADL impairment, by \$1,200; and each functional limitation, by \$900. Being close to death increases spending by nearly \$7,500.³⁸ Once disability measures are included, medical spending is not very strongly related to age. The healthy elderly spend about \$3,000 per person on medical care annually, independent of age. Older persons spend more because they are sicker, not because they are older.

Exhibit 6 shows the implication of this finding for forecasts of medical spending. The first row presents a baseline forecast in which there is no change assumed in the health of the population and no growth at all in medical care costs. Under these assumptions medical spending per person would increase from about \$650 per person to more than \$1,000 by 2050, or 74 percent. The increase is a result of the increasing aged share of the population, and partly a shift in the aged population toward more very old persons.

The next row shows simulation results similar to those in the first row except that it assumes that disability rates will continue to decline at 1 percent per year over the next half-century and that the share of persons in the last year of life will decline, as current forecasts predict. This is not meant as a realistic simulation of the world; as noted above, some medical spending is required to produce the reduction in disability. Rather, this simulation is designed to gauge how important such health changes can be in comparison to the effects of aging alone. Changes in population health are substantively important. The alternative forecast suggests an increase in spending of only 50 percent, about two-thirds as much as the scenario assuming no health improvement.

**POPULATION
CHANGE** **23**

EXHIBIT 6

Effect Of Health Changes And Technological Cost Growth On Forecasts Of Medical Spending For The Elderly, 2000–2050

Scenario	Increase in per person spending on the elderly, 2000 to 2050
Base	74%
Base + health improvements	50
Base + health improvements + spending increase	146

SOURCE: Author's analysis of data from the Medicare Current Beneficiary Survey, 1992–1994, and Social Security Trustees' Report, 2001.

NOTES: The base scenario assumes constant age- and sex-specific medical spending over time and no increase in medical costs. The second row includes a continued decline in disability of 1 percent per year along with forecast mortality reductions. The third row adds in a technologically driven increase in medical spending.

While this saving is large, it is likely to be dwarfed by the technological component of medical care cost increases. Historically, medical costs have increased about two percentage points above the rate of GDP growth for the past half-century. About half of this has been attributed to technological change in medicine.³⁹ Thus, many forecasts, including those by the Medicare trustees, assume that the technological component of medical cost increases will be about 1 percent over the next seventy-five years.⁴⁰

The third row shows the impact of this technological component of cost increase. Incorporating this effect raises the overall burden of medical spending for the aged considerably. Compared with current spending, medical care spending on the elderly would more than double in this scenario, even with health continuing to improve. Thus, changes in health status will reduce in magnitude, but not solve, the fiscal burden of aging for medical spending.

■ **Disability and retirement.** Changes in the health of the elderly could affect public policies in other ways as well. A particularly important realm for this is policy affecting retirement ages. The fact that the elderly are increasingly healthy suggests that many can continue working past present retirement ages. Only 15 percent of men over age sixty-five now work, including only one-quarter of men ages sixty-five to sixty-nine, despite the fact that only a small share of the younger elderly have serious disabilities that would prevent them from working.

This trend toward early retirement is partly the result of public and private policies that have encouraged early labor-force withdrawal. Public policy once mandated retirement at fixed ages, first sixty-five and then seventy. Even though this mandate has been eliminated, retirement at young ages is encouraged by pension benefits that are actuarially more generous for early retirement than for later retirement. Pension incentives are not the only reason people retire at young ages—desire for leisure and increasing wealth matter as well—but they are an important reason.⁴¹

As the elderly become more numerous, both the public and private sectors may find it advantageous to change these policies. Changes in retirement ages would help to offset the rising costs of Social Security in addition to Medicare and Medicaid costs. Private employers also might be driven to eliminate early-retirement incentives, as the dearth of younger workers projected for the future raises the value of older workers.

The fact that the elderly are increasingly healthy at older ages suggests that increasing employment rates for the elderly may not be too burdensome. In this respect, reductions in disability can be a blessing more than a curse.

The author is grateful to Grant Miller and Sarah Reber for research assistance; to Mary Grace Kovar, Ken Manton, Louise Sheiner, and Richard Suzman for helpful conversations; and to the National Institute on Aging for research support.

NOTES

1. L.M. Verbrugge and A.M. Jette, "The Disablement Process," *Social Science and Medicine* 38, no. 1 (1994): 1–14; and A.M. Pope and A. Tarlov, eds., *Disability in America: Toward a National Agenda for Prevention* (Washington: National Academy Press, 1991). The definitions proposed in these papers are similar, and I generally use them in what follows, with small changes in terminology.
2. National Center for Health Statistics, *Health, United States, 2001* (Washington: U.S. Government Printing Office, 2001), Table 30.
3. D. Costa and R. Steckel, "Long-Term Trends in Health, Welfare, and Economic Growth," in *Health and Welfare During Industrialization*, ed. R. Steckel and R. Floud (Chicago: University of Chicago Press, 1997), 47–89.
4. E. Crimmins, Y. Saito, and D. Ingegneri, "Changes in Life Expectancy and Disability-Free Life Expectancy in the United States," *Population and Development Review* 15, no. 2 (1989): 253–267.
5. T. Waidmann, J. Bound, and M. Schoenbaum, "The Illusion of Failure: Trends in Self-Reported Health of the U.S. Elderly," *Milbank Quarterly* 73, no. 2 (1995): 253–287.
6. NCHS, *Health, United States, 2001*, Table 97.
7. *Ibid.*, Table 112.
8. The list of ADLs includes difficulty eating, getting in and out of bed, getting around inside, dressing, bathing, and using the toilet. The list of IADLs includes doing light housework, doing laundry, preparing meals, shopping, getting around outside, managing money, and using the telephone.
9. See K.G. Manton and X. Gu, "Changes in the Prevalence of Chronic Disability in the United States Black and Non-Black Population above Age 65 from 1982 to 1999," *Proceedings of the National Academy of Sciences*, no. 11 (2001): 6354–6359.
10. R.F. Schoeni, V.A. Freedman, and R.B. Wallace, "Persistent, Consistent, Widespread, and Robust? Another Look at Recent Trends in Old-Age Disability," *Journal of Gerontology, Series B, Psychological Sciences and Social Sciences* 56, no. 4 (2001): S206–S218. These authors present annual data from the NHIS.
11. I interpolate nursing home utilization rates in the years between surveys assuming a constant growth rate.
12. E. Crimmins, Y. Saito, and S. Reynolds, "Further Evidence on Recent Trends in the Prevalence and Incidence of Disability among Older Americans from Two Sources: The LSOA and the NHIS," *Journal of Gerontology, Series B, Psychological Sciences and Social Sciences* 52, no. 2 (1997): S59–S71.
13. V.A. Freedman and B.J. Soldo, eds., *Trends in Disability at Older Ages: Summary of a Workshop* (Washington: National Academy Press, 1994); and J.M. Wiener et al., "Measuring the Activities of Daily Living: Comparisons across National Surveys," *Journal of Gerontology* 45, no. 6 (1990): S229–S237.
14. See T. Waidmann and K. Liu, "Disability Trends among the Elderly and Implications for the Future," *Journal of Gerontology, Series B, Psychological Sciences and Social Sciences* 55, no. 5 (2000): S298–S307.
15. Analysis of SIPP and SOA data on functional impairments is also contained in V.A. Freedman and L.G. Martin, "Understanding Trends in Functional Limitations among Older Americans," *American Journal of Public Health* 88, no. 1 (1998): 1457–1462; and V.A. Freedman and L.G. Martin, "The Contribution of Chronic Conditions to Trends in Old-Age Functioning," *American Journal of Public Health*

**POPULATION
CHANGE** 25

- 90, no. 11 (2000): 1755–1760.
16. S.H. Allaire et al., “Evidence for Decline in Disability and Improved Health among Persons Aged 55 to 70 Years: The Framingham Heart Study,” *American Journal of Public Health* 89, no. 11 (1999): 1678–1683.
 17. See also A.E. Stuck et al., “Risk Factors for Functional Status Decline in Community-Living Elderly People: A Systematic Literature Review,” *Social Science and Medicine* 48, no. 4 (1999): 445–469; and Freedman and Martin, “The Contribution of Chronic Conditions.”
 18. The NLTCs data show this.
 19. Freedman and Martin, “The Contribution of Chronic Conditions”; and M. McClellan and L. Yan, “Understanding Disability Trends in the U.S. Elderly Population: The Role of Disease Management and Disease Prevention” (Unpublished paper, Stanford University, 2000).
 20. SOA; and *Health Care Financing Review, Medicare and Medicaid Statistical Supplements*, 1992 and 1996.
 21. About 6 percent of the elderly reported having an artificial joint in 1984. If this share doubled with a doubling of replacement surgeries, the increase is about 3 percent. Sixty-two percent of those with artificial joints reported no ADLs or IADLs because of arthritis or orthopedic problems. Of those with disability because of arthritis or orthopedic problems, 37 percent reported that as the sole cause. Thus, an estimate of the impact of the impact of joint replacement surgery on disability is about 0.7 percentage points (3 percent \times 62 percent \times 37 percent).
 22. Fewer than 1 percent of respondents report ADLs or IADLs solely because of vision problems. Still, cataract surgery could be very important for other measures of health. The proportion of the elderly reporting difficulty reading newsprint even when using corrective lenses fell by half from 1984 to 1996.
 23. S.E. Gabriel and R.A. Fehring, “Trends in the Utilization of Non-Steroidal Anti-Inflammatory Drugs in the United States, 1986–1990,” *Journal of Clinical Epidemiology* 45, no. 9 (1992): 1041–1044; and A. Pali, S. Hungin, and W.F. Kean, “Nonsteroidal Anti-Inflammatory Drugs: Overused or Underused in Osteoarthritis?” *American Journal of Medicine* 110, no. 1A (2001): 8S–11S. Most recently, Cox-2 drugs have been developed, but these drugs are too recent to affect disability in this time period.
 24. Freedman and Martin, “The Contribution of Chronic Conditions.”
 25. V.L. Burt et al., “Trends in the Prevalence, Awareness, Treatment, and Control of Hypertension in the Adult U.S. Population,” *Hypertension* 26, no. 1 (1995): 60–69.
 26. *Health, United States, 2001*, Table 60.
 27. Relative risks for heart disease, stroke, and respiratory disease are from J.M. Lightwood and S.A. Glantz, “Short-Term Economic and Health Benefits of Smoking Cessation,” *Circulation* 96, no. 4 (1997): 1089–1096). These data are combined with information on changes in smoking rates from the Centers for Disease Control and Prevention and disability for people with those conditions from the Supplements on Aging, to estimate the impact of smoking changes on disease.
 28. L.R. Elveback, D.C. Connolly, and L.J. Melton, “Coronary Heart Disease in Residents of Rochester, Minnesota, VII: Incidence, 1950 through 1982,” *Mayo Clinical Proceedings* 61, no. 11 (1986): 896–900.
 29. These data are from the NLTCs. For discussion of personal assistance technologies, see K.G. Manton, L. Corder, and E. Stallard, “Changes in the Use of Personal Assistance and Special Equipment from 1982 to 1989: Results from the 1982 and 1989 NLTCs,” *Gerontologist* 33, no. 2 (1993): 168–176; and J.N. Russell et al., “Trends and Differential Use of Assistive Technology Devices:

- United States, 1994," *Advance Data from Vital and Health Statistics* 292 (Hyattsville, Md.: NCHS, 1997).
30. V.A. Freedman and L.G. Martin, "The Role of Education in Explaining and Forecasting Trends in Functional Limitations among Older Americans," *Demography* 36, no. 4 (1999): 461–473; and Manton and Gu, "Changes in the Prevalence of Chronic Disability."
 31. Y. Stern et al., "Influence of Education and Occupation on the Incidence of Alzheimer's Disease," *Journal of the American Medical Association* 271, no. 13 (1994): 1004–1010.
 32. Current Population Survey, March 1980 and March 2000.
 33. I. Elo and S. Preston, "Effects of Early Life Conditions on Adult Mortality: A Review," *Population Index* 58, no. 2 (1992): 186–212.
 34. L. Berkman, "The Role of Social Relations in Health Promotion," *Psychosomatic Medicine* 57, no. 3 (1995): 245–254.
 35. These data are from the SOA.
 36. For more discussion, see D. Cutler and L. Sheiner, "Demographics and the Demand for Medical Spending: Standard and Non-Standard Effect," in *Demographic Change and Fiscal Policy*, ed. A. Auerbach and R. Lee (Cambridge: Cambridge University Press, 2001), 253–291.
 37. The correlation between these variables is about 0.7, but the regression indicates that all are statistically significantly related to spending. The coefficients on the disability measures are somewhat higher, but relatively similar, when the death variable is excluded. Age has a more pronounced effect, though. These regressions do not include direct measures of medical conditions. Some of this morbidity is captured by the health status measures. If morbidity measures were included, the results would probably be similar, as morbidity would logically be expected to decline with falling disability and mortality.
 38. This is consistent with the estimates of J.D. Lubitz and G.F. Riley, "Trends in Medicare Payments in the Last Year of Life," *New England Journal of Medicine* 328, no. 15 (1993): 1092–1096, although the data are from different sources.
 39. J.P. Newhouse, "Medicare Care Costs: How Much Welfare Loss?" *Journal of Economic Perspectives* 6, no. 3 (1992): 3–21.
 40. Board of Trustees, Federal Hospital Insurance Trust Fund, 2001 *Annual Report* (Washington: Centers for Medicare and Medicaid Services, 2001); and Technical Review Panel on the Medicare Trustees Reports, *Review of Assumptions and Methods of the Medicare Trustees' Financial Projections* (Washington: CMS, 2000).
 41. J. Gruber and D. Wise, eds., *Social Security and Retirement around the World* (Chicago: University of Chicago Press, 1999); and J. Quinn, "The Labour Market, Retirement, and Disability" (Unpublished paper, Boston University, 1998).