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Mortality of Americans Age 65 and Older: 1980 to 2004

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Summary

Individuals age 65 and older have experienced remarkable declines in mortality during the past 20 years. In 1980, 14.2% of newborns could expect to live to age 90; by 2003, this percentage increased nearly 50% to 20.9%. Average life expectancy went from 73.7 years in 1980 to 77.8 years in 2004 – about 30.5 years longer than the anticipated life expectancy for a baby born at the beginning of the 20th century.

Between 1930 and 2003, the proportion of older Americans who lived to age 65 increased by more than 50%, the percentage to reach age 75 nearly tripled, and the fraction to reach age 85 increased nearly sixfold. Greater longevity is one factor contributing to the quickly growing share of elderly Americans. In 1950, persons age 65 and older made up 8.1% of the population. In 2000, they accounted for 12.4% of the population; by 2030, one in five Americans is projected to be a senior citizen.

In 2004, a total of 1.8 million deaths of people age 65 and older was reported in the United States; one-third lost their life to a heart condition, one-fifth to cancer. Nevertheless, the number of deaths attributable to cardiovascular disease has fallen by nearly one-third since 1980. Moreover, the death rate for heart disease in 2004 was 41.6% lower than in 1980. Similarly, the death rate for stroke declined by 48.2% during the last quarter century. These declines are attributable to a number of factors, including medical advances that facilitate the diagnosis and treatment of these conditions, the introduction of new pharmaceuticals, and important changes in lifestyle behaviors, including less cigarette smoking and changes in diet.

This significant decrease, however, has been partially offset by an increase in cases of some chronic conditions among older Americans. In particular, since 1980, the share of elderly deaths resulting from kidney disease, diabetes, Alzheimer's disease, atherosclerosis, and chronic liver disease more than quadrupled (from 5.0% to 20.1%), and death rates for chronic lower respiratory diseases increased by 120%.

Increases in mortality attributable to chronic illness have not been evenly distributed. Even among the elderly, death rates vary by age. Moreover, significant racial and ethnic disparities are evident, reflecting different disease profiles for underlying populations, unequal access to health care, and other sociodemographic factors, such as income and education. Diabetes has been particularly deadly among blacks and Native Americans, heart disease has disproportionately affected white men, and Alzheimer's has been especially detrimental to white women.

As the population of older Americans grows and the cost of medical care increases, the public policy interest in identifying the predominant causes of death among the elderly becomes more acute. Given the concentration of medical expenditures at the end of life, and the fact that Medicare covers more than 95% of all Americans age 65 and older, understanding trends in mortality may inform policy makers as they tackle the many challenges associated with financing and delivering care to the nation's rapidly growing cohort of older Americans.

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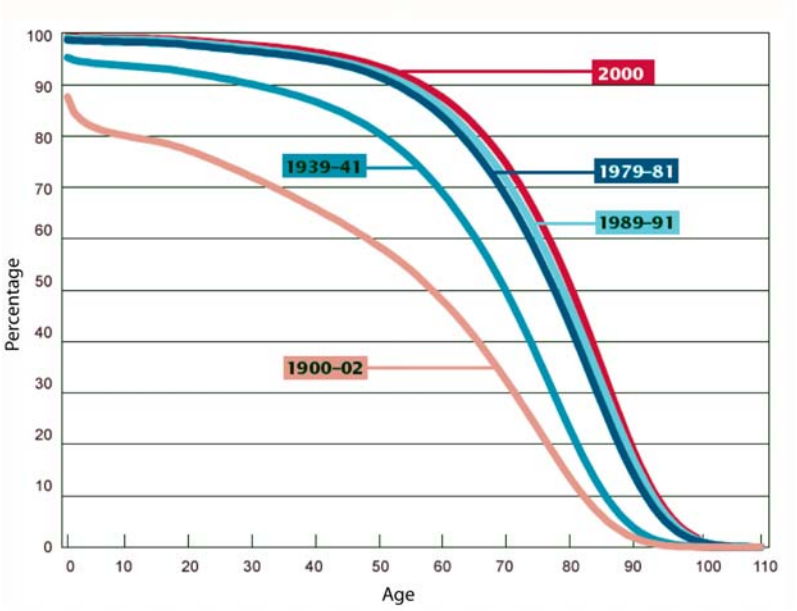
Introduction

During the course of the 20th century, life expectancy in the United States increased significantly. Average life expectancy went from 47.3 years around 1900 to 77.0 years in 2000.[1] By 2004, life expectancy at birth achieved a record high of 77.8 years, about 30.5 years longer than the anticipated life expectancy for a baby born at the beginning of the 20th century.[2]

Trends in life expectancy by age may be visually represented with survival curves, which depict the percentage of a given birth cohort that survives to later ages. **Figure 1** compares survival curves for selected years between 1900 and 2000.

Figure 1. Survival of U.S. Cohorts to Selected Ages: 1900/1902 to 2000



Source: CRS adaptation of graphic from He et al., *65+ in the United States.*
Note: The reference population for these data is the resident population. Data for 1900-02 and 1939-41 also include deaths of nonresidents of the United States.

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[1] Wan He, Manisha Sengupta, Victoria A. Velkoff, and Kimberly A. DeBarros, U.S. Census Bureau, Current Population Reports, P23-209, *65+ in the United States: 2005* (Washington, DC: U.S. Government Printing Office, 2005).

[2] Elizabeth Arias, United States Life Tables, 2003, *National Vital Statistics Reports*, vol. 54, no. 14, April 19, 2006 (updated March 28, 2007), Table 12, available at [http://www.cdc.gov/nchs/data/nvsr/nvsr54/nvsr54_14.pdf].

The bottom curve demonstrates that for individuals born in 1900-1902, survival chances were lower across the entire life span, particularly at young ages. For instance, approximately 20% of those born in 1900-1902 died between birth and age 10; today, by contrast, less than 1% of children fail to see their 10th birthday.

During the last century, the percentage of older Americans who lived to their 65th birthday doubled, the fraction who lived to be 75 years old nearly tripled, and the share who lived past age 85 increased nearly sixfold.[3]

Much of the life expectancy improvement for infants and children occurred before 1930 and is attributable to better nutrition and cleaner water. Between 1930 and 1960, survival improved substantially for middle-aged individuals. Between 1960 and 2000, mortality improvements were significant at the older ages. Physicians and researchers credit medical innovations and new pharmaceuticals with some of the longevity increases experienced by older Americans. For example, important treatments for cardiovascular conditions explain in large measure the 50% decrease in heart disease mortality seen since 1960 (discussed in more detail below).[4]

Greater longevity is one of the reasons why the share of Americans age 65 and older has grown so quickly. In 1950, persons age 65 and older made up 8.1% of the population; in 2004, they accounted for 12.4%.[5] This pattern is expected to continue and to be exacerbated as the "baby boom" generation begins to retire.[6] The U.S. Census Bureau projects that the elderly population will swell exponentially after 2010, and that nearly one-in-five Americans will be a senior citizen by 2030.[7] As a result, policy makers foresee significantly greater enrollment in Medicare and Medicaid over the next few decades. These changes will exert major cost pressures on public health insurance programs as the ratio of non-elderly taxpayers to elderly individuals shrinks. For instance, unless the financing mechanism for Medicare is changed, or its benefit structure altered, it is projected that the Medicare Trust Fund will be depleted in 2019.[8]

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[3] Between 1900 and 2000, respectively, the share of the United States population that lived to age 65 went from 41% to 82%; to age 75, from 23% to 64%; and to age 85, from 6% to 35%. See Arias, 2006, United States Life Tables, 2003.

[4] David M. Cutler, Angus Deaton, and Adriana Lleras-Muney, The Determinants of Mortality, *NBER Working Paper No. W11963*, (Cambridge, MA: National Bureau of Economic Research, January 2006), available at [http://ssrn.com/abstract=877468].

[5] For more details, see CRS Report RL32701, *The Changing Demographic Profile of the United States*, by Laura B. Shrestha.

[6] A "baby boomer" is someone who was born during the post-World War II period of increased birth rates. Demographers and sociologists typically define baby boomers as individuals born between 1946 and 1964.

[7] He et al., *65+ in the United States*. For additional information, see CRS Report RL32792, *Life Expectancy in the United States*, by Laura B. Shrestha.

[8] *2007 Annual Report of the Board of Trustees of the Federal Old-Age and Survivors Insurance and Disability Insurance Trust Funds*, (Washington, DC: U.S. GPO, May 1, 2007), available at [http://www.cms.hhs.gov/ReportsTrustFunds/downloads/tr2007.pdf].

(continued...)

This report is divided into four parts. The first outlines the primary causes of death among older Americans (age 65+). The second section discusses trends in cause-specific mortality for the elderly between 1980 and 2004. The third section highlights disparities in death rates among persons age 65 and older. The report concludes with a discussion of the policy implications of declining mortality rates in the elderly population, as well as the more prominent role that chronic disease is playing as a cause of death for individuals age 65 and older.

Primary Causes of Death in 2004

In 2004, a total of 1.8 million deaths of people age 65 and older was reported in the United States. A majority of these deaths were attributable to two conditions: coronary heart disease (CHD) and malignant neoplasms, more commonly known as cancer. CHD comprises several separate heart problems, including angina,[9] myocardial infarction,[10] congestive heart failure,[11] and arrhythmias.[12] Each of these conditions is caused or exacerbated by atherosclerosis, which refers to the accumulation of plaque in coronary arteries. Over time, these fatty deposits, composed of cholesterol, calcium, and other substances, build up on the walls of blood vessels, thus impeding circulation and reducing the amount of oxygen that reaches the heart muscle.

Cancer, though often discussed as a single condition, actually consists of more than 100 different diseases, characterized by uncontrolled division of cells and the ability of these cells to permeate adjacent tissues (a process called *invasion*) and to travel through the bloodstream or lymphatic system and implant themselves in distant organs (*metastasis*). Many malignant neoplasms are associated with exposure to environmental factors, such as tobacco smoke, radiation, and alcohol. Cancer may affect people at any point, but the risk of developing cancer tends to increase with age.

Other leading causes of mortality among older Americans include cerebrovascular disease (stroke), chronic lower respiratory diseases (CLRD),[13]

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[8] (...continued)
For more information on the budgetary impact of the aging of population, see CRS Report RS22008, *Federal Spending for Older Americans*, by April Grady and William Joseph Klunk.

[9] *Angina* is chest pain that occurs when the heart fails to receive sufficient blood.

[10] Commonly known as a *heart attack*, this condition occurs when a blood clot develops at the site of plaque buildup in the coronary artery. This clot blocks the supply of oxygen-rich blood to the heart.

[11] Congestive heart failure is a misnomer, describing the inability of the heart to work properly — not its failure to function at all. Typically, persistent atherosclerosis, high cholesterol, or hypertension weaken the heart muscle over time, eventually impeding the heart's capacity to efficiently pump blood through the circulatory system.

[12] An *arrhythmia* describes a departure from the normal rhythmic beat of the heart. This may be transitory, recurring, or permanent.

[13] The precursor to CLRD was chronic obstructive pulmonary disease (COPD). Both COPD (continued...)

Alzheimer's disease, and diabetes (see **Table 1**). Although the number of elderly deaths attributable to these four conditions in 2004 (355,004) is notable, it pales in comparison to the deaths caused by heart disease and cancer (919,149) that year.

Table 1. Number and Share of Elderly Deaths Attributed to Leading Causes of Death, 1980 and 2004

Cause	1980		2004	
	Deaths	Percentage	Deaths	Percentage
Heart disease	595,406	44.4	533,302	30.4
Cancer	258,389	19.3	385,847	22.0
Stroke	146,417	10.9	130,538	7.4
CLRD	43,587	3.2	105,197	6.0
Alzheimer's disease	1,037	0.1	65,313	3.7
Diabetes	25,216	1.9	53,956	3.1
Influenza/pneumonia	45,512	3.4	52,760	3.0
Nephritis (renal conditions)	12,968	1.0	35,105	2.0
Accidents	24,844	1.8	35,020	2.0
Septicemia	6,843	0.5	25,644	1.5
Subtotal (top 10 causes of death)	***1,166,078*** [a]	***86.9***	***1,422,682***	***81.0***
All causes	**1,341,848**	**100.0**	**1,755,669**	**100.0**

Source: CRS compilation from National Center for Health Statistics, *Health, United States, 2006*, available at [http://www.cdc.gov/nchs/data/hus/hus06.pdf].

Note: Causes of death are ordered according to their rank in 2004.

a. The rows for 1980 cannot strictly be added to achieve a subtotal for number of deaths attributable to the top 10 causes of death. In 1980, neither septicemia nor Alzheimer's disease was among the 10 leading causes of deaths. They ranked 11th and 15th, respectively. Instead, in 1980, atherosclerosis (#6) claimed the lives of 26,580 elderly Americans and liver disease (#10) killed 9,519. The numbers and percentages in the subtotal for 1980 reflect the atherosclerosis and liver disease figures — not the deaths resulting from septicemia and Alzheimer's disease.

Increasing longevity in the United States has contributed to the rising incidence of chronic illness. In essence, greater life expectancy has effectively provided elderly individuals with additional years to develop conditions such as

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[13] (...continued)
and CLRD refer to various chronic conditions, including chronic bronchitis and emphysema, that cause irreversible airflow obstruction. The distinction between COPD and CLRD relates to a change between versions 9 and 10 of the International Classification of Disease (ICD) taxonomy. The ICD-10 added asthma to the list of COPD conditions and renamed COPD to Chronic Lower Respiratory Disease (CLRD).

arthritis, dementia, and congestive heart failure. Older Americans, who – a generation ago – might have died from episodes of influenza or pneumonia, are surviving acute illnesses, living longer, and dying as a result of complications associated with chronic conditions like emphysema, Alzheimer's disease, diabetes, and renal disease. With these chronic conditions becoming more common among older Americans, causes of death have generally become less concentrated. In 1980, for example, 81.2% of all elderly deaths were attributable to five conditions: heart disease, cancer, stroke, influenza/pneumonia, and chronic obstructive pulmonary disease (COPD). By 2004, however, these same conditions accounted for 68.8% of mortality among Americans age 65 and older.

While the proportion of elderly fatalities caused by heart disease, stroke, and cancer fell between 1980 and 2004 from about three in four to three in five, this decrease was partially offset by a concurrent increase in the number of deaths attributable to other chronic disease. In the last quarter century, for instance, the share of elderly deaths linked to diabetes increased by 63.2%, the fraction of deaths caused by CLRD rose more than 85%, and the percentage whose deaths were caused by renal diseases more than doubled.[14] Overall, the total share of elderly deaths resulting from certain chronic conditions — kidney disease, CLRD, diabetes, Alzheimer's disease, atherosclerosis, and liver disease — has more than quadrupled since 1980, from 5.0% to 20.1%.

It should be noted that the sharp increase in deaths resulting from CLRD and the concomitant drop in pneumonia/influenza mortality from 1998-99 are in part statistical artefacts attributable to changes in the International Classification of Disease. An important change from the 9th edition (ICD-9) to the 10th edition (ICD-10) is that the latter allows the individual charged with filling out the death certificate to give precedence to an underlying condition when reporting primary cause of death.

As an example, a person with a severely compromised immune system who dies of pneumonia would — under the ICD-9 rules — most likely have had "pneumonia/influenza" listed as his or her primary cause of death. The ICD-10, however, provides coroners, physicians, and funeral home directors the latitude to identify a different underlying cause of death if a person obviously expires as a direct consequence of that condition. Therefore, after the introduction of the ICD-10, the person who died of pneumonia (in the example above) may have AIDS listed as the primary cause of death — even though the most immediate cause of death was a respiratory ailment.

The impact of this ICD-10 rule change was to reduce the number of deaths assigned to some conditions, such as pneumonia, and to increase the number of deaths assigned to a few chronic diseases, including AIDS and CLRD (see footnote above for further discussion of the ICD-10 and CLRD mortality).

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[14] Increases in CLRD deaths after 1999 may in part be attributable the International Classification of Disease change from COPD (ICD-9) to CLRD (ICD-10).

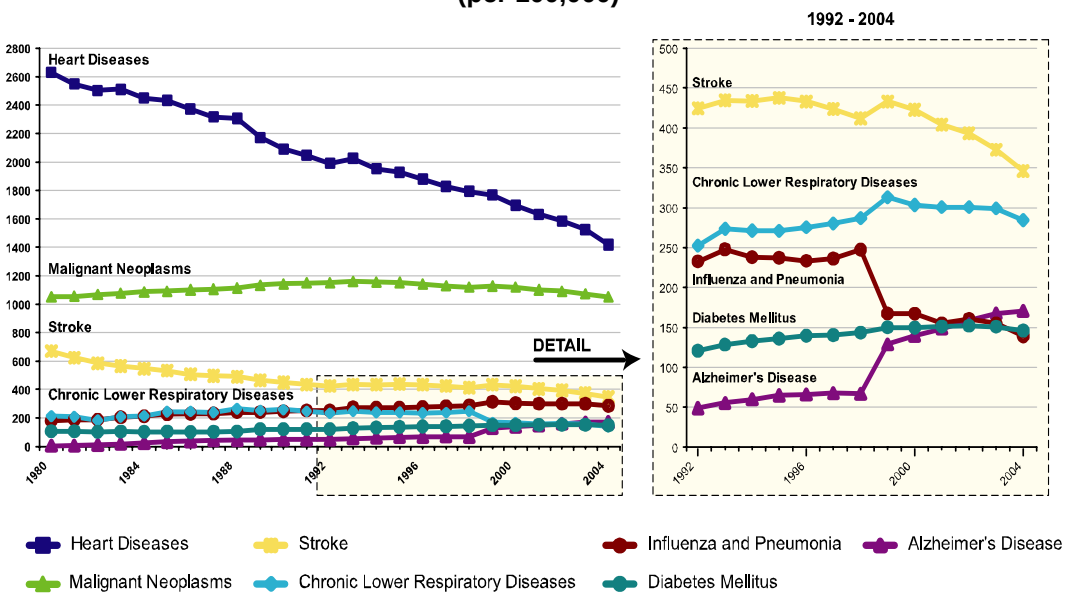
Trends

Reports of death in a population are quantified in various ways, one of the most common being mortality rate, or death rate, which is the number of deaths (all-cause or specific-cause) per 100,000 individuals in a given sociodemographic group (e.g., age, race, gender) or in a particular region. Almost all diseases or health outcomes occur at different rates in different age groups. For instance, communities with a disproportionate number of older individuals have higher rates of cancer, whereas regions populated by families and young children have higher rates of sports injuries. This is true even if the individuals in the two communities have the same risk of developing cancer or being injured.

Figure 2 illustrates age-adjusted mortality rates for leading causes of death between 1980 and 2004. Age-adjusted mortality rates control for age by adjusting mortality rates to a standard population, thus allowing researchers and policy makers to compare rates between years. A comparison of the crude death rate from cerebrovascular disease (stroke) between 1980 and 2004, for example, would be misleading because strokes primarily afflict the elderly, who today comprise a significantly larger proportion of the population than in 1980.

Figure 2. Age-Adjusted Mortality Rates for Leading Causes of Death, Persons Age 65 and Older: 1980-2004

(per 100,000)



Source: National Center for Health Statistics, *Trends in Health and Aging*, available at [http://www.cdc.gov/nchs/agingact.htm]; National Center for Health Statistics, *Death rates by 10-year age groups and age-adjusted death rates for 113 selected causes, race and sex: United States, 1979-98*, Table HIST001R, at [http://www.cdc.gov/nchs/data/statab/hist001r.pdf].

Note: In this report, age-adjusted mortality rates are based on populations enumerated as of April 1st for census years and estimated as of July 1st for all other years.

Even with no change in the age-specific risk of dying of stroke, one would observe a higher crude death rate in 2004 simply because the population is older. Using age-

adjusted rates accounts for changes in population structure over time and facilitates the comparison of mortality rates across years.[15]

Between 1980 and 2004, the overall age-adjusted mortality rate (all causes) for older Americans decreased by 19.7%. Much of this decline is explained by drop in heart disease and stroke mortality rates among people age 65 and older during this period. The decline in heart disease mortality rates is especially noteworthy because the prevalence of heart disease has not decreased in the past 25 years.

Persons diagnosed with cardio- and cerebrovascular disease are living longer, thanks to improved surgical techniques, the advent of angioplasty, and the use of anticoagulants. Declining heart disease and stroke mortality rates may also be attributable to changes in lifestyle behaviors, including less cigarette smoking and changes in diet to reduce the consumption of saturated fats.[16] During the same period, though, CLRD and diabetes mortality rates increased 58.6% and 36.7%, respectively. The age-adjusted cancer mortality rate among the over-65 population remained virtually unchanged between 1980 and 2004.[17]

Arguably, the most significant mortality change during this period was the rising number of fatalities associated with Alzheimer's disease (AD). Between 1980 and 2004, deaths resulting from AD increased from 1,037 to 65,313, with the share of all deaths attributable to AD rising from 0.08% to 3.7%. **Figure 3** depicts changes in mortality rates for the seven leading causes of death in the over-65 population between 1980 and 2004. It illustrates how dramatic recent changes in Alzheimer's mortality have been relative to other leading causes of deaths. Though most of the changes represented in **Figure 3** are substantial by virtually any standard, they are dwarfed by the increase in the mortality rate for AD, which skyrocketed over the last quarter century, increasing 40-fold (3,904.7%).[18]

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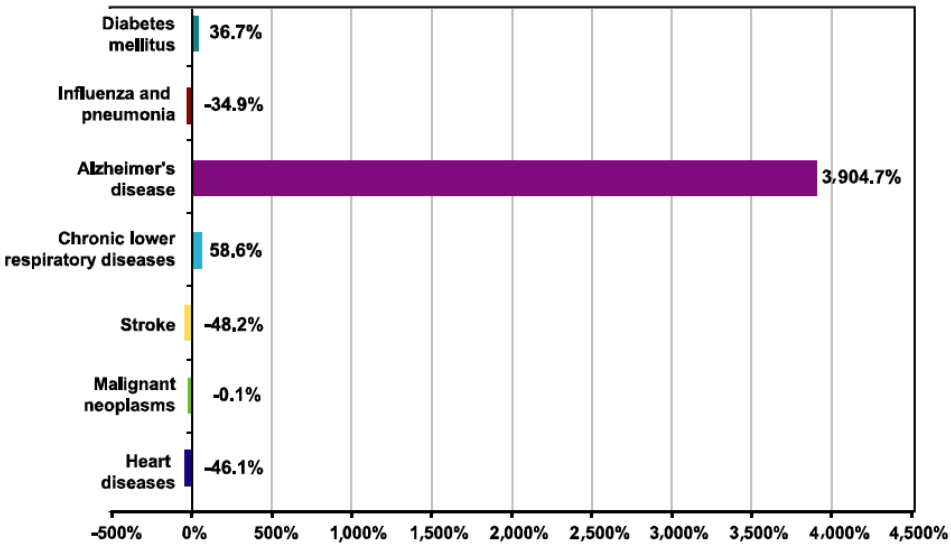
[15] Adjustment is accomplished by first multiplying the age-specific rates of death by age-specific weights. The weights for each group are proportional to the age distribution of the standard U.S. population. The weighted rates are then summed across the age groups to give an age-adjusted rate.

[16] David M. Cutler, Behavioral Health Interventions: What Works and Why? National Bureau of Economic Research, Working Paper, June 2002, available at [http://www.economics.harvard.edu/faculty/dcutler/papers/interventions_6-02.pdf].

[17] Death rates for cancer rose between 1980 and 1990 but have been falling during the last 15 years, driven largely by decreasing mortality in the four most common malignancies: prostate, breast, lung, and colon cancers. The drop in lung cancer deaths is likely a result of the significant numbers of Americans who quit smoking 15 to 20 years ago. A majority of these individuals were men; consequently, lung cancer mortality in older men is now falling, whereas mortality in older women has leveled off.

[18] Despite this exponential increase, the Alzheimer's disease mortality rate has yet to match the death rates for cardiovascular disease, stroke, and cancer (see **Figure 2**).

Figure 3. Percentage Change in Age-Adjusted Mortality Rates Among Older Americans: 1980-2004



Source: CRS calculations based on data from National Center for Health Statistics, *Trends in Health and Aging*, available at [http://www.cdc.gov/nchs/agingact.htm].

Although this jump may reflect true changes in the risk of dying from AD, other explanations for this dramatic rise exist. Alzheimer's was a little-known condition in 1980. Only in the past two decades has the medical community begun to better understand the disease and to distinguish it from "age-related forgetfulness," or senility. Scientists now widely recognize two significant abnormalities in the brains of people with AD: twisted nerve cell fibers, known as neurofibrillary tangles, and a sticky protein called beta amyloid, which forms deposits called plaques.[19] Plaques and tangles are associated with damage to healthy brain cells, causing the brain to atrophy and shrink. Damage to the area of the brain responsible for memory, the hippocampus, appears to be particularly acute.[20] In addition, persons with AD underproduce chemicals in the brain necessary for communication between nerve cells. These chemicals, called neurotransmitters, include acetylcholine, serotonin, and norepinephrine.[21]

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[19] Brian E. Leonard, Alzheimer's Disease and Stroke: Possible Biochemical Causes and Treatment Strategies in *Fundamentals of Psychopharmacology*, published online, John Wiley and Sons, Ltd., 2003, pp.341-374, at [http://dx.doi.org/10.1002/0470871482.ch14].

[20] Anne Brown Rodgers, *2005-2006: A Progress Report on Alzheimer's Disease*, U.S. Department of Health and Human Services, National Institutes of Health, National Institute on Aging, NIH Publication Number: 06-6047, April 2007.

[21] Agnes Heinz, *Alzheimer's Disease: A Status Report for 2002*, New York: American Council on Science and Health, October 2002.

Three factors may explain the increased frequency with which AD has been diagnosed and labeled a cause of death in the over-65 population.[22] First, the development of diagnostic criteria for AD and a greater understanding of AD among medical professionals, coroners, and funeral directors (who determine the underlying cause of death listed on death certificates) may have affected the Alzheimer's mortality rate.[23] Second, the adoption of the 10th Revision of the International Classification of Diseases (ICD-10) by the U.S. National Center for Health Statistics in 1999 may have promoted the identification of Alzheimer's as a cause of death instead of more common designated conditions, such as pneumonia or stroke.[24] Finally, because AD is especially prevalent in individuals age 85 and older, it is also possible that the aging of the American population has accelerated the incidence of this condition and thus affected AD death rates.

Disparities

Death rates among older Americans vary by race, ethnicity, gender, and even age itself. This variability reflects different health risks and disease profiles for underlying populations, disparities in access to health-care services, and other sociodemographic factors, such as income or education. This section examines some of these mortality rate disparities.

Changes in mortality since 1980 have not affected older Americans uniformly (see **Table 2**). Although the top three killers of people age 65 and older have remained the same since 1980, significant differences are apparent when mortality rates are compared across age groups. For example, the largest decrease in heart disease mortality (55.5%) was experienced by persons between the ages of 65 and 74, followed by persons age 75-84 (49.7%) and 85+ (37.0%).

Cancer mortality has increased slightly for individuals over age 75 (~3.8%) but decreased somewhat for the 65-74 subgroup (-7.7%). As deaths from lung cancer have fallen, mortality rates for CLRD have increased. CLRD mortality rates among the "oldest old" (85+) have risen considerably (120%) since 1980. Death rates for Alzheimer's disease, however, have seen the most dramatic relative increases. Individuals age 65 to 74 have experienced a 515% rise, or more than sixfold increase; rates for persons age 75 to 84 jumped 341%, and rates for persons 85 and older, who are most susceptible to Alzheimer's, rose almost 11,000% (see **Table 2** below).

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[22] Cause of death data are drawn from death certificates and thus rely on the ability of a physician or coroner or funeral home director to make a proper diagnosis and accurately record this information on an individual's death certificate.

[23] CRS Report RL32970, *Biomedical Advances in Alzheimer's Disease*, by Michele M. Schoonmaker and Laura B. Shrestha.

[24] In the mid- to late-1990s, physicians and researchers argued in favor of including Alzheimer's diagnostic criteria in the ICD-10 because AD was systematically being underreported on death certificates: patients succumbing to Alzheimer's-related infections such as pneumonia were having "pneumonia" instead of "Alzheimer's disease" listed as the primary cause of death on their death certificates. See Emily Yoffe, How Does Alzheimer's Kill? *Slate*, 2001, available at [http://www.slate.com/id/1007601].

Table 2. Crude Mortality Rates for Leading Causes of Death, by Age, 1980-2004

(per 100,000 population)

Cause	Age	1980	1990	2000	2004	% Change (1980-2004)
All causes	65-74	2,994.9	2,648.6	2,399.1	2,164.6	-27.7
	75-84	6,692.6	6,007.2	5,666.5	5,275.1	-21.2
	85+	15,980.3	15,327.4	15,524.4	13,823.5	-13.5
Heart disease	65-74	1,218.6	894.3	665.6	541.6	-55.5
	75-84	2993.1	2,295.7	1,780.3	1,506.3	-49.7
	85+	7,777.1	6,739.9	5,926.1	4,895.9	-37.0
Malignant neoplasms	65-74	817.9	872.3	816.3	755.1	-7.7
	75-84	1,232.3	1,348.5	1,335.6	1,280.4	3.9
	85+	1,594.6	1,752.9	1,819.4	1,653.3	3.7
Stroke	65-74	219.0	144.2	128.6	107.8	-50.8
	75-84	786.9	498.0	461.3	386.2	-50.9
	85+	2,283.7	1,628.9	1,589.2	1,245.9	-45.4
CLRD	65-74	129.1	152.5	169.4	153.8	19.1
	75-84	224.4	321.1	386.1	366.7	63.4
	85+	274.0	433.3	648.6	601.7	119.6
Alzheimer's disease	65-74	3.2	10.2	18.7	19.7	515.6
	75-84	4.8	58.2	139	168.7	341.5
	85+	7.6	185.5	659.1	818.8	10,673.7
Diabetes mellitus	65-74	62.1	73.4	90.8	87.2	40.4
	75-84	129.8	144.2	178.7	176.9	36.3
	85+	222.4	251.9	315.6	207.0	-6.9

Source: CRS compilation from National Center for Health Statistics, *Health, United States, 2006*, Tables 35-38 and 41, available at [http://www.cdc.gov/nchs/data/hus/hus06.pdf]; *DataWarehouse GMWK51*, Death Rates for Alzheimer's Disease by Race and Sex: United States, 1979-98, at [http://www.cdc.gov/nchs/datawh/statab/unpubd/mortabs/gmwkh12_10.htm].

Because mortality rate changes have varied by age, cancer is now the most common cause of death among individuals age 65-74, having eclipsed heart disease (see **Table 3**). In addition, the third-leading killer for this subgroup is no longer stroke. Instead, it is chronic lower respiratory disease (CLRD). The fourth leading cause of death among 75-to-85-year-olds is no longer influenza/pneumonia — it is diabetes. For persons age 85 and older, it is Alzheimer's disease. These last two conditions, diabetes and AD, deserve particular mention, as neither was a leading cause of mortality prior to 2000. Unlike AD, which may reasonably be explained by a greater awareness about the condition, the rising prominence of diabetes largely reflects increases in obesity since 1990 and a concurrent decrease in physical activity

by elderly individuals.[25] Researchers note, however, that the increase in Type 2 diabetes and diabetes mortality among older Americans may also have been influenced by a change in diagnostic criteria recommended by the CDC in July 1997.[26]

Table 3. Top Five Causes of Death for Older Americans, by Age, 2004

Rank	Age 65-74	Age 75-84	Age 85+
1	Cancer	Heart	Heart
2	Heart	Cancer	Cancer
3	CLRD	Stroke	Stroke
4	Stroke	Diabetes	Alzheimer's disease
5	Diabetes	CLRD	Influenza/pneumonia

Source: CRS compilation from National Center for Health Statistics, *Health, United States, 2006,* available at [http://www.cdc.gov/nchs/data/hus/hus06.pdf].

Mortality rates among persons age 65 and older are also unevenly distributed across racial and ethnic groups. These differences reflect different disease profiles for underlying populations, unequal access to health care, and other sociodemographic factors, such as income and education. Panel A of **Table 4** illustrates death rates per 100,000 by race, ethnicity, and age of the U.S. population age 65 and older in 2004. Panel B represents rate ratios for the different race/age/gender combinations, using non-Hispanic whites as a reference group.

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[25] Agency for Healthcare Research and Quality and the Centers for Disease Control and Prevention, Physical Activity and Older Americans: Benefits and Strategies, June 2002, available at [http://www.ahrq.gov/ppip/activity.htm]. National Health and Nutrition Examination Survey (NHANES) data showing the prevalence of obesity is available from the CDC at [http://209.217.72.34/aging/TableViewer/tableView.aspx?ReportId=412].

[26] Based on 1997 recommendations from the Expert Committee on the Diagnosis and Classification of Diabetes Mellitus (Diabetes Care, vol. 20, pp. 1183-1197), the fasting plasma glucose level required for a diagnosis of diabetes was reduced from "greater than or equal to 140" to "greater than 125" mg/dl. See A. Marshall McBean, Shuling Li, David T. Gilbertson, and Allan J. Collins, Differences in Diabetes Prevalence, Incidence, and Mortality Among the Elderly of Four Racial/Ethnic Groups: Whites, Blacks, Hispanics, and Asians, *Diabetes Care,* vol. 27, 2004, pp. 2317-2324.

Table 4. Death Rates and Death Rate Ratios, by Race/Ethnicity and Age: U.S. Elderly Population, 2004

Sex and Age Group	Non-Hispanic White	Non-Hispanic Black	Hispanic	Asian/Pacific Islander	Native American
Panel A: Death Rates					
Males					
65-74	2,617.9	3,818.3	1,994.3	1,363.4	2,196.8
75-84	6,461.5	7,710.3	4,791.6	3,766.3	4,584.2
85+	15,498.2	14,452.5	9,932.8	10,118.2	7,923.8
Females					
65-74	1,752.0	2,386.1	1,297.2	933.2	1,700.9
75-84	4,571.1	5,300.0	3,329.6	2,558.2	3,533.4
85+	13,609.6	12,896.9	9,253.0	8,125.8	7,093.7
Panel B: Death Rate Ratios **(Non-Hispanic Whites as Referent)**					
Males					
65-74	1.00	1.46	0.76	0.52	0.84
75-84	1.00	1.19	0.74	0.58	0.71
85+	1.00	0.93	0.64	0.65	0.51
Females					
65-74	1.00	1.36	0.74	0.53	0.97
75-84	1.00	1.16	0.73	0.56	0.77
85+	1.00	0.95	0.68	0.60	0.52

Source: CRS compilation from National Center for Health Statistics, *Health, United States, 2006*, available at [http://www.cdc.gov/nchs/data/hus/hus06.pdf].

The ratios illustrate a consistent pattern between ages 65 and 84. Most non-Hispanic blacks have higher death rates than non-Hispanic whites. By contrast, Hispanics, Asian-Pacific Islanders (hereafter, API), and Native Americans have mortality rates lower than those of non-Hispanic whites. These advantages, however, attenuate with age. For instance, between age 65 and 74, heart disease mortality rates are 46% greater for non-Hispanic black males than for non-Hispanic white males. This difference diminishes somewhat after age 75 and significantly after age 80. Beyond age 85 mortality rates for heart disease eventually "cross-over," with the risk of death from heart disease among whites surpassing that for blacks.[27]

[27] Irma T. Elo, Samuel H. Preston, Racial and Ethnic Differences in Mortality at Older Ages in Linda G. Martin and Beth J. Soldo, eds., Racial and Ethnic Differences in the Health of Older Americans, (Washington, DC: National Academy Press, 1997).

Although mortality rates for the top three causes of death (heart disease, stroke, and cancer) are higher for males than females, the relative gender disparities are proportional across racial categories (see **Table 5**). For both males and females, disease-specific mortality rates are highest among non-Hispanic blacks, followed by non-Hispanic whites and then Hispanics. For instance, non-Hispanic black women are at least 42% more likely to die of heart disease than Hispanic or API or Native American women.[28]

Table 5. Condition-Specific, Age-Adjusted Death Rates, by Race/Ethnicity, 2004

(per 100,000 population)

Underlying Cause of Death	Non-Hispanic White	Non-Hispanic Black	Hispanic	Asian/Pacific Islander	Native American
Panel A: Females					
Heart disease	1,506.9	1,604.9	957.5	661.6	786.3
Cancer	910.9	949.6	551.2	496.9	558.1
Stroke	419.8	446.8	243.3	263.2	215.3
CLRD	295.6	129.6	104.6	63.9	159.8
Alzheimer's disease	227.1	139.8	99.3	47.7	91.5
Diabetes	133.4	279.6	196.6	100.5	240.2
Influenza/pneumonia	164.4	123.5	104.6	85.9	135.8
Nephritis	83.6	164.6	68.1	46.1	78.5
Accidents	87.2	55.6	44.6	50.7	85
Septicemia	60.5	128.2	45.8	29.1	73
All causes	**4,858.6**	**4,925.0**	**2,981.4**	**2,247.8**	**3097.0**
Panel B: Males					
Heart disease	1,696.8	1,873.3	1,144.5	877.4	1,031.7
Cancer	1,335.8	1,635.8	860.5	753.1	752.6
Stroke	335.4	422.6	235.1	275.2	188.5
CLRD	361.3	261.3	160.4	155.1	231.9
Alzheimer's disease	127.0	92	71.0	30.5	26.6
Diabetes	155.2	261.1	212.6	109.7	231.9
Influenza/pneumonia	164.6	167.6	120.1	131.4	130.5
Nephritis	104.8	191.6	81.0	52.2	95.4
Accidents	115.2	101.7	78.7	69.2	118.4
Septicemia	69.0	143.6	47.9	34.3	41.1
All causes	**5,391.2**	**6,131.2**	**3,634.5**	**2,973.7**	**3,456.2**

Source: CRS compilation from National Center for Health Statistics, *Health, United States, 2006*, available at [http://www.cdc.gov/nchs/data/hus/hus06.pdf].

[28] Rate ratios are not displayed in **Table 5**.

The disparity is greater for non-Hispanic black men, whose risk of heart disease mortality is at least 63% greater than non-white minorities. Asian/Pacific Islanders generally exhibit the lowest risk for all causes of death, with the exception of stroke.

The top three causes of death (heart disease, cancer, and stroke) are the same for most racial/ethnic categories, with two exceptions. For non-Hispanic white males, CLRD replaces stroke as the third-leading cause of death. Among Native Americans, diabetes replaces stroke for females; CLRD and diabetes tie for third place for males.

For females, the highest rates of diabetes mortality are seen among non-Hispanic blacks and Native Americans. Both groups have experienced unmatched increases in obesity in recent years.[29] By contrast, among males, the highest death rates for diabetes are seen among Hispanics and non-Hispanic whites. Alzheimer's disease disproportionately afflicts and kills older non-Hispanic whites. Among men, non-Hispanic whites are 38% more likely to die from AD than blacks, who have the second-greatest death rate from Alzheimer's. Among women, non-Hispanic whites are 62% more likely to die from AD than blacks.

A final observation concerns the seventh leading cause of death — influenza/pneumonia. The highest death rates for these conditions among older Americans are seen in the non-Hispanic white population. What may be most striking about influenza/pneumonia mortality, however, is not the differences in death rates by race, but rather the similarities and dissimilarities by gender. Among most non-white racial/ethnic groups, men are more likely than women to die of the flu or pneumonia. Reasons for this are unclear, but a large body of research[30] shows that women receive more preventive care and visit health-care providers more regularly than men, supporting the hypothesis that females benefit from early diagnosis and may increase the likelihood that they are able to avoid or effectively treat these conditions before they become life-threatening.

Interestingly, the most recent data suggest that death rates for influenza/pneumonia are identical for men and women of Caucasian descent. This is very different, of course, from the pattern discussed above, which is exhibited by all other groups. Explanations for this gender equivalence are not readily apparent. Why among non-Hispanic whites alone are men and women equally likely to die from influenza/pneumonia? Because non-Hispanic whites have the highest death rates from these conditions, it seems unlikely that influenza vaccination rates and

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[29] Nicole Cossrow and Bonita Falkner, Race/Ethnic Issues in Obesity and Obesity-Related Comorbidities, *Journal of Clinical Endocrinology & Metabolism*, vol. 89, no. 6, 2004, pp. 2590-2594; Jason D Boardman, Jarron M. Saint Onge, Richard G. Rogers, and Justin T. Denney, Race Differentials in Obesity: The Impact of Place, *Journal of Health and Social Behavior*, vol. 46, no. 3, 2005, pp. 229-243.

[30] Steven M. Asch, Eve A. Kerr, Joan Keesey, John L. Adams, Claude M. Setodji, Shaista Malik, and Elizabeth A. McGlynn, Who Is at Greatest Risk for Receiving Poor-Quality Health Care? *New England Journal of Medicine*, vol. 354, No. 11, March 16, 2006, pp. 1147-1156.

access to care could serve as sufficient explanation for this mortality pattern. A different possibility is that most white people who succumb to influenza or pneumonia do so very late in life — at ages that surpass the typical life expectancies for males in minority populations.

Policy Implications

As achievements in modern medicine and changes in lifestyle behavior have fostered greater life expectancy for the nation's elderly, the number of older Americans living with chronic disease has also grown. Often, diseases that used to be fatal by middle-age can now be effectively managed for years. As a result, older adults are living longer with chronic conditions such as coronary heart disease, nephritis, and even some forms of cancer. This trend may be a concern because conditions such as diabetes, CLRD, and Alzheimer's disease can be resource-intensive, generating significant costs for treatments (e.g., dialysis, transplant surgery, respiratory therapy, and institutional long-term care).

The indirect and direct costs associated with treating chronic diseases in the elderly population are significant, especially when long-term maintenance therapy is required. Families may shoulder an enormous burden when caring for elderly persons unable to live independently. Caregivers often work part-time or deplete their savings and assets to care for elders. The direct costs of long-term treatment of older Americans in nursing homes and intermediate care facilities is borne at least in part by the taxpayers who subsidize the Medicaid and Medicare programs.

Although more and more elderly Americans live with multiple and complex chronic illnesses, requiring a high degree of medical management, policy makers are just beginning to consider the implications that the rise in chronic disease has for Medicare.[31] Medicare was designed to deal primarily with the effects of acute illness, which was seen at the time of its implementation as the major threat to the health and financial security of the aged. Now, however, about 20% of Medicare beneficiaries have five or more chronic conditions; all told, they account for more than two-thirds of Medicare spending.[32]

As the share of the population age 65 and older increases in coming decades, federal outlays for Medicaid and Medicare are expected to grow substantially, from 21% of all government spending in 2006 to an estimated 31% in 2017.[33] According to projections by the Congressional Budget Office (CBO), this will represent 5.9%

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[31] U.S. Congress. Senate Special Committee on Aging. The Future of Medicare: *Recognizing the Need for Chronic Care Coordination*. 110th Congress, 1st Session, May 9, 2007; Gerald F. Anderson, Medicare and Chronic Conditions, *New England Journal of Medicine*, Vol. 353, pp.305-309, 2005.

[32] Partnership for Solutions, *Medicare: Cost and Prevalence of Chronic Conditions*, Johns Hopkins University, Baltimore MD, 2002.

[33] For a more detailed discussion of federal spending on health-care entitlement programs, see CRS Report RS22619, *Health Care Spending and the Aging of the Population*, by Jennifer Jenson.

of Gross Domestic Product (GDP) in 2017, compared with 4.3% of GDP in 2006.[34] With 70% of all deaths and more than 75% of all health-care costs in the United States now attributable to chronic disease, the Centers for Disease Control and Prevention warns that "the United States cannot effectively address escalating health care costs without addressing the problem of chronic diseases."[35]

Some of the questions currently being discussed by legislators include the extent to which the government is willing to shift the costs of long-term care provided today to future generations of Americans, how much financial responsibility each family should bear for the long-term health care needs of its eldest members, and what kinds of preventive care or health promotion services — not currently covered by Medicare or Medicaid — would help stem the tide of chronic illness in the 65-and-older population.

Whether and how to address these issues remains a subject of contentious debate, but health-care experts anticipate that the growing prevalence of chronic disease in this country, with its disproportionate effect on the health of minority populations and on the mortality of the aged, will play a prominent role in discussions of health reform.[36]

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[34] See U.S. Congressional Budget Office, *The Budget and Economic Outlook: Fiscal Years 2008 to 2017*, January 2007, p. 50.

[35] Centers for Disease Control and Prevention, National Center for Chronic Disease Prevention and Health Promotion, available at [http://www.cdc.gov/nccdphp/overview.htm].

[36] These experts include Emory University professor Kenneth Thorpe, former Surgeon General Richard Carmona, and former CMS Administrator Mark McClellan. See Tony Pugh, Curbing chronic diseases new issue in healthcare politics, *Kansas City Star*, July 27, 2007.