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Chartbook on Health Data on Older Americans: United States, 1992

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No. 29

This volume includes charts presenting data from various sources concerning the health status and determinants of health of older persons. This chartbook is a companion report to Health Data on Older Americans: United States, 1992.

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Chartbook on Health Data on Older Americans

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Introduction

The age composition of the United States population has changed dramatically during the 20th century. Most impressive has been the increase in the size of the population 65 years of age and over. At the turn of the century, this segment of the population represented approximately 4 percent of the total population. By 1990, this percent had more than tripled to over 12 percent of the total population. Embedded in the expansion of the older population is a disproportionate increase in the size of the "oldest-old" population, those 85 years of age and over.

This "graying" of America has important economic and social policy implications already putting demands on local, State, and Federal social welfare systems and on health care systems in general. Thus, the importance of fully comprehending the health status, resource utilization patterns, costs of care, and needs of special segments of the older population cannot be overstated. This chartbook displays and analyzes data on the health of older Americans. It is unique in that the detailed age categories and the comprehensive presentation of information from a variety of data sources are not routinely shown in reports of the National Center for Health Statistics (NCHS). The chartbook is divided into three major sections: health status, health care use and its cost, and special topics. The sources of the data, from NCHS and other organizations, are indicated on each chart and described in detail in the appendix.

This chartbook and a companion detailed data report represent an update and expansion of a 1986 report on the health of older Americans (1). An advisory group was convened to review the 1986 report and advise on the content and format of this update. Organizations that were members of the advisory group were:

American Association of Retired Persons
Brookings Institution
Congressional Budget Office
Congressional Research Service
General Accounting Office
Gerontological Society of America
National Council on Aging
National Institute on Aging
Office of Technology Assessment
U.S. Senate Special Committee on Aging
U.S. House of Representatives Select Committee on Aging

The advisory group recommended two different formats for releasing health data on older Americans: a detailed data report aimed at those who wanted indepth information for research and a chartbook aimed at those who wanted summary information. This is the chartbook; the detailed data report, *Health Data on Older Americans: United States, 1992*, is also available (2). Only a subset of the information in the detailed data report is presented here by topic. The order

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of the topics is identical to the chapter headings of the data report. The reader interested in more information and in an indepth analysis of a topic can refer to the relevant chapter of the data report.

Because many of the estimates in this report are based on a sample survey, they may differ somewhat from the figures that would have been obtained if a complete census had been taken using the same survey and processing procedures. The validity of hypotheses about these sample survey estimates was evaluated according to statistical protocols described in the appendix. Terms in the text relating to differences, such as "higher" and "less," indicate that the differences are statistically significant. Terms such as "similar" or "no difference" mean that no statistically significant difference exists between the estimates being compared. Generally, statistical tests performed were two-tailed tests unless there was an a priori one-tailed hypothesis. A detailed discussion of hypothesis testing and the level of statistical significance is included in the appendix.

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1. Havlik RJ, et al. Health statistics on older persons: United States, 1986. National Center for Health Statistics. Vital Health Stat 3(25). 1987.
2. Van Nostrand JF, Furner SE, and Suzman R, eds. Health data on older Americans: United States, 1992. National Center for Health Statistics. Vital and Health Stat 3 (27). 1993.

Chapter 1
Health status

by Sylvia E. Furner, Ph.D., University of Illinois at Chicago School of Public Health

There are a variety of ways of measuring health status, including perceptions of health, functional limitations, and causes of death. In this section, data on respondent-assessed health status, level of functional limitation, change in functional status, and causes of death are presented. The influence of age, sex, and race on these measures is explored.

Measures of health

Respondent-assessed general health is a simple, yet informative, measure of health. Among persons 65 years of age and over who lived in the community, respondent-assessed health status appeared to show an inverse relationship with age; as age increased, perceptions of excellent or very good health decreased. However, this decrease was not statistically significant (figure 1). Approximately one-third of the population aged 65 years of age and over rated their health as good, and this proportion remained stable with increasing age. The proportion of older adults who rated their health as fair or poor increased significantly between ages 70–74 and 75–79.

Note: The author wishes to acknowledge the contributions of Robin Mermelstein, Ph.D., Baila Miller, Ph.D., and Thomas Prohaska, Ph.D., from the University of Illinois at Chicago, and Veronica Benson, B.A., Susan Jack, M.S., Jeffrey Maurer, M.S., Harry Rosenberg, Ph.D., and Joan F. Van Nostrand, M.P.A., from NCHS, who were the authors of the chapters in the companion report, *Health Data on Older Americans: United States, 1992*, and Richard Suzman, Ph.D., National Institute on Aging, who reviewed the text.

Functional status is an important health indicator for older persons. Functional status is commonly defined in terms of the ability to perform basic activities of daily living (ADL's) and instrumental activities of daily living (IADL's). ADL's include seven personal care activities: eating, toileting, dressing, bathing, walking, getting in and out of a bed or chair (transferring), and getting outside. For this analysis, individuals were considered to have difficulty with an ADL if they reported having any difficulty performing one of the activities because of a health or physical problem. Problems with ADL's increased with advancing age (figure 2). Fifteen percent of males and 16 percent of females in the 65–69 year age group had difficulty performing at least one ADL. By ages 85 and over, 35 percent of the males and 48 percent of the females reported difficulty performing at least one ADL.

IADL's include six home management activities: preparing meals, shopping for personal items, managing money, using the telephone, doing heavy housework, and doing light housework. As with ADL's, individuals were considered to have difficulty with an IADL if they reported having any difficulty performing one of the activities because of a health or physical problem. Difficulties in performing IADL's are related to age and sex (figure 3). For both males and females, the percent reporting difficulty with IADL's increased with advancing age. At every age subgroup, a greater percent of women than men reported difficulty in performing IADL's.

These sex differences may not, however, be the result of true functional differences between men and women, but rather may be the result of differences in role socialization (with men typically performing fewer IADL's than women, thus causing men's reports of difficulty to be underestimated), or the result of an age bias, within each subgroup (on average, within any given age subgroup, women had higher mean ages than men).

Because ischemic heart disease is one of the leading causes of mortality among older persons, it is important to understand the prevalence of this condition among those 65 years of age and over. An indirect indicator of the effect of declining ischemic heart disease mortality that has been observed since the mid-1960's could be an increase in the prevalence of this condition. For those 65 years of age and over, the reported rates of ischemic heart disease increased from 1979–81 to 1985–87 (figure 4). This is primarily the result of a significant increase in rates among males (data not shown); there was not a significant increase for females. It is possible that more diagnostic studies have been done in recent years, resulting in an increase in the number of cases being diagnosed. During the time periods shown, there was no significant difference in prevalence of ischemic heart disease between the age groups for both sexes combined. However, females 75 and over reported higher rates of ischemic heart disease than younger females (there was no male age differential). The fact that the prevalence did not decrease with age is an indication that older persons may be surviving longer with their disease.

Functional status and living arrangements

Understanding an older person's level of functional limitation is important in assessing his or her ability to remain independent in the community. Less than 7 percent of the population 65–74 years of age living in the community reported difficulties with three or more ADL's (figure 5). For both sexes, there was a significant increase in the percent reporting difficulty with three or more ADL's from those in the younger age group to those in the age group 75 years and over. Difficulties with IADL's show the same age patterns (figure 6).

Functional status may dictate, to a certain extent, the living arrangements of older persons. The cross-sectional nature of the data used here does not allow for an assessment of the directionality of this relationship; however, the data can be used to assess the existence of an association. Females 75 years of age and over with high levels (three or more difficulties) of functional impairment, both ADL's and IADL's, were more likely to live with others than to live alone (figures 7 and 8). There was no significant difference in living arrangement for younger females, 65–74 years of age, or for males at any age among older persons with high levels of functional impairment.

Older persons who have problems with both ADL's and IADL's may represent a more disabled group. More males reported no difficulties with either measure than females—75 versus 61 percent (figure 9). A greater percent of females, 22 percent, reported difficulties with both ADL's and IADL's than males, 11 percent. Males were more likely to report difficulties with ADL's only but were less likely to report difficulties with IADL's only.

Changes in functional status and risk of institutionalization and death

Longitudinal data demonstrate the extent of the influence of age and sex on the risk of death and institutionalization (as measured by residence in a nursing home) (figure 10). The previously well-documented mortality trends were evident here. Persons 80 years of age and over and men had the highest mortality rates. Al-

though both men and women 80 years of age and over were more likely to be in nursing homes then those in younger age groups, women in this older age category were at significantly higher risk of nursing home residence than their male age peers (6.0 versus 3.6 percent).

Functional status influences mortality and risk of nursing home residence (figure 11). Two or more limitations in basic ADL's were associated with risk of death and nursing home residence. Approximately 21 percent of those in 1984 with two or more limitations in ADL's were deceased in 1986, and approximately 6 percent were in a nursing home. The pattern of change in level of difficulty in ADL and IADL functioning varied somewhat by age (figures 12 and 13). Among those without any limitations in 1984, 77 percent of those aged 70–79 years remained independent, and 66 percent of those 80 and over remained independent (figure 12). Among those with some difficulties in 1984, fewer persons 80 years of age and over improved to no difficulties (15 percent) than did persons 70–79 years of age (26 percent). Similar patterns were evident for IADL difficulty (figure 13).

Mortality

Substantial declines in death rates in conjunction with dramatic increases in life expectancy have contributed to the unprecedented growth in the percent of the population 65 years of age and over. To better prepare for the future needs of our aging society, it is important to investigate and identify the changing mortality trends.

From 1960 to 1990, the death rate for the population 65 years of age and over decreased by approximately 19 percent. The decline in unadjusted death rates over this time period was not shared equally among males and females or among white and black persons. White males experienced a 20-percent decline in death rates, while black males experienced only a 12-percent decline (figures 14 and 15). White females experienced a 16-percent decline, while black females experienced a 13-percent decline.

Although these declines in death rates appeared to be substantial, no adjustment was made for the change in the age composition of the population. A more accurate comparison is of the age-adjusted death rates, which assume a fixed age distribution (that of the 1940 U.S. population). The age-adjusted comparisons show more clearly the magnitude of the decline in death rates, free of the effects of changes in age composition (figure 15). It can be seen that the greatest decline in age-adjusted mortality rates occurred among white females 65 years of age and over—32 percent. The declines are larger among white than black persons for both males and females.

The leading causes of death for the population 65 years of age and over were heart disease, cancer, and cerebrovascular disease. These three causes accounted for approximately 70 percent of all deaths in those 65 years and over and in those 85 and over (figure 16). For the oldest-old, those 85 and over, fewer deaths are from cancer, and a greater percent of deaths are from heart disease and cerebrovascular disease.

Life expectancy has increased substantially during the 20th century. In particular, between 1960 and 1990 (provisional data), life expectancy at age 65 increased for males and females and for white and black people (figure 17). The increases have not been equal, however. Life expectancy at age 65 for white males increased 2.4 years, but the corresponding increase for black males was 1.5 years. Life expectancy at age 65 for white females increased 3.1 years, but among black females, the increase was 2.5 years.

Increases in the life expectancy at age 85 would indicate that the oldest-old are living longer. For the time period 1960–90 (provisional data), there is some evidence that this occurred, but the increase was not equal among race-sex groups (figure 18). Black males experienced a

very slight increase in life expectancy at age 85, and white males and black females increased their life expectancy at age 85 by almost 1 year. White females experienced a 1.7-year increase in life expectancy at age 85.

Recent short-term trends in death rates for the major chronic diseases affecting older persons provide evidence of more immediate change. However, long-term trends over several decades can provide substantial evidence of any secular changes that may have occurred and can help elucidate the increase in the size of the older population. For the three major causes of death affecting older persons (diseases of the heart, malignant neoplasms, and cerebrovascular disease), both short-term and long-term (age-adjusted) trends were investigated (figures 19–26).

Comparison of the death rates from diseases of the heart between 1980 and 1986 reveals declines in all race-sex groups; however, the declines were clearly greater for white than for black people (figure 19). Rates for black females show the least decline. The sex differential in mortality from diseases of the heart was evident, with rates for males consistently higher than rates for females for both black and white people.

The comparison of the age-adjusted death rates for diseases of the heart between 1960 and 1986 in persons 65 years of age and over reveals large declines for both sexes and for white and black persons (figure 20). The greatest declines in these rates were for white females and white males.

Deaths resulting from malignant neoplasms, including neoplasms of the lymphatic and hematopoietic tissues (hereinafter called "cancer"), increased during the period 1980–86 for all race-sex groups (figure 21). The sex differential in mortality from cancer was evident, with rates for males being consistently higher than rates for females.

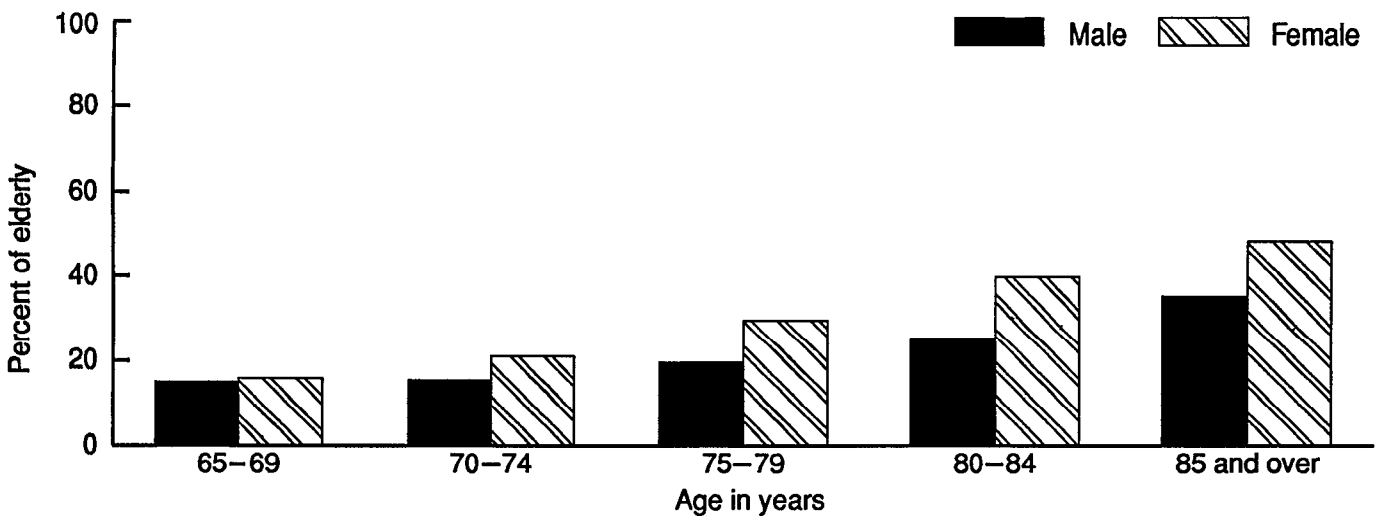
The age-adjusted death rates from cancer for the population 65 years of age and over increased substantially from 1960 to 1986 for both sexes and both races (figure 22).

A large part of the increase in cancer mortality is the result of substantial increases in death rates for malignant neoplasms of the respiratory and intrathoracic organs (hereinafter called "respiratory cancer") (figure 23). Although the death rates from respiratory cancer clearly increased from 1980 to 1986, the long-term trends from 1960 to 1986 were even more dramatic (figure 24). The greatest increases in the age-adjusted death rates from respiratory cancer—more than 400 percent—were for both black and white females. The increase was more than 200 percent for black males and more than 100 percent for white males.

Death rates from cerebrovascular disease (hereinafter called "stroke") declined rapidly (figure 25). The declines were consistent for the race-sex groupings. The age-adjusted death rates for stroke from 1960 to 1986 revealed substantial declines for both males and females and white and black people (figure 26).

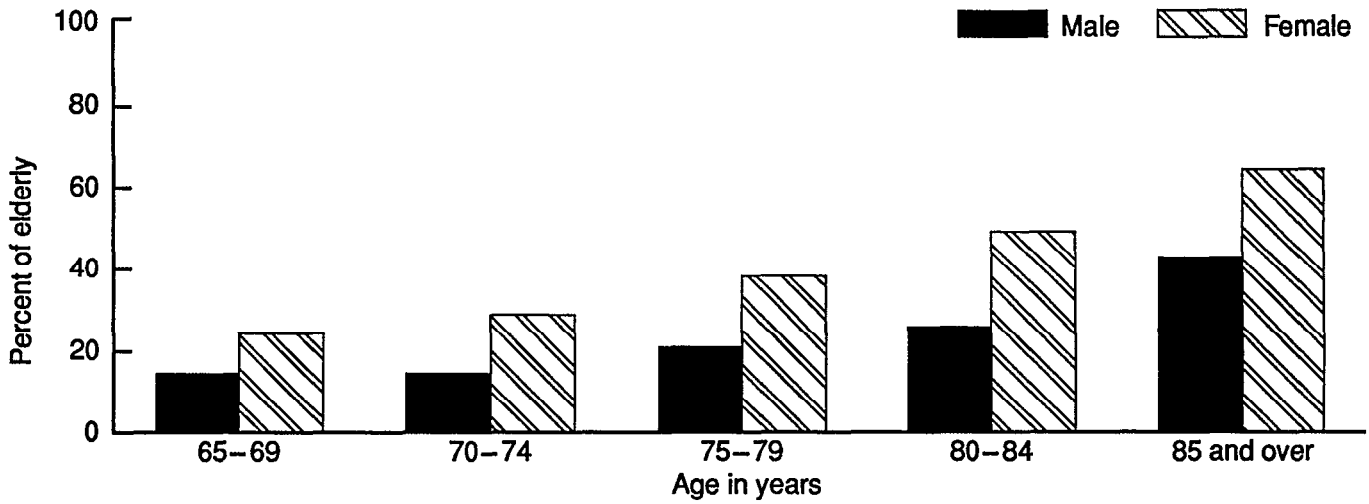
NOTES: Data are based on household interviews of the civilian noninstitutionalized population. Excludes unknown respondent-assessed health status. Percents may not add to 100 because of rounding.
SOURCE: National Center for Health Statistics: Data from the National Health Interview Survey.

Figure 1. Average annual percent distribution of persons 65 years of age and over, according to respondent-assessed health status: United States, 1985–87



NOTES: Data are based on household interviews of the civilian noninstitutionalized population. ADL is activity of daily living. Excludes unknown respondent-assessed health statuses. Excludes those for whom information was missing on all ADL's. Persons reported as not performing an ADL were classified with those reported as having difficulty with that ADL. ADL's include eating, toileting, dressing, bathing, walking, getting in and out of a bed or chair, and getting outside.
SOURCE: National Center for Health Statistics: Data from the National Health Interview Survey 1986 Functional Limitations Supplement.

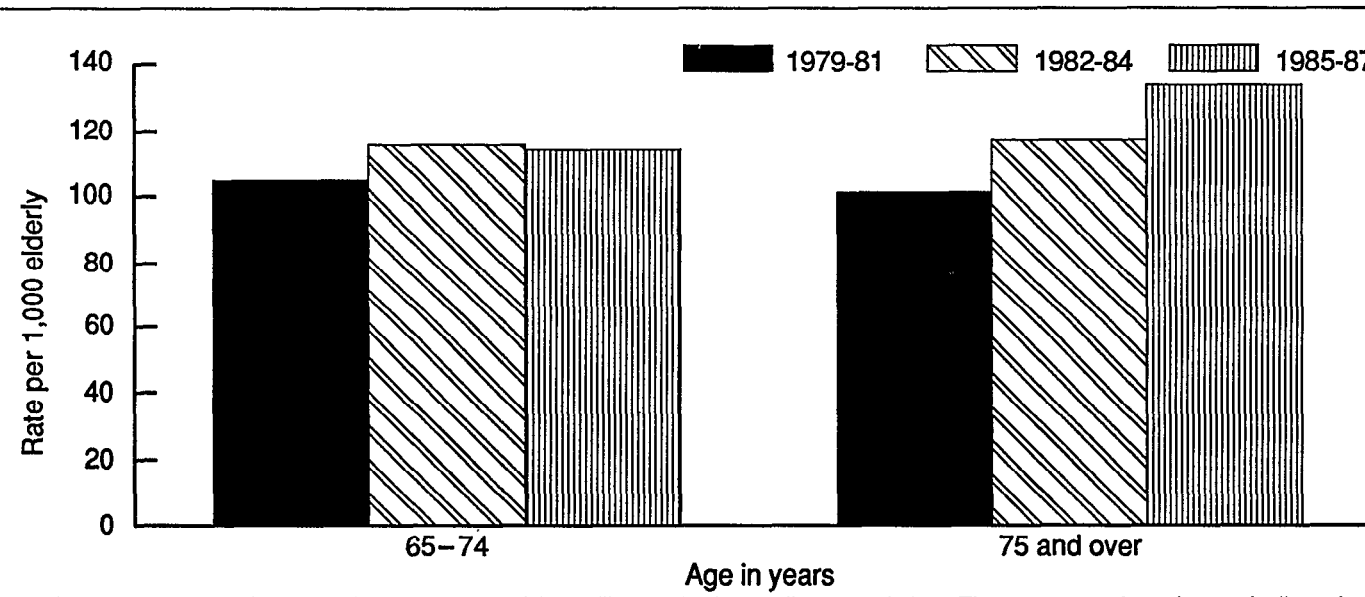
Figure 2. Percent of persons 65 years of age and over who reported difficulty with at least one activity of daily living, by sex, for all respondent-assessed health statuses: United States, 1986



NOTES: Data are based on household interviews of the civilian noninstitutionalized population. IADL is instrumental activity of daily living. Excludes unknown respondent-assessed health status. Excludes those for whom information was missing on all IADL's. Persons reported as not performing an IADL were not classified with those reported as having difficulty with that IADL. IADL's include meal preparation, shopping, managing money, using the telephone, light housework, and heavy housework.

SOURCE: National Center for Health Statistics: Data from the National Health Interview Survey 1986 Functional-Limitations Supplement.

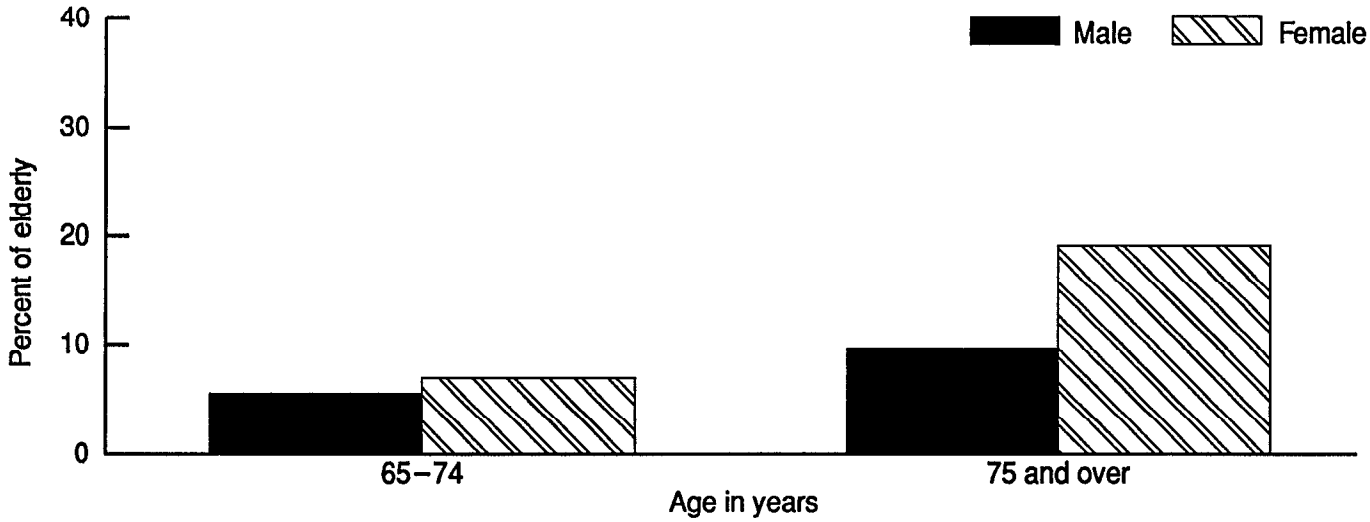
Figure 3. Percent of persons 65 years of age and over who reported difficulty with at least one instrumental activity of daily living, by sex, for all respondent-assessed health statuses: United States, 1986



NOTE: Data are based on household interviews of the civilian noninstitutionalized population. These rates are based on unduplicated counts; a person was counted only once for each condition, regardless of the number of mentions of that condition.

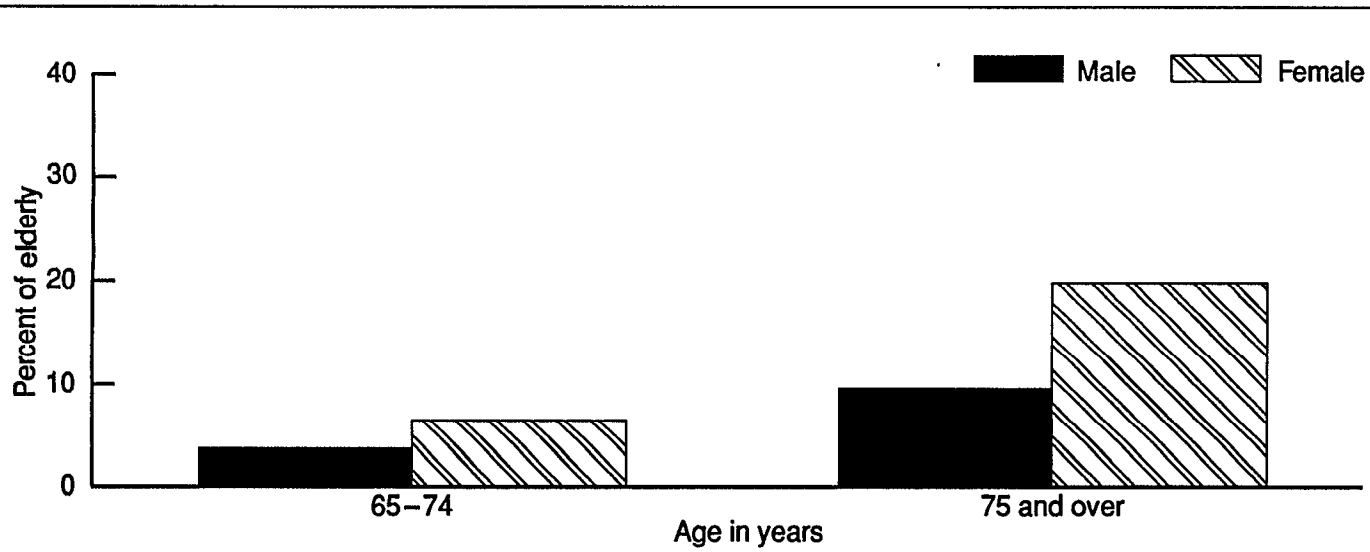
SOURCE: National Center for Health Statistics: Data from the National Health Interview Survey.

Figure 4. Average annual rate of ischemic heart disease per 1,000 persons 65 years of age and over: United States, 1979–81, 1982–84, and 1985–87



NOTES: Data are based on household interviews of the civilian noninstitutionalized population. ADL is activity of daily living. Excludes those for whom information was missing on all ADL's. Persons reported as not performing an ADL are included with those reported as having difficulty or receiving help with that ADL. ADL's include eating, toileting, dressing, bathing, walking, getting in and out of a bed or chair, and getting outside.
SOURCE: National Center for Health Statistics: Data from the National Health Interview Survey 1986 Functional Limitations Supplement.

Figure 5. Percent of persons 65 years of age and over who reported having difficulty performing three or more activities of daily living, by age and sex: United States, 1986



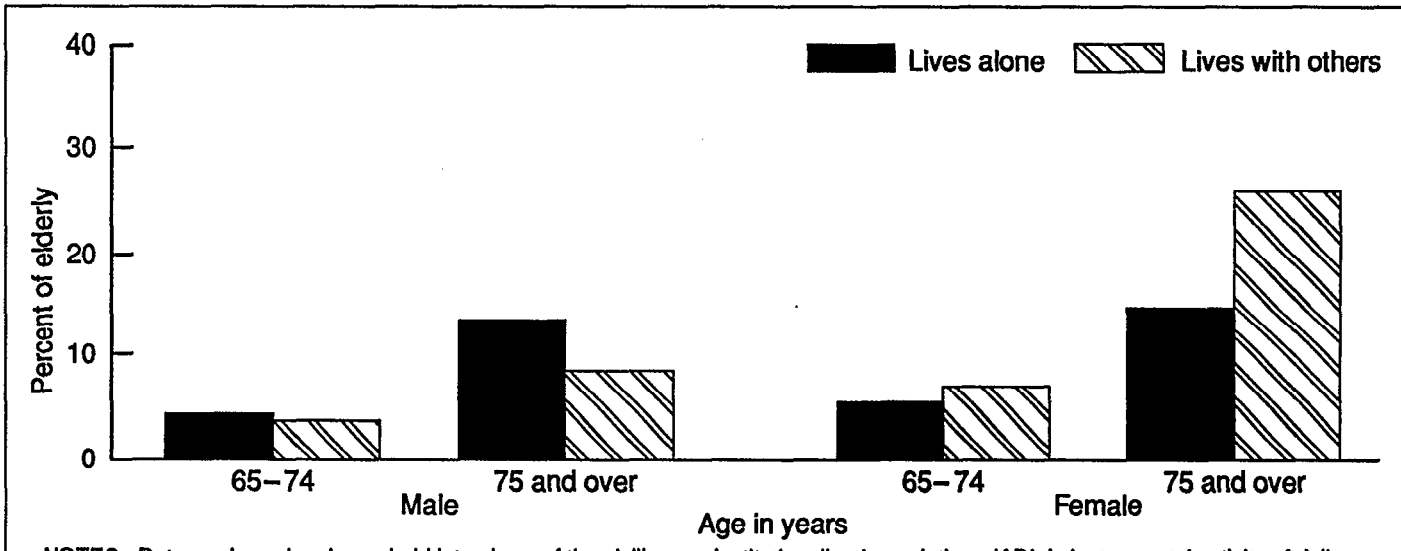
NOTES: Data are based on household interviews of the civilian noninstitutionalized population. IADL is instrumental activity of daily living. Excludes those for whom information was missing on all IADL's. Persons reported as not performing an IADL are not included with those reported as having difficulty with that IADL. IADL's include preparing meals, shopping, managing money, using the telephone, light housework, and heavy housework.
SOURCE: National Center for Health Statistics: Data from the National Health Interview Survey 1986 Functional Limitations Supplement.

Figure 6. Percent of persons 65 years of age and over who reported having difficulty performing three or more instrumental activities of daily living, by age and sex: United States, 1986

NOTES: Data are based on household interviews of the civilian noninstitutionalized population. ADL is activity of daily living. "Lives with others" category includes spouse. Persons reported as not performing an ADL are included with those reported as having difficulty with that ADL. ADL's include eating, toileting, dressing, bathing, getting in and out of a bed or chair, walking, and getting outside.

SOURCE: National Center for Health Statistics: Data from the National Health Interview Survey 1986 Functional Limitations Supplement.

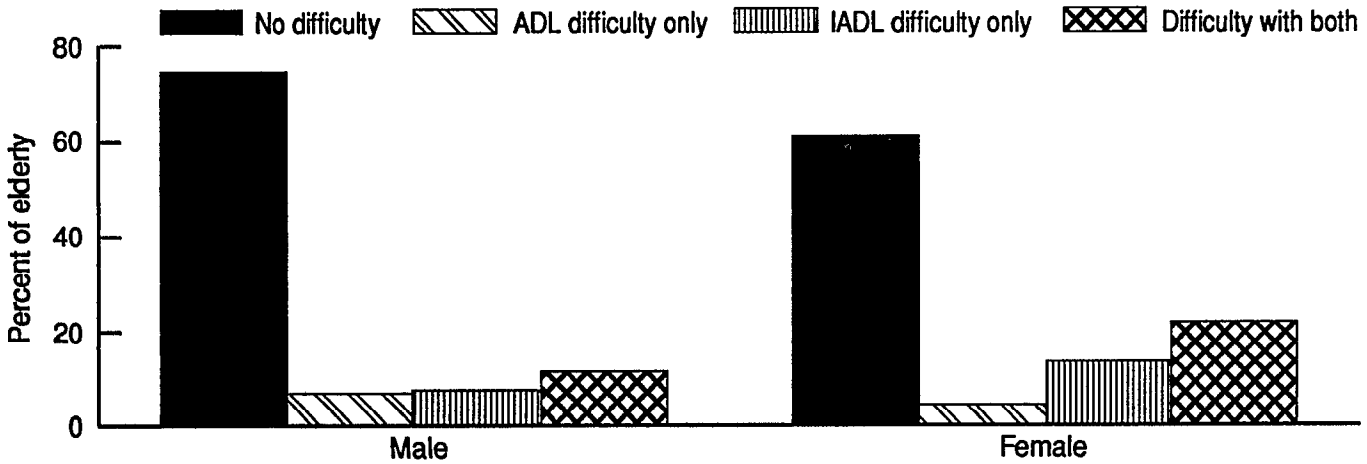
Figure 7. Percent of persons 65 years of age and over reporting difficulty performing three or more activities of daily living, by living arrangement, sex, and age: United States, 1986



NOTES: Data are based on household interviews of the civilian noninstitutionalized population. IADL is instrumental activity of daily living. "Lives with others" category includes spouse. Persons reported as not performing an IADL are not included with those reported as having difficulty with that IADL. IADL's include meal preparation, shopping, managing money, using the telephone, light housework, and heavy housework.

SOURCE: National Center for Health Statistics: Data from the National Health Interview Survey 1986 Functional Limitations Supplement.

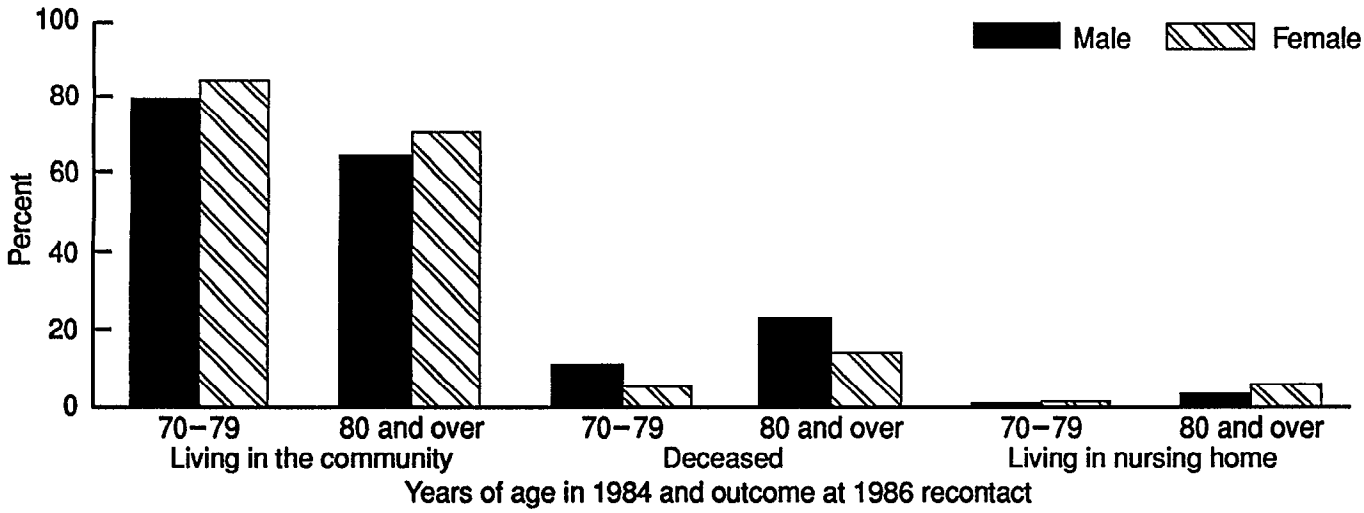
Figure 8. Percent of persons 65 years of age and over reporting difficulty performing three or more instrumental activities of daily living, by living arrangement, sex, and age: United States, 1986



NOTES: Data are based on household interviews of the civilian noninstitutionalized population. ADL is activity of daily living. IADL is instrumental activity of daily living. Excludes those for whom information was missing on all ADL's. Persons reported as not performing an ADL are included with those reported as having difficulty or receiving help with that ADL. ADL's include eating, toileting, dressing, bathing, walking, getting in and out of a bed or chair, and getting outside. Excludes those for whom information was missing on all IADL's. Persons reported as not performing an IADL are not included with those reported as having difficulty or receiving help with that IADL. IADL's include preparing meals, shopping, managing money, using the telephone, light housework, and heavy housework.

SOURCE: National Center for Health Statistics: Data from the National Health Interview Survey 1986 Functional Limitations Supplement.

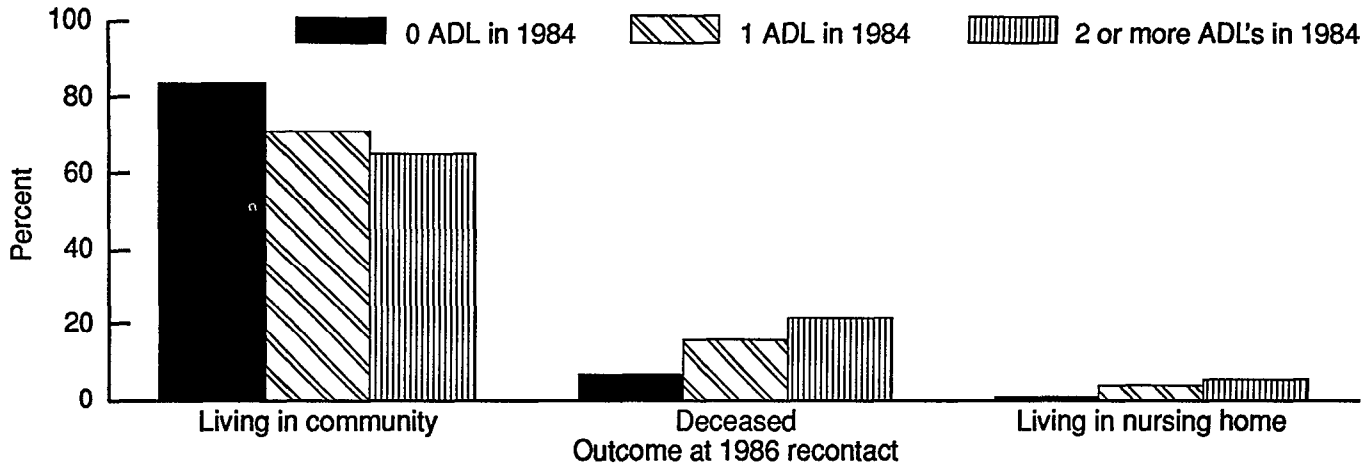
Figure 9. Percent distribution of persons 65 years of age and over reporting difficulty performing activities of daily living and instrumental activities of daily living, according to sex: United States, 1986



NOTES: Data are based on 1986 telephone followup of 1984 household interviews of the civilian noninstitutionalized population. Includes persons hospitalized at time of recontact. "Living in nursing home" catagory excludes persons discharged from nursing homes prior to recontact.

SOURCES: National Center for Health Statistics: Data from the National Health Interview Survey 1984 Supplement on Aging and 1986 Longitudinal Study on Aging.

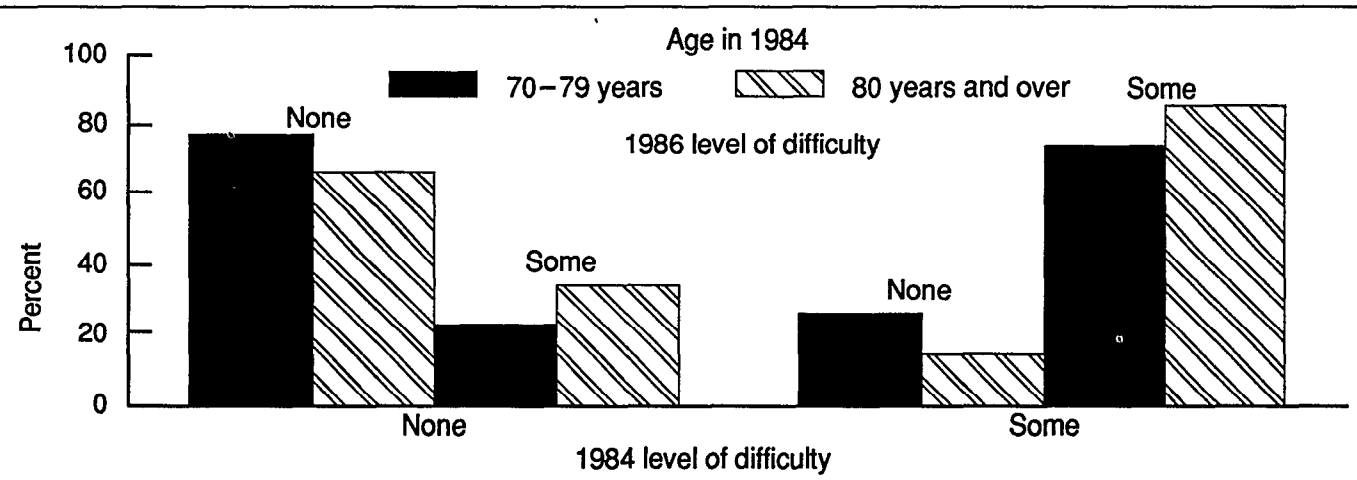
Figure 10. Percent distribution of persons 70 years of age and over in 1984, according to outcome at 1986 recontact, age, and sex: United States



NOTES: Data are based on 1986 telephone followup of 1984 household interviews of the civilian noninstitutionalized population. ADL is activity of daily living. Includes persons hospitalized at time of recontact. Excludes those for whom information was missing on all ADL's. Persons reported as not performing an ADL were classified with those reported as having difficulty with that ADL. ADL's include eating, toileting, dressing, bathing, walking, getting in and out of a bed or chair, and getting outside. "Living in nursing home"catagory excludes persons discharged from nursing homes prior to recontact.

SOURCES: National Center for Health Statistics: Data from the National Health Interview Survey 1984 Supplement on Aging and 1986 Longitudinal Study on Aging.

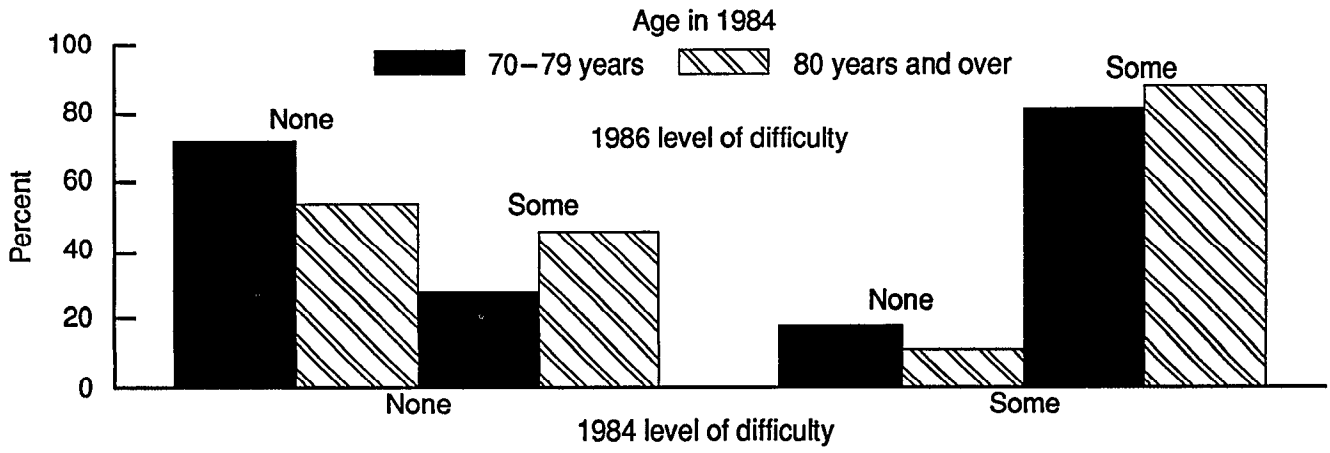
Figure 11. Percent distribution of persons 70 years of age and over in 1984, according to outcome at 1986 recontact and number of activities of daily living for which difficulty was reported in 1984: United States



NOTES: Data are based on 1986 telephone followup of 1984 household interviews of the civilian noninstitutionalized population. ADL is activity of daily living. Includes persons hospitalized at time of recontact and persons discharged from nursing homes prior to recontact. Excludes persons who had died, were not located, or were in a nursing home in 1986. Excludes persons for whom status of difficulty in 1984 was unknown. Excludes deaths or nursing home stay in 1986. Persons reported as not performing an ADL were classified with those reported as having difficulty with that ADL. ADL's include eating, toileting, dressing, bathing, walking, getting in and out of a bed or chair, and getting outside.

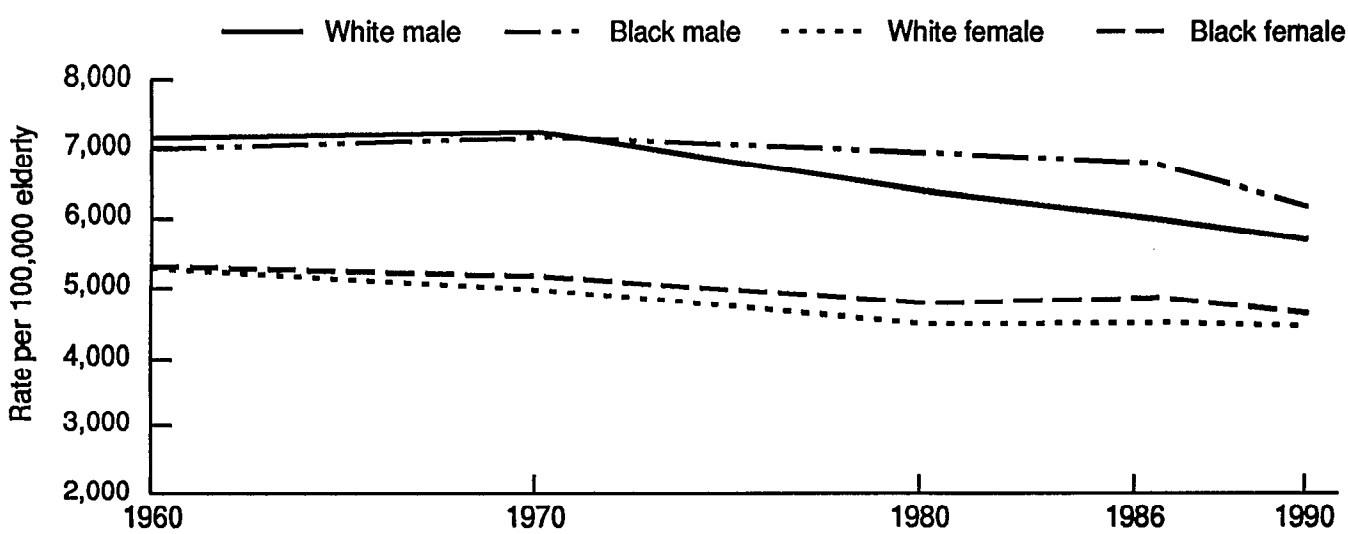
SOURCE: National Center for Health Statistics: Data from the 1986 Longitudinal Study on Aging.

Figure 12. Percent distribution of persons 70 years of age and over, according to age and extent of difficulty in performing activities of daily living in 1984 and at 1986 recontact for those living in the community between 1984 and 1986: United States



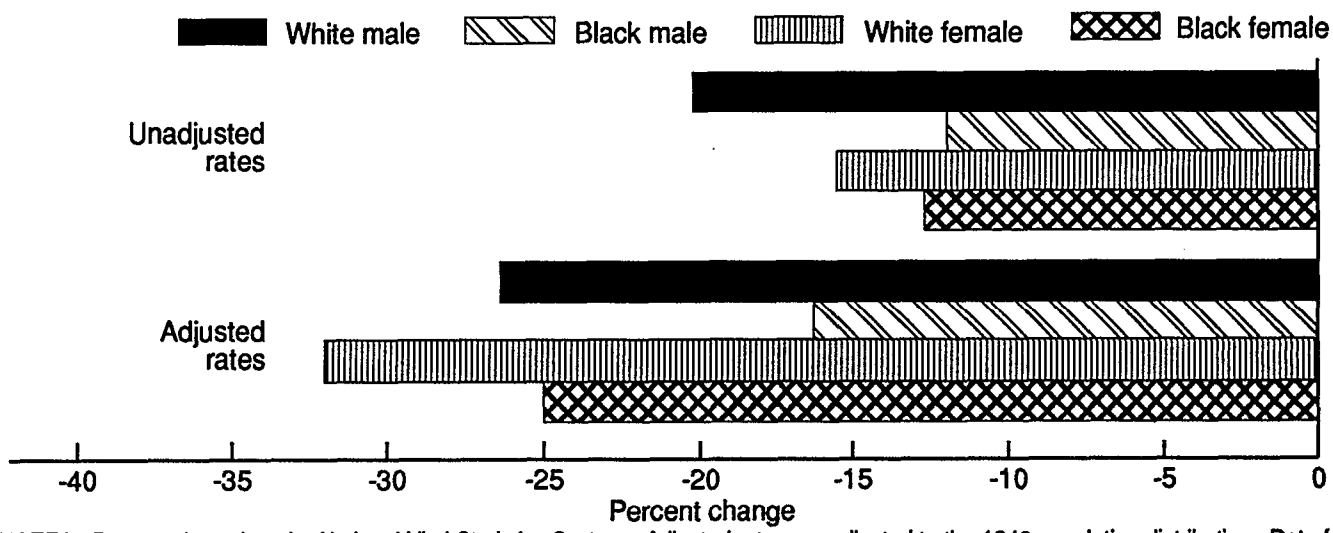
NOTES: Data are based on 1986 telephone followup of 1984 household interviews of the civilian noninstitutionalized population. IADL is instrumental activity of daily living. Includes persons hospitalized at time of recontact and persons discharged from nursing homes prior to recontact. Excludes persons who had died, were not located, or were in a nursing home in 1986. Excludes persons for whom status of difficulty in 1984 was unknown. Persons reported as not performing an IADL were not classified with those reported as having difficulty with that IADL. IADL's include meal preparation, shopping, managing money, using the telephone, light housework, and heavy housework.
SOURCE: National Center for Health Statistics: Data from the 1986 Longitudinal Study on Aging.

Figure 13. Percent distribution of persons 70 years of age and over, according to age and extent of difficulty in performing instrumental activities of daily living in 1984 and at 1986 recontact for those living in the community between 1984 and 1986: United States



NOTES: Data are based on the National Vital Statistics System. Rate for 1960 includes deaths of nonresidents of the United States. Data for 1990 are provisional.
SOURCE: National Center for Health Statistics. Vital statistics of the United States, vol II, mortality, part A. Washington: Public Health Service. Selected years.

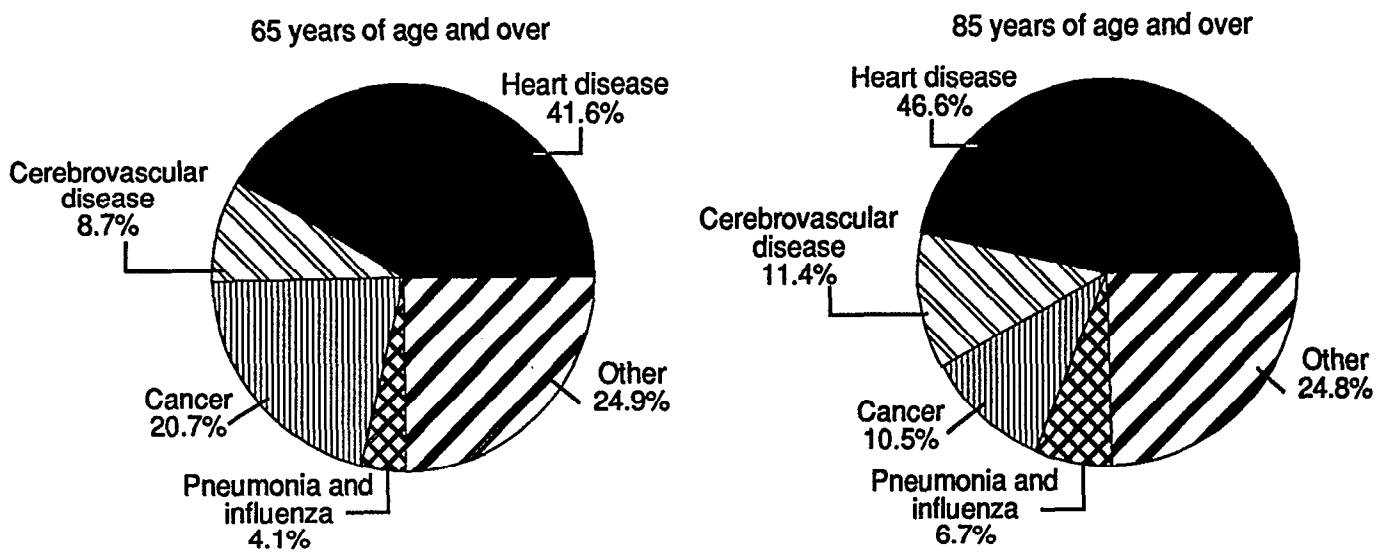
Figure 14. Death rates from all causes for persons 65 years of age and over, by race and sex: United States, selected years, 1960–90



NOTES: Data are based on the National Vital Statistics System. Adjusted rates are adjusted to the 1940 population distribution. Data for 1990 are provisional.

SOURCE: National Center for Health Statistics. Vital statistics of the United States, vol II, mortality, part A, Washington: Public Health Service.

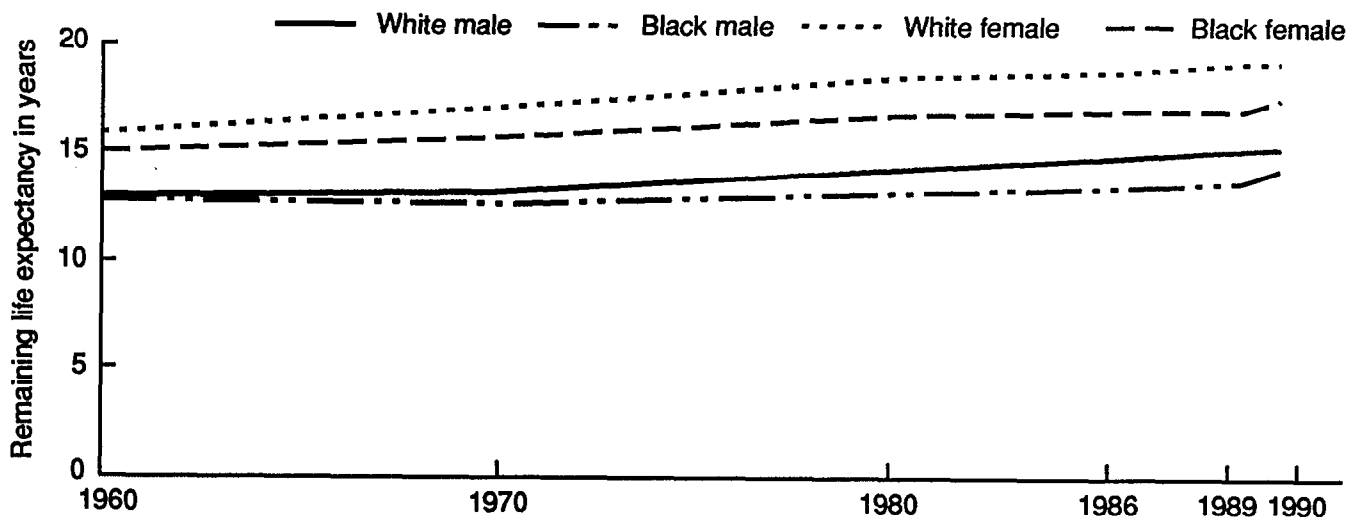
Figure 15. Percent change in death rates for persons 65 years of age and over, by race and sex: United States, 1960–90



NOTES: Data are based on the National Vital Statistics System. Coded according to the *International Classification of Diseases, 9th Revision.*

SOURCE: National Center for Health Statistics: Mortality Statistics Branch, Division of Vital Statistics.

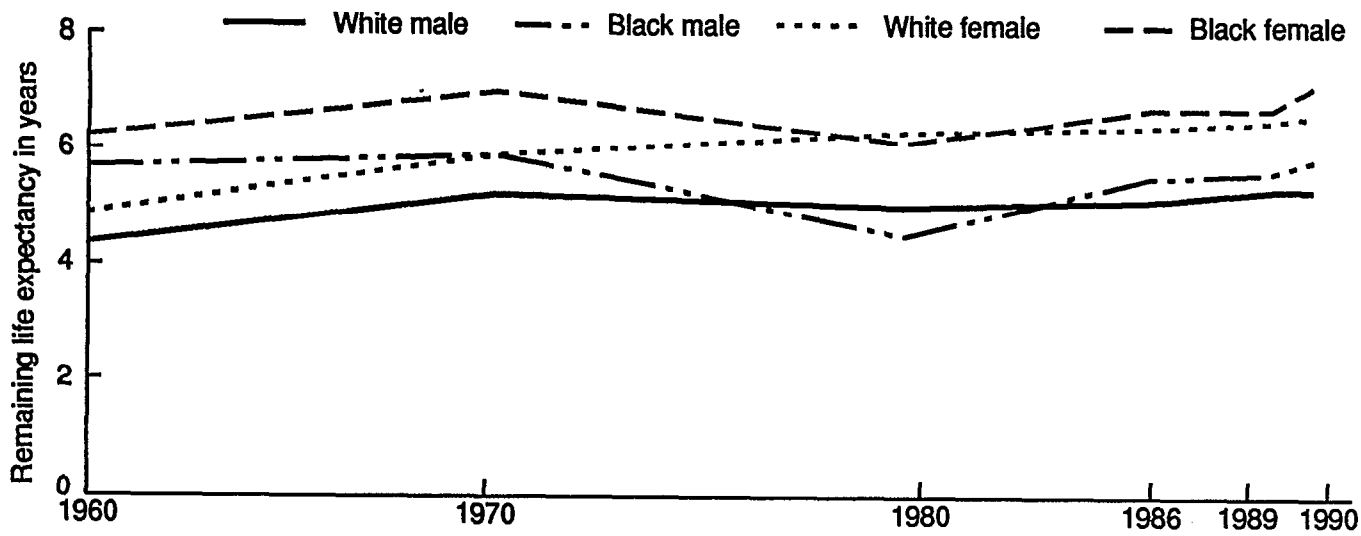
Figure 16. Percent distribution of deaths, according to age and underlying cause of death for persons 65 years of age and over and 85 years of age and over: United states, 1986



NOTES: Data are based on the National Vital Statistics System. Includes deaths of nonresidents of the United States for 1960 and 1990. Data for 1990 are provisional.

SOURCE: National Center for Health Statistics. Vital statistics of the United States, vol II, mortality, part A. Washington: Public Health Service, selected years.

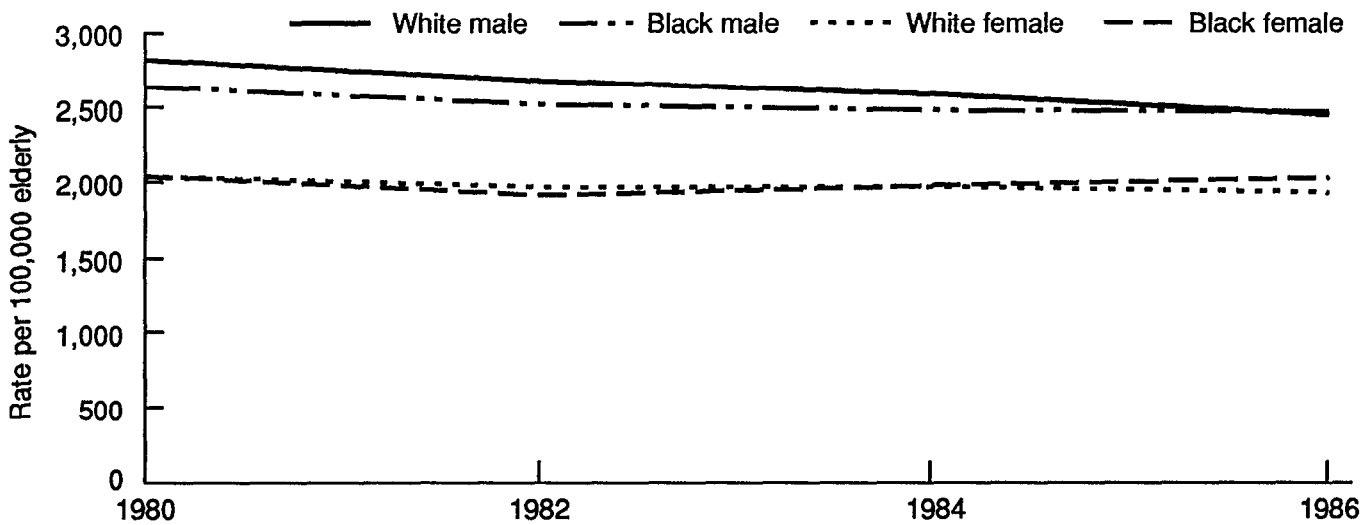
Figure 17. Life expectancy at age 65, by race and sex: United States, selected years, 1960–90



NOTES: Data are based on the National Vital Statistics System. Includes deaths of nonresidents of the United States for 1960 and 1990. Data for 1990 are provisional.

SOURCE: National Center for Health Statistics. Vital statistics of the United States, vol II, mortality, part A. Washington: Public Health Service, selected years.

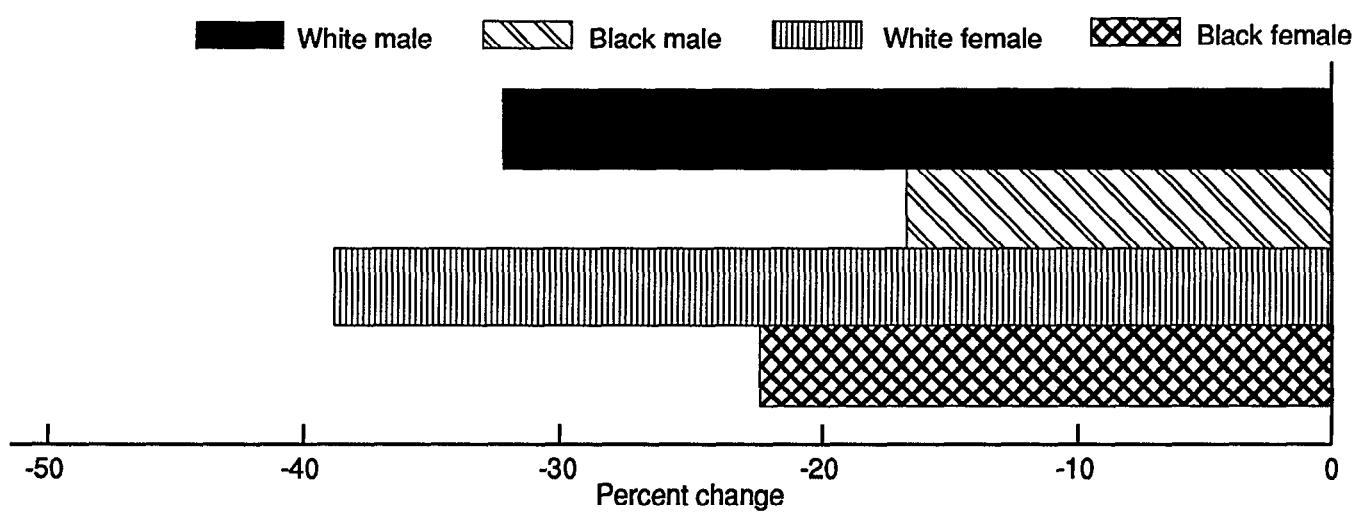
Figure 18. Life expectancy at age 85, by race and sex: United States, selected years, 1960–90



NOTES: Data are based on the National Vital Statistics System. Diseases of the heart comprise codes 390-398, 402, and 404-429 of the *International Classification of Diseases, 9th Revision.*

SOURCE: National Center for Health Statistics. Vital statistics of the United States, vol II, mortality, part A. Washington: Public Health Service. Selected years.

Figure 19. Death rates from diseases of the heart for persons 65 years of age and over, by race and sex: United States, selected years, 1980–86



NOTES: Data are based on the National Vital Statistics System. Adjusted to the 1940 population distribution. Diseases of the heart comprise codes 390-398, 402, and 404-429 of the *International Classification of Diseases, 9th Revision.* Comparability ratio for 7th to 8th revisions equals 1.0045 and for 8th to 9th revisions equals 1.0126.

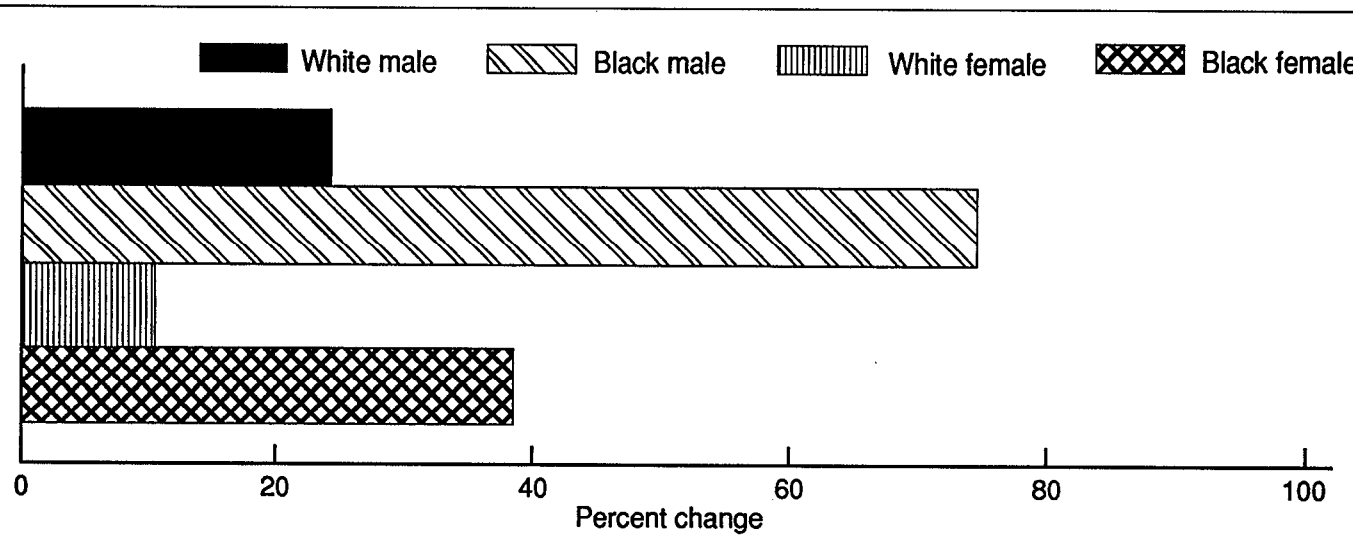
SOURCE: National Center for Health Statistics. Vital statistics of the United States, vol II, mortality, part A, Washington: Public Health Service.

Figure 20. Percent change in age-adjusted death rates from diseases of the heart for persons 65 years of age and over, by race and sex: United States, 1960–86

NOTES: Data are based on the National Vital Statistics System. Malignant neoplasms, including neoplasms of lymphatic and hematopoietic tissues, comprise codes 140-208 of the *International Classification of Diseases, 9th Revision.*

SOURCE: National Center for Health Statistics. Vital statistics of the United States, vol II, mortality, part A. Washington: Public Health Service. Selected years.

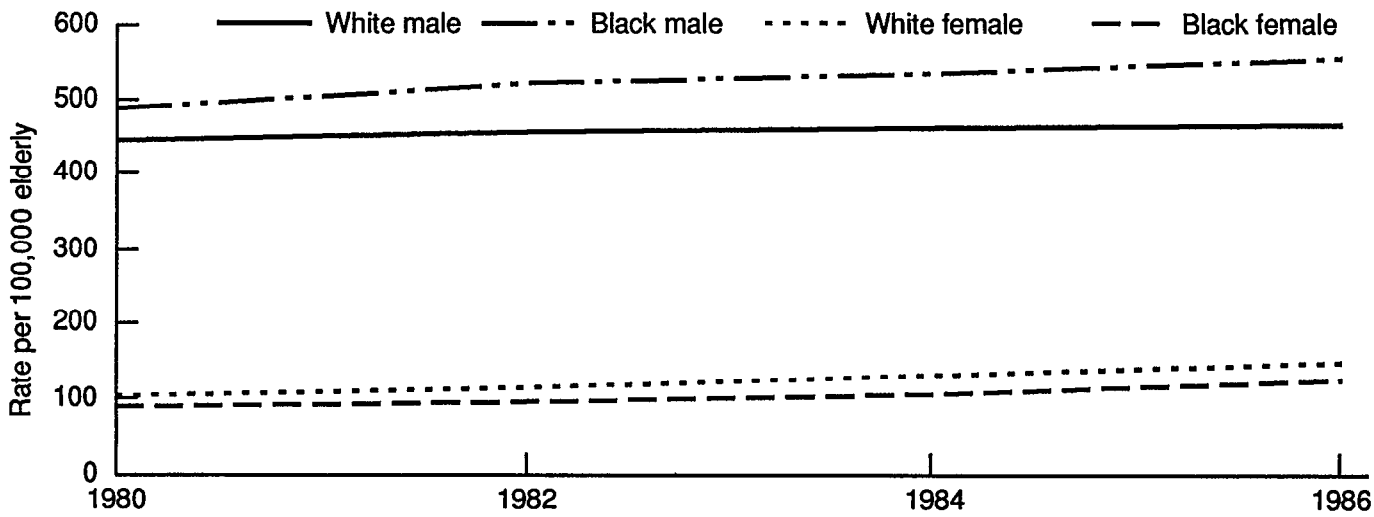
Figure 21. Death rates from malignant neoplasms, including neoplasms of the lymphatic and hematopoietic tissues, for persons 65 years of age and over, by race and sex: United States, selected years, 1980–86



NOTES: Data are based on National Vital Statistics System. Adjusted to the 1940 population distribution. Malignant neoplasms, including neoplasms of lymphatic and hematopoietic tissues, comprise codes 140-208 of the *International Classification of Diseases, 9th Revision.* Comparability ratio for 7th to 8th revisions equals 1.0017 and for 8th to 9th revisions equals 1.0026.

SOURCE: National Center for Health Statistics. Vital statistics of the United States, vol II, mortality, part A, Washington: Public Health Service.

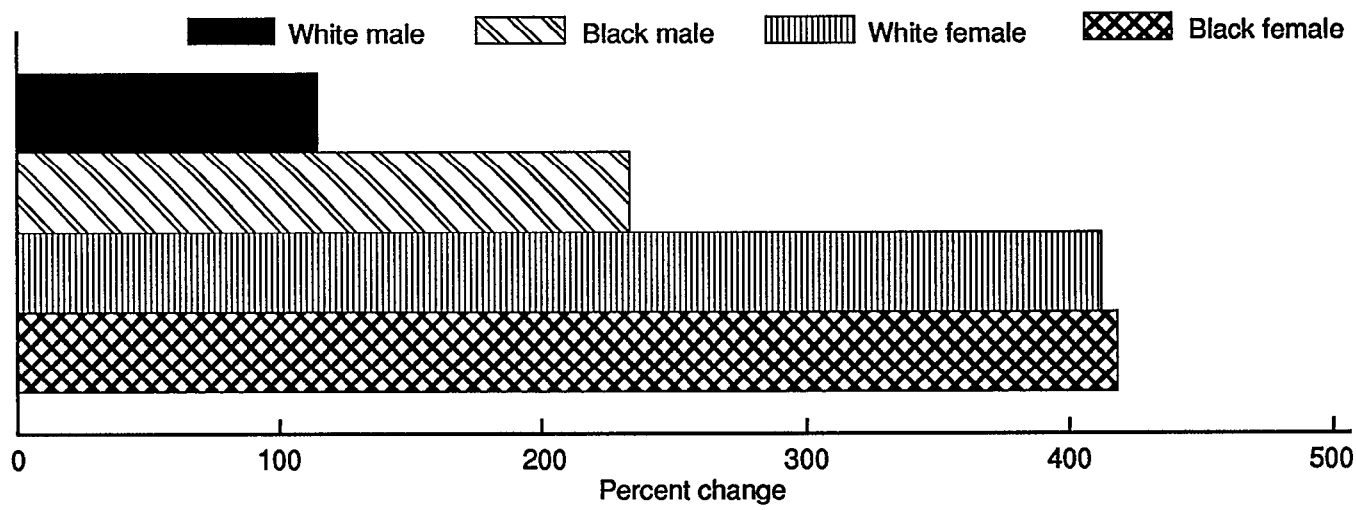
Figure 22. Percent change in age-adjusted death rates from malignant neoplasms, including neoplasms of the lymphatic and hematopoietic tissues, for persons 65 years of age and over, by race and sex: United States, 1960–86



NOTES: Data are based on the National Vital Statistics Systems. Malignant neoplasms of the respiratory and intrathoracic organs comprise codes 160-165 of the *International Classification of Diseases, 9th Revision.*

SOURCE: National Center for Health Statistics. Vital statistics of the United States, vol II, mortality, part A. Washington: Public Health Service. Selected years.

Figure 23. Death rates from malignant neoplasms of the respiratory and intrathoracic organs for persons 65 years of age and over, by race and sex: United States, selected years, 1980–86



NOTES: Data are based on the National Vital Statistics System. Adjusted to the 1940 population distribution. Malignant neoplasms of the respiratory and intrathoracic organs comprise codes 160-165 of the *International Classification of Diseases, 9th Revision.* Comparability ratio for 7th to 8th revisions equals 1.0316 and for 8th to 9th revisions equals 1.0007.

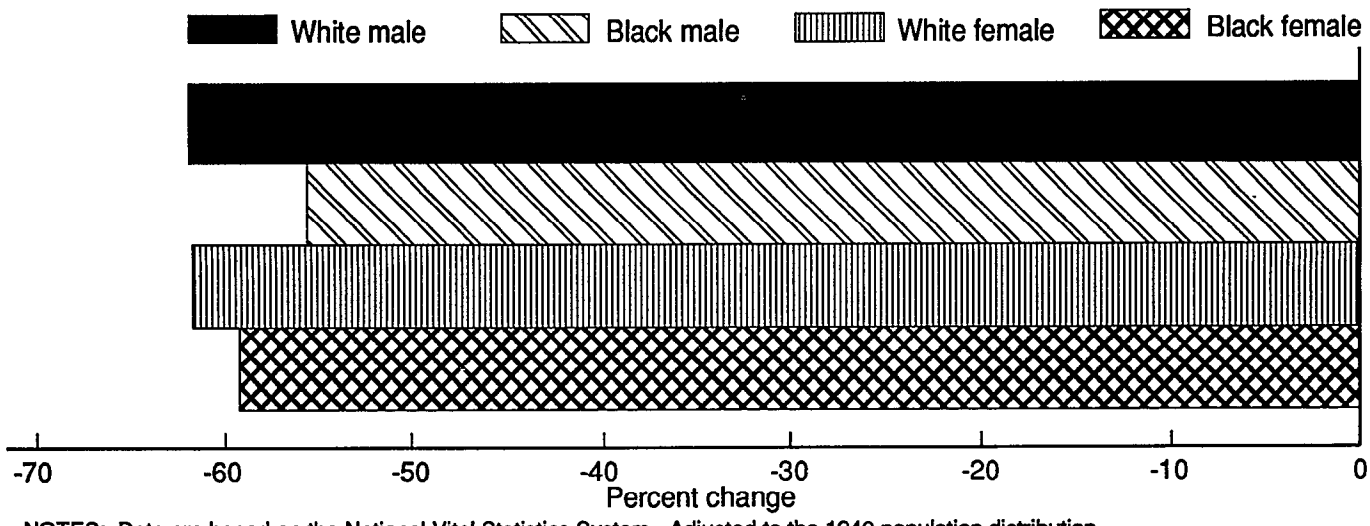
SOURCE: National Center for Health Statistics. Vital statistics of the United States, vol II, mortality, part A, Washington: Public Health Service.

Figure 24. Percent change in age-adjusted death rates from malignant neoplasms of the respiratory and intrathoracic organs for persons 65 years of age and over, by race and sex: United States, 1960–86

NOTES: Data are based on the National Vital Statistics System. Cerebrovascular diseases comprise codes 430-438 of the *International Classification of Diseases, 9th Revision.*

SOURCE: National Center for Health Statistics. Vital statistics of the United States, vol II, mortality, part A. Washington: Public Health Service. Selected years.

Figure 25. Death rates from cerebrovascular diseases for persons 65 years of age and over, by race and sex: United States, selected years, 1980–86



NOTES: Data are based on the National Vital Statistics System. Adjusted to the 1940 population distribution. Cerebrovascular diseases comprise codes 430-438 of the *International Classification of Diseases, 9th Revision.* Comparability ratio for 7th to 8th revisions equals 0.9905 and for 8th to 9th revisions equals 1.0049.

SOURCE. National Center for Health Statistics. Vital statistics of the United States, vol II, mortality, part A, Washington: Public Health Service.

Figure 26. Percent change in age-adjusted death rates from cerebrovascular disease for persons 65 years and over, by race and sex: United States, 1960–86

Chapter 2
Health care use and its cost

by Sylvia E. Furner, Ph.D., University of Illinois at Chicago School of Public Health

The extent to which the older population uses both institutional and noninstitutional health care is a function of health status, access to care, and increasing age. In this section, data on acute care, selected issues in long-term care, patterns of drug prescribing by office-based physicians for the older population living in the community, and the cost of health care and sources of payment are presented. The existence of any differential usage of health care services by age, sex, and race subgroups is explored.

Acute care

Respondent-assessed health status correlates with the use of health care services. The number of physician visits for those 65 years of age and over who rated their health as fair or poor was greater than for those who rated their health as excellent or good (figure 27). This difference in physician visits by health status was evident for both sexes and for both white and black persons. For all health statuses, only black females had a greater number of physician visits.

Nearly one-half of the physician office visits by older persons were to either general practice or internal medicine physicians (figure 28). Approximately 30 percent of the office visits by persons 65 years of age and over were to general practice physicians. This percent did not vary by age or sex. Twenty-two percent of office visits by this population were to internists, again with no variation by age or sex. The number of visits to ophthalmologists increased with age for both males and females (data not shown). The fact that females live longer explains the larger percent of females visiting eye specialists, compared with males (15 versus 12 percent).

Average length of stay in short-stay hospitals for persons 65 years of age and over decreased (figures 29 and 30). This decline was evident in the leading causes of hospitalization for both females and males. Of the first-listed diagnoses shown in the two figures, the largest reduction in average length of stay was for females with fractures (figure 29).

The discharge rate for persons 65 years of age and over with pneumonia and influenza increased with age for both females and males, a relationship that was more pronounced in recent years than a decade or more ago (figures 31 and 32). The rate of discharge for males 65 years of age and over with these diagnoses was greater in 1987 than 1981, whereas for females in this same age category, no difference was evident between these years.

Among older persons, the discharge rate for both females and males with hip fractures increased with age (figures 33 and 34). However, unlike discharge rates associated with pneumo-

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nia or influenza, there was no substantial difference in these rates between 1981 and 1987.

As the population aged, the percent of hospitalized patients discharged to long-term care facilities increased (figure 35). This was evident in both 1981 and 1987 and for both males and females. Females had a larger percent of discharges to long-term care facilities than males in both 1981 and 1987 for all age groups except those 85 years of age and over in 1987.

Selected issues in long-term care

Concerns about the need for and availability of long-term care have increased over the last 30 years. This is in part the result of the increase in the number of those at greatest risk of needing long-term care, persons 85 years of age and over. Long-term care refers to care delivered to individuals who are dependent on others for assistance with the basic tasks necessary for physical, mental, and social functioning over sustained periods. This care can be delivered either in an institutional setting, for example, a nursing home, or in a community setting with the use of a formal or an informal caregiver.

Cognitive disability of nursing home residents

The physical health status of nursing home residents has been documented, but less attention has been focused on the cognitive functioning of nursing home residents. In this section, data on the cognitive disability of these persons are presented. Variations by type of disability are discussed.

Cognitive disabilities are a significant health problem in nursing homes. For every 1,000 residents in 1985, 674 residents had at least one cognitive disability. Cognitive disabilities cover a wide range of conditions, including dementias, psychiatric conditions, affective states, substance abuse, and mental retardation. The most common disability was organic brain syndrome (figure 36). The prevalence of multiple disabilities was common.

ADL disabilities have been found to be significant predictors of mortality in general and risk of admission to nursing homes as well as mortality during the first year of a nursing home stay. Those residents with Alzheimer's disease, organic brain syndromes, or anxiety and depressive disorders had significantly higher proportions who required help with five to seven ADL's than residents without cognitive disabilities (figure 37). Residents with schizophrenia and alcohol and drug abuse had significantly lower proportions who required help with five to seven ADL's.

About 12 percent of residents with no cognitive disabilities had severe incontinence, that is, difficulty in controlling both bladder and bowels. Those residents with Alzheimer's disease and organic brain syndromes had the highest levels of severe incontinence (figure 38).

A significantly greater percent of residents with schizophrenia, depressive and anxiety disorders, alcohol and drug abuse, and mental retardation received mental health evaluation or treatment in the past month (figure 39). This included mental health evaluation or treatment by a psychiatrist, psychologist, psychiatric or clinical social worker, psychiatric nurse, or physician other than a psychiatrist. Receipt of social services by the mentally retarded was twice as high as by those without cognitive disabilities.

One strength of data on nursing home discharges is that it characterizes a completed episode of care and sheds light on outcomes of care. In comparison to discharges of persons without cognitive disabilities, a greater percent of those discharged with organic brain syndromes, Alzheimer's disease, schizophrenia, or mental retardation had long stays of 1 year or more (figure 40). For the mentally retarded, the percent with long stays was twice as high.

Use of informal and formal care by elderly in the community

Approximately 80 percent of community based long-term care comes from informal networks of family or friends. In this section, data on the use and changes in use of such informal helpers by frail elders living in the community are presented.

The number of informal helpers that a frail elder had in 1982 was associated with subsequent mortality; those with three or more informal helpers were more likely to die (25 percent deceased) than those with one informal helper (18 percent deceased) (figure 41). With respect to risk of institutionalization, those with two helpers in 1982 were more likely to be in an institution than those with one helper in 1982.

Forty-five percent of frail elders with one informal helper in 1982 had one informal helper in 1984 (figure 41). This stability in the size of the informal-helper network was not as evident for those with larger networks. Twenty-nine percent of those with two informal helpers in 1982 had the same number in 1984; similarly, 29 percent of those with three or more informal helpers had the same number in 1984. Finally, there was a difference in the percent of frail elders who shifted from some helpers in 1982 to no helpers in 1984. Those with only one helper in 1982 were more likely than those with either two or three or more helpers in 1982 to shift to no helpers in 1984.

Patterns of drug prescribing by office-based physicians

The elderly utilize a disproportionate share of health care in general, and drugs in particular. There is good reason for this, as the incidence and prevalence of most chronic illnesses increases with age.

Older persons who sought health care from office-based physicians received different types of prescribed therapies. More than 50 percent of the therapies prescribed for older persons were drug-only (figure 42). For 10 percent of persons 65 years of age and over, non-drug therapy only was prescribed, and more than 21 percent had neither type of therapy prescribed. There was no significant change in the distribution of prescribed therapies by age among older persons who sought care from office-based physicians (figure 43).

Physician reports of drug prescriptions for older patients reveal some differences by age (figure 44). Hydrochlorothiazide, alone or in combination with other drugs, was the most frequently reported generic ingredient for persons 65–74 years of age. Digoxin replaced hydrochlorothiazide in the age group 75 years and over, with hydrochlorothiazide ranking second in frequency of reports. Digoxin and furosemide were the only drugs to show significant increased prescription rates with age. Both potassium and nitroglycerin prescription were reported with the same frequency in each age group.

The percent of office visits to physicians for persons 65 years of age and over with the mention of one or more drugs changed according to principal diagnosis and, in some situations, age (figures 45 and 46). For all disease categories, it is clear that multiple drug mentions were more common than single drug mentions, and this was true for the age groups investigated. For the "all principal diagnoses" classification, there was a greater difference between the single and multiple drug percents in those 75 years of age and over, compared with those 65–74 years of age. Thus, the likelihood of multiple drug prescribing increased with age. This phenomenon, however, depended on the principal diagnosis. For hypertension, the difference between single and multiple drug percents was 45 percent for those 75 years of age and over and 29 percent for those 65–74. For arthropathies, there was only a modest difference by age. Asthma and ischemic heart disease appeared to cause no increase in the

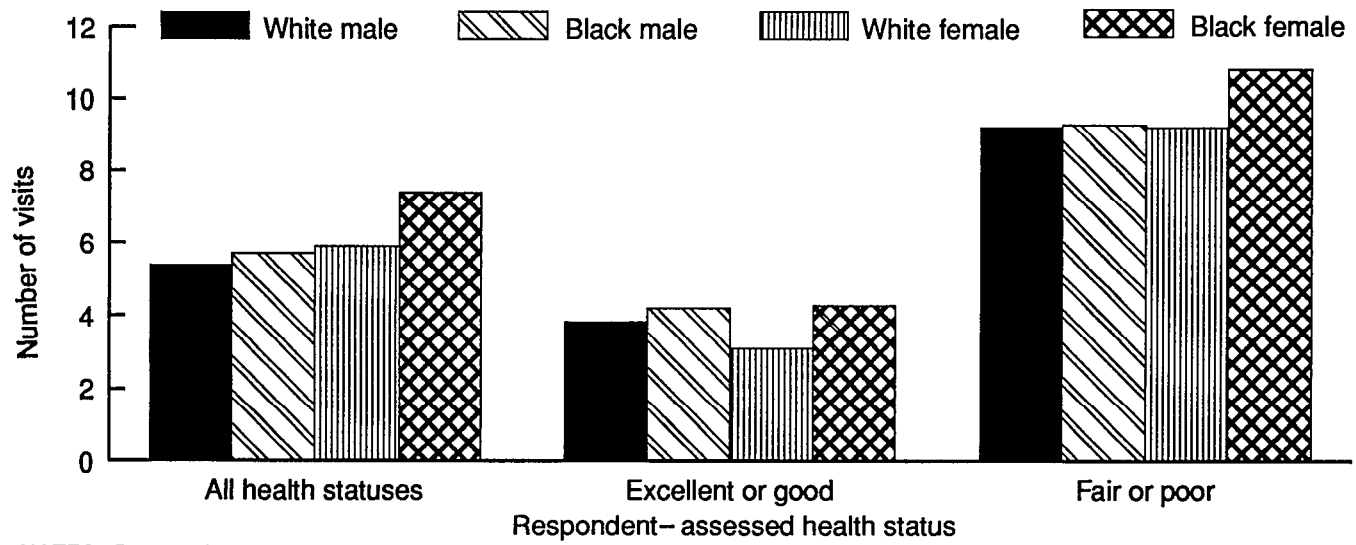
likelihood of prescribing multiple drugs with age. It appeared more likely that these diseases were treated with multiple drugs regardless of age.

Cost of health care and sources of payment

Per capita personal health care expenditures clearly increased with age (figure 47). In 1987, expenditures for those persons 65–69 years of age were $3,728 per person and more than twice that amount, $9,178 per person, for those 85 years of age and over.

The number of persons 65 years of age and over who were enrolled in Medicare has increased over time (figure 48). Total enrollment of the elderly in Medicare increased from 24 million in 1977 to 29 million in 1986. This is, of course, a reflection of the shifting age structure of the population. Additionally, there are more females enrolled than males, and the percent increase in enrollment for females was greater than for males.

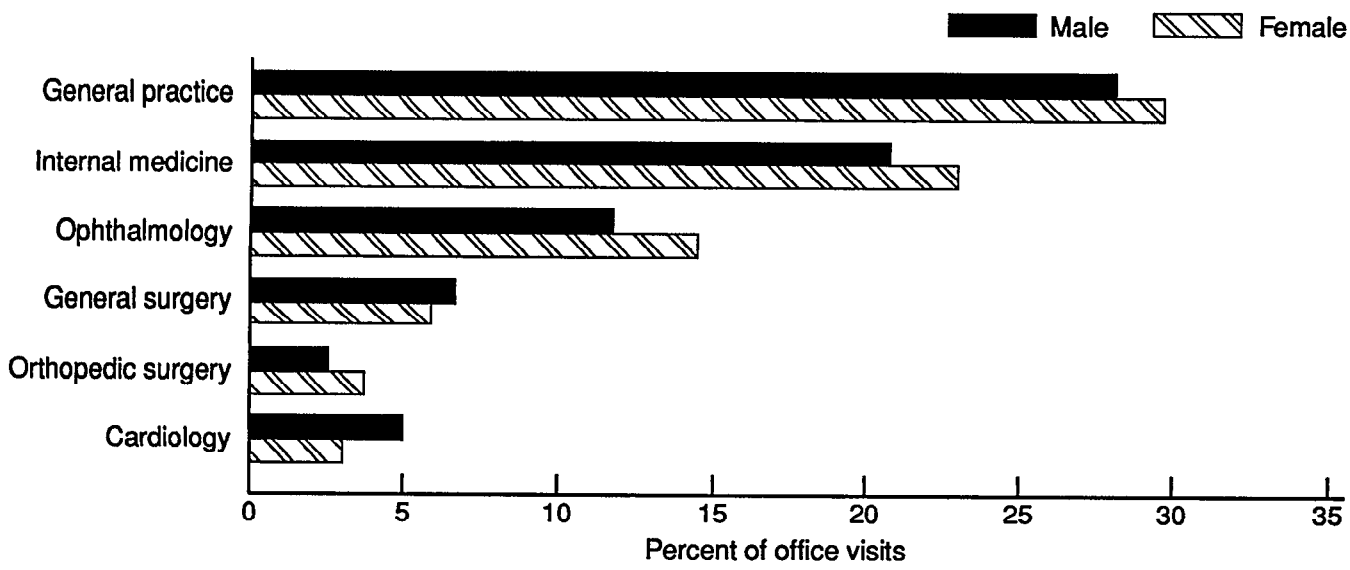
For nursing home stays, Medicaid was the principal source of payment for 50 percent of the older population (figure 49). Self-payment of nursing home stays was substantial, at 44 percent.



NOTES: Data are based on household interviews of the civilian noninstitutionalized population. The category "All health statuses" includes unknown respondent-assessed health status.

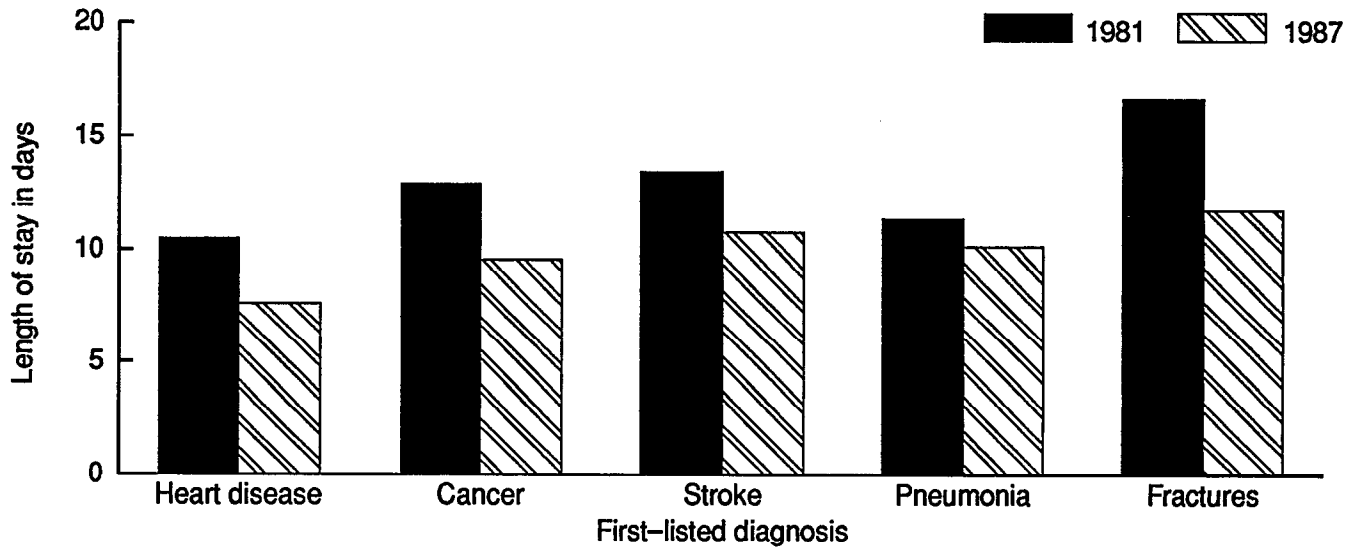
SOURCE: National Center for Health Statistics: Data from the National Health Interview Survey.

Figure 27. Average annual number of physician visits per person, for persons 65 years of age and over, by race, sex, and respondent-assessed health status: United States, 1985–87



NOTE: Data are based on reporting by a sample of office-based physicians.
SOURCE: National Center for Health Statistics: Data from the National Ambulatory Medical Care Survey.

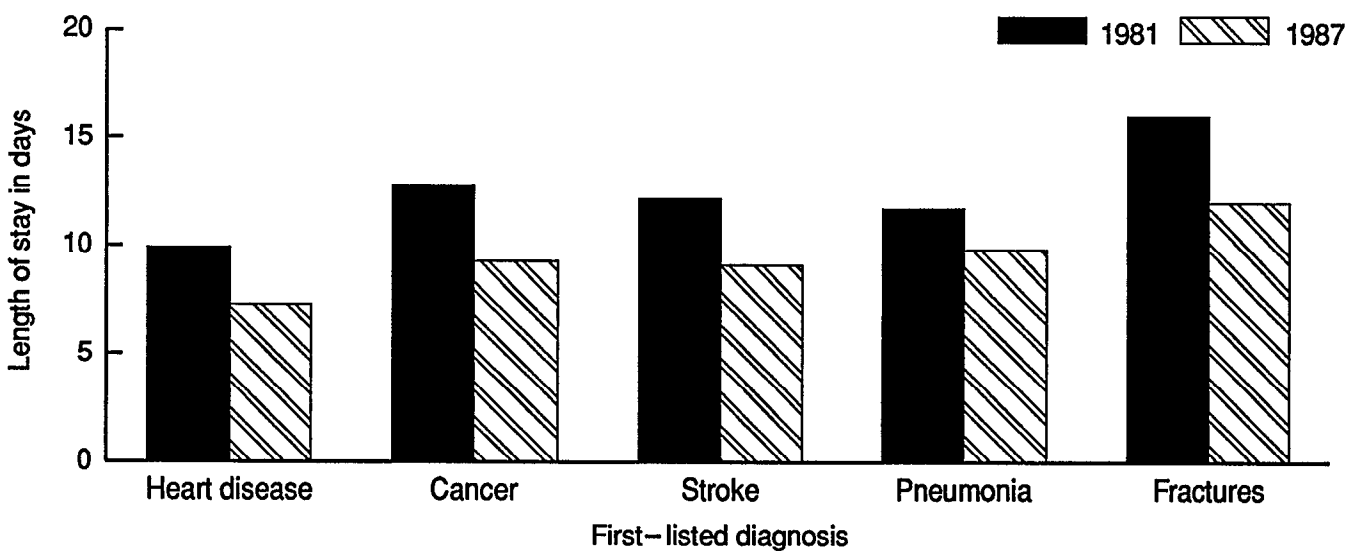
Figure 28. Percent of office visits by persons 65 years of age and over to selected physician specialists, by sex: United States, 1985



NOTES: Discharges are from non-Federal short-stay hospitals. Coded according to the *International Classification of Diseases, 9th Revision, Clinical Modification.*

SOURCE: National Center for Health Statistics: Data from the National Hospital Discharge Survey.

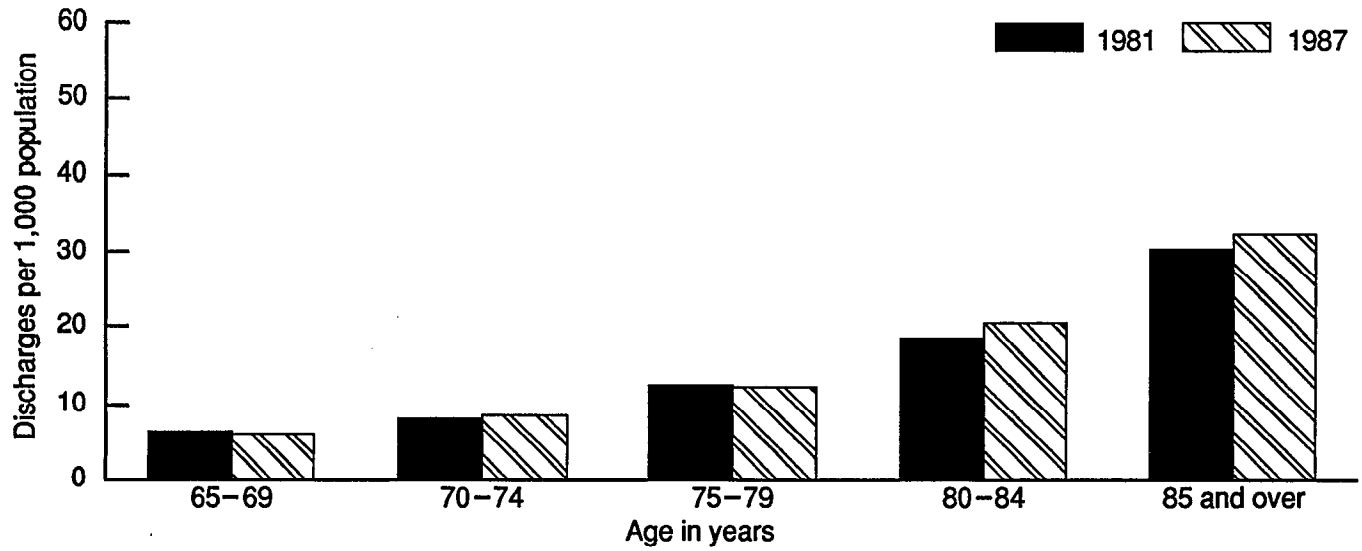
Figure 29. Average length of stay in days for females 65 years of age and over discharged from short-stay hospitals, by selected first-listed diagnoses: United States, 1981 and 1987



NOTES: Discharges are from non-Federal short-stay hospitals. Coded according to the *International Classification of Diseases, 9th Revision, Clinical Modification.*

SOURCE: National Center for Health Statistics: Data from the National Hospital Discharge Survey.

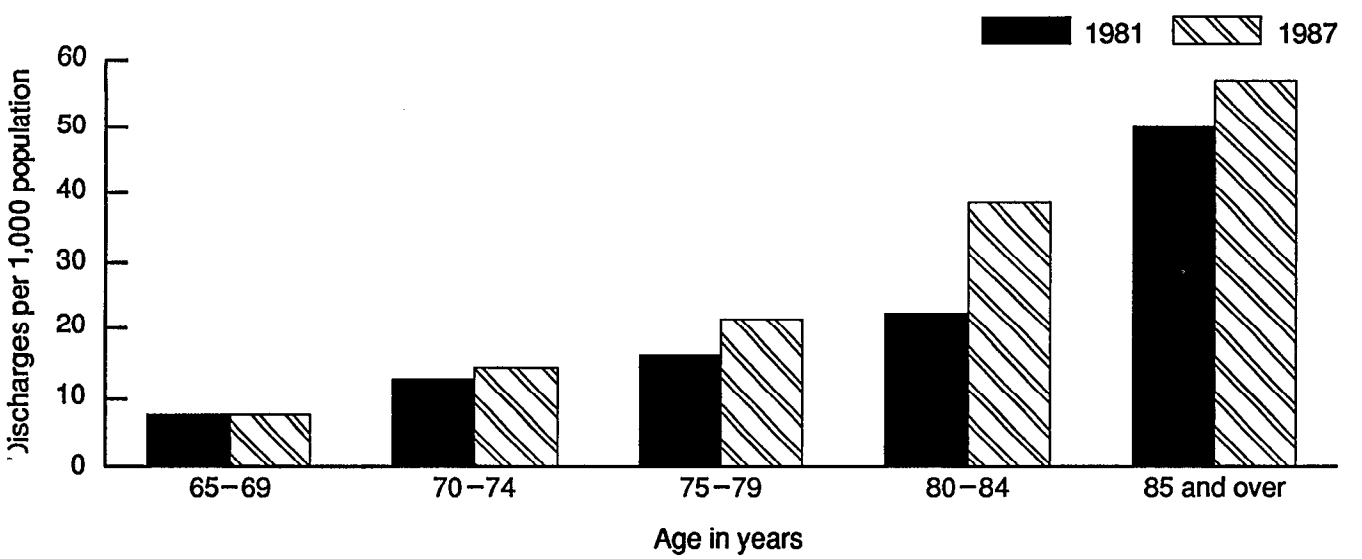
Figure 30. Average length of stay in days for males 65 years of age and over discharged from short-stay hospitals, by selected first-listed diagnoses: United States, 1981 and 1987



NOTES: Discharges from non-Federal short-stay hospitals. Pneumonia or influenza comprises codes 480-487 of the *International Classification of Diseases, 9th Revision, Clinical Modification.*

SOURCE: National Center for Health Statistics: Data from the National Hospital Discharge Survey.

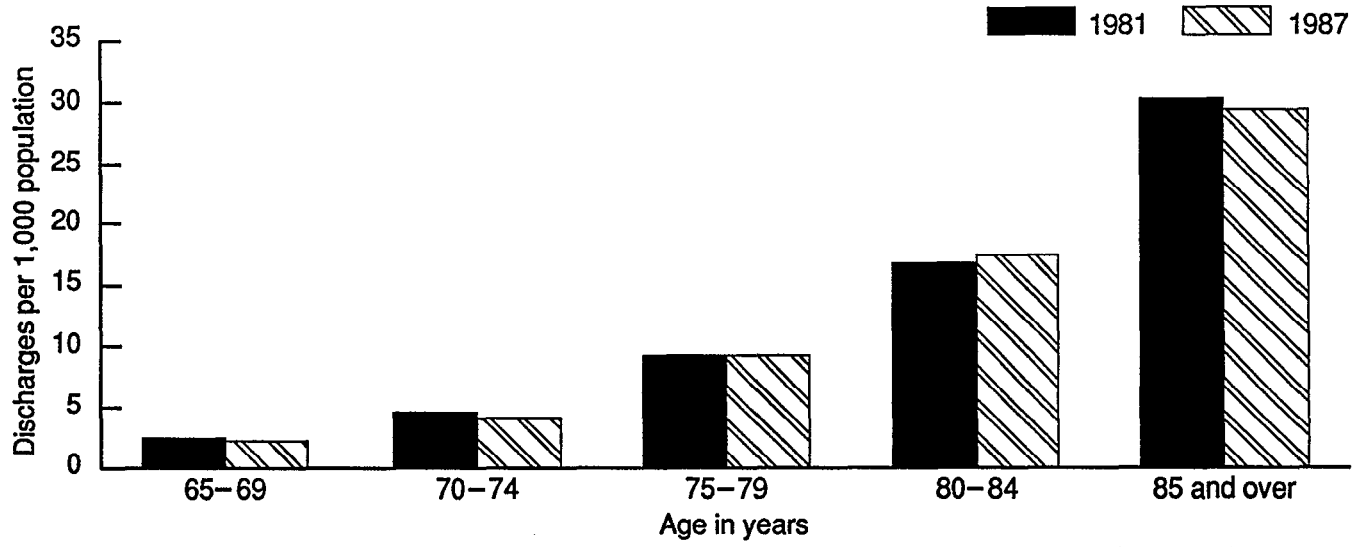
Figure 31. Rates of discharge for females 65 years of age and over discharged from short-stay hospitals with a diagnosis of pneumonia or influenza, by age: United States, 1981 and 1987



NOTES: Discharges from non-Federal short-stay hospitals. Pneumonia or influenza comprises codes 480-487 of the *International Classification of Diseases, 9th Revision, Clinical Modification.*

SOURCE: National Center for Health Statistics: Data from the National Hospital Discharge Survey.

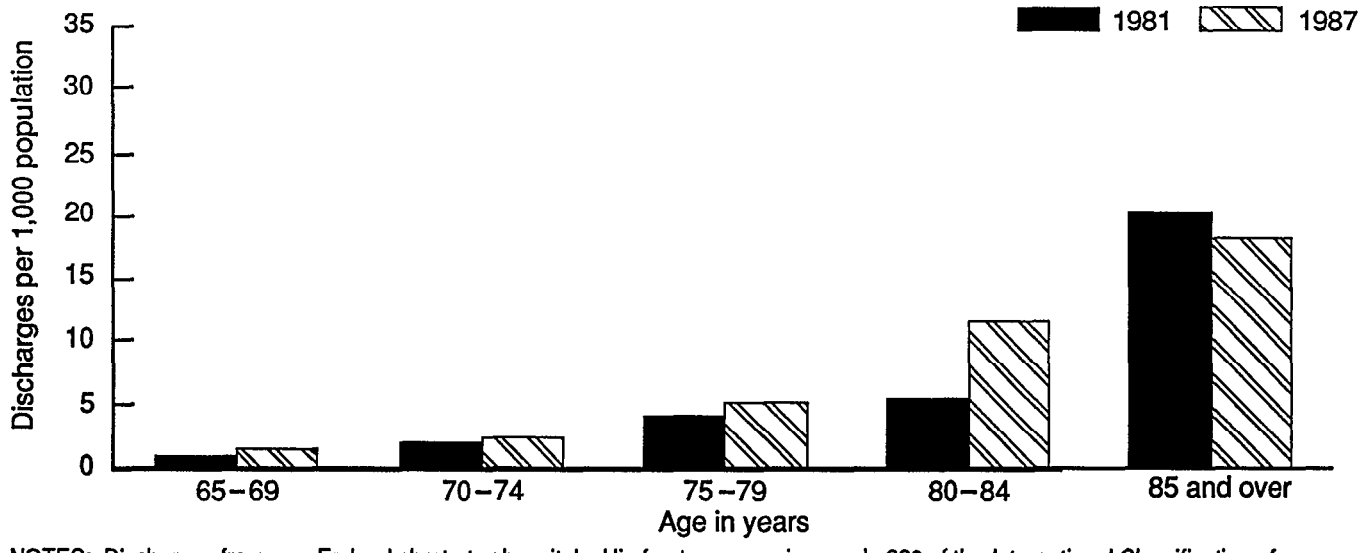
Figure 32. Rates of discharge for males 65 years of age and over discharged from short-stay hospitals with a diagnosis of pneumonia or influenza, by age: United States, 1981 and 1987



NOTES: Discharges from non-Federal short-stay hospitals. Hip fracture comprises code 820 of the *International Classification of Diseases, 9th Revision, Clinical Modification.*

SOURCE: National Center for Health Statistics: Data from the National Hospital Discharge Survey.

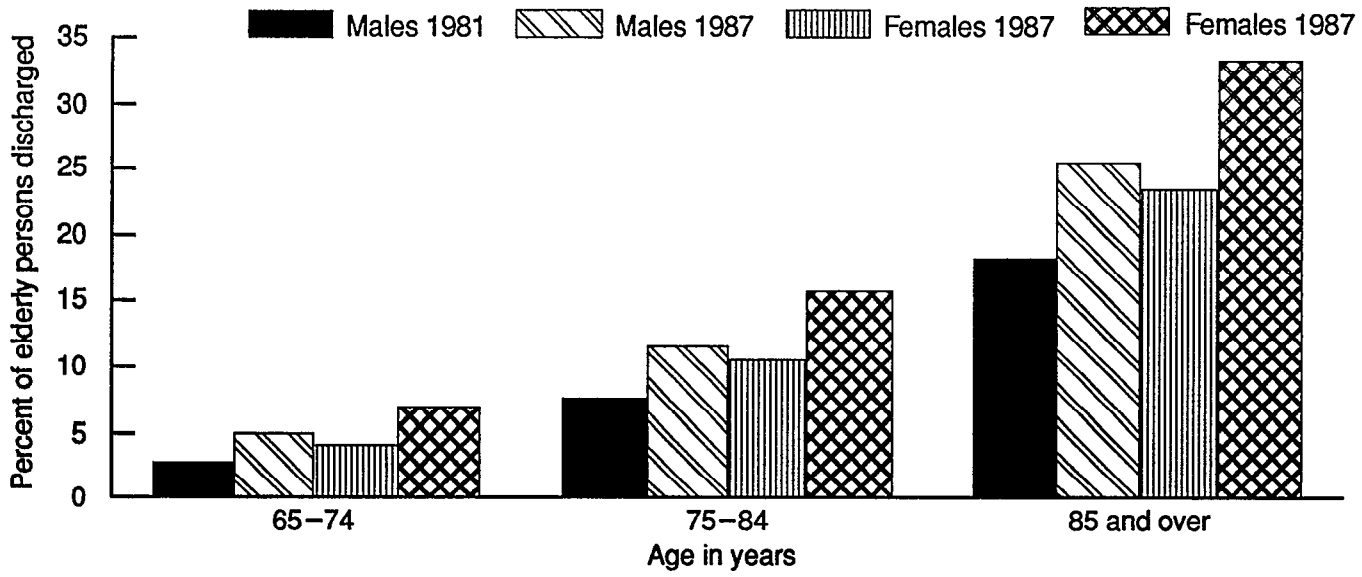
Figure 33. Rates of discharge for females 65 years of age and over discharged from short-stay hospitals with a diagnosis of hip fracture (fracture of neck of femur), by age: United States, 1981 and 1987



NOTES: Discharges from non-Federal short-stay hospitals. Hip fracture comprises code 820 of the *International Classification of Diseases, 9th Revision, Clinical Modification.*

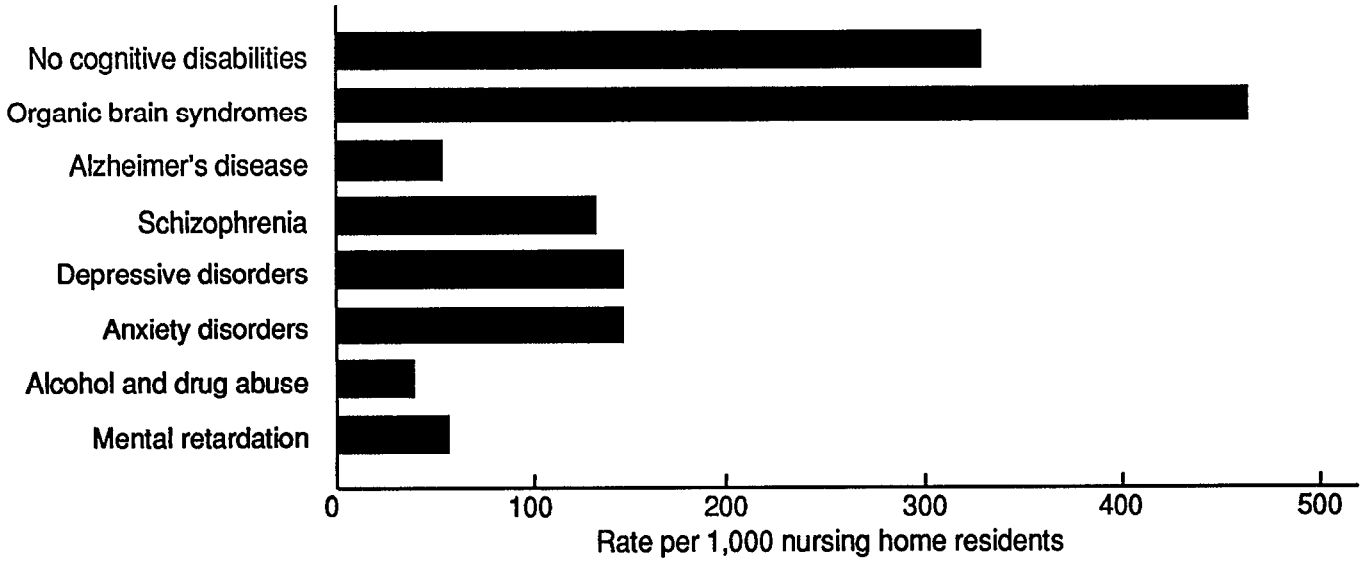
SOURCE: National Center for Health Statistics: Data from the National Hospital Discharge Survey.

Figure 34. Rates of discharge for males 65 years of age and over discharged from short-stay hospitals with a diagnosis of hip fracture (fracture of neck of femur), by age: United States, 1981 and 1987



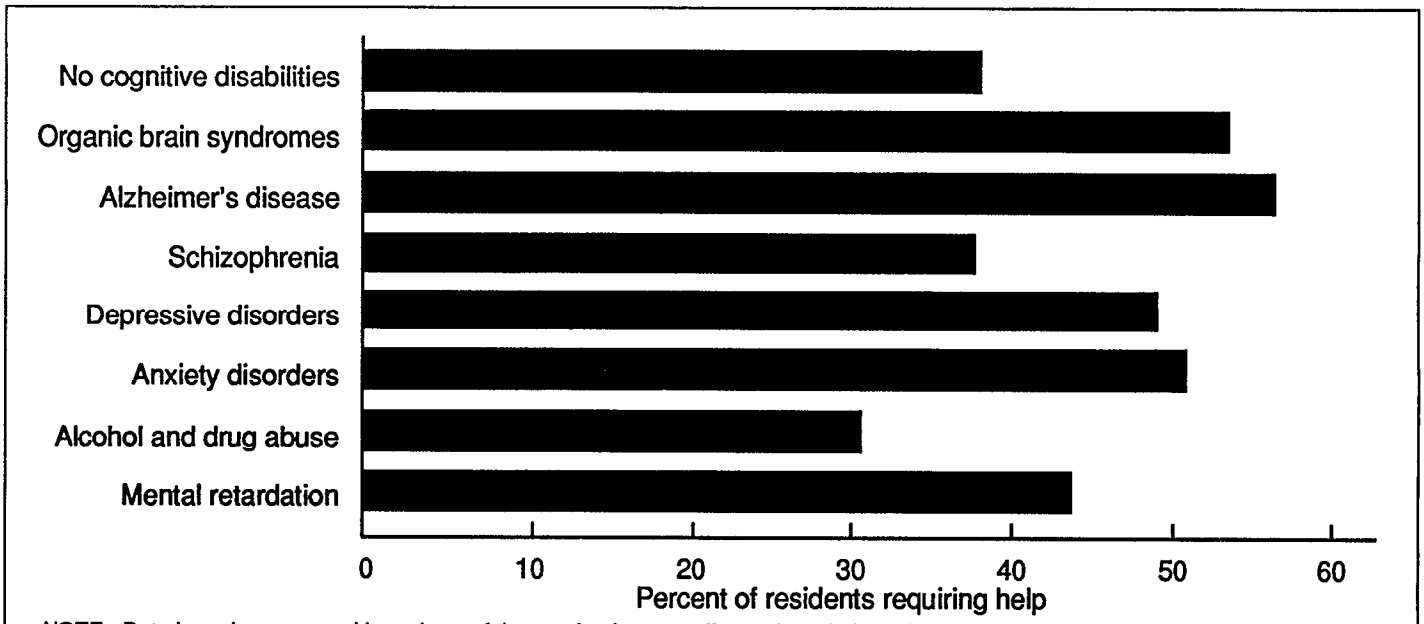
NOTE: Discharges from non-Federal short-stay hospitals.
SOURCE: National Center for Health Statistics: Data from the National Hospital Discharge Survey.

Figure 35. Percent of persons 65 years of age and over discharged from short-stay hospitals to long-term care, by sex and age: United States, 1981 and 1987



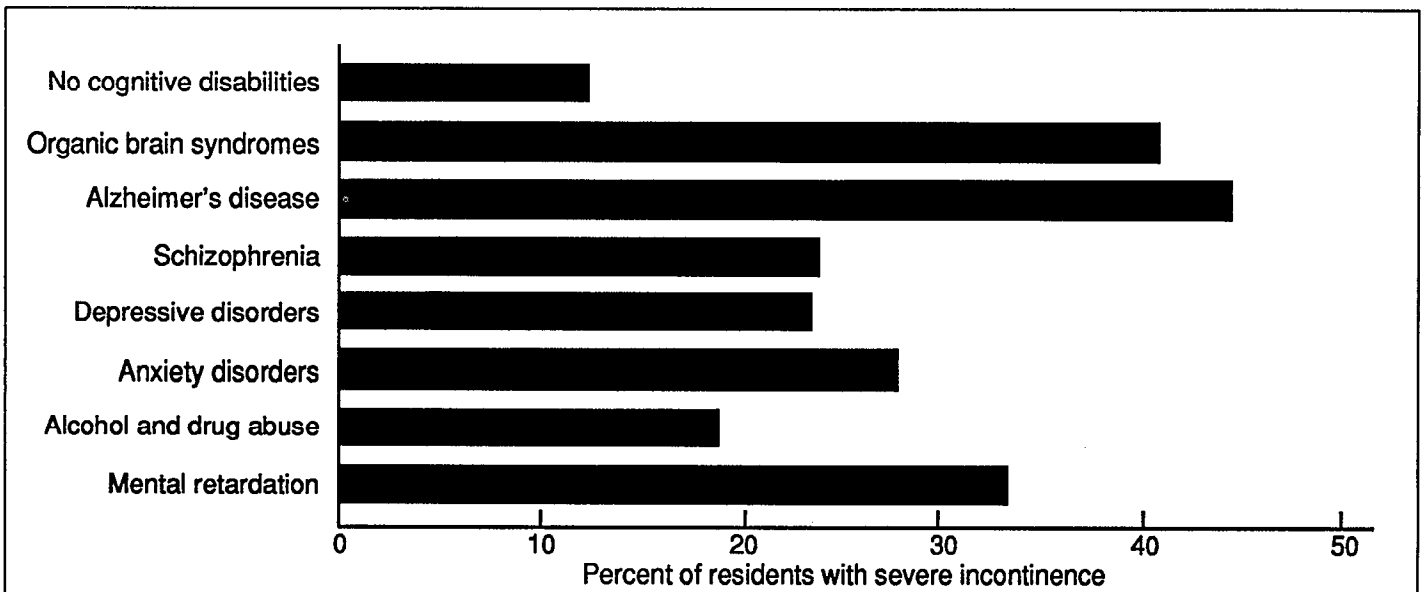
NOTE: Data based on personal interviews of the nursing home staff most knowledgeable about the residents sampled.
SOURCE: National Center for Health Statistics: Data from the National Nursing Home Survey.

Figure 36. Rate of cognitive disabilities per 1,000 nursing home residents, by type of disability: United States, 1985



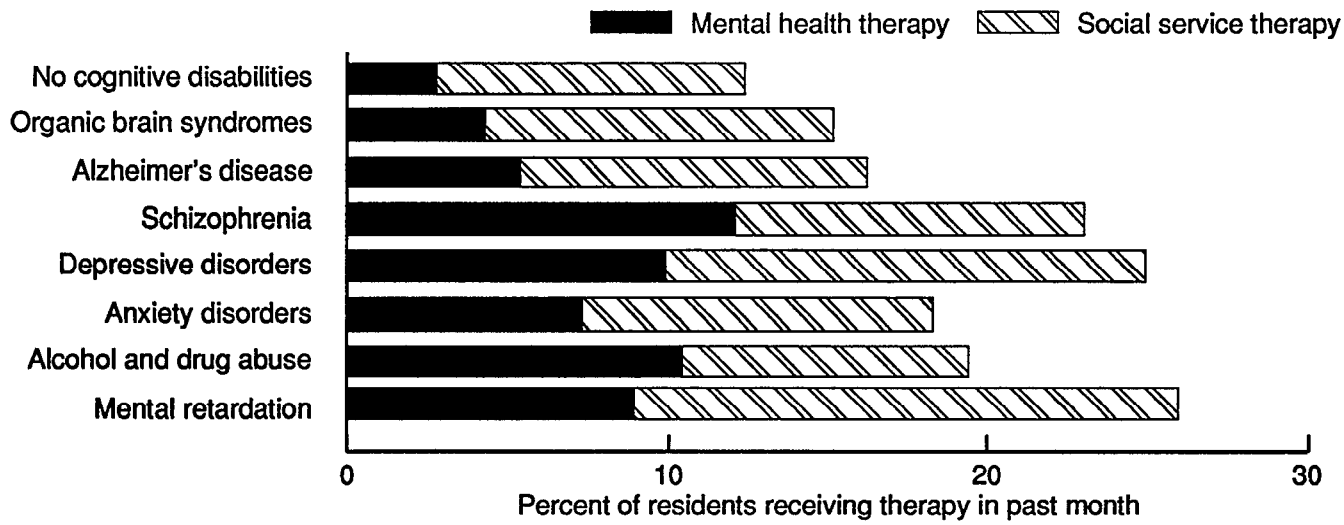
NOTE: Data based on personal interviews of the nursing home staff most knowledgeable about the residents sampled.
SOURCE: National Center for Health Statistics: Data from the National Nursing Home Survey.

Figure 37. Percent of nursing home residents 65 years of age and over who had selected cognitive disabilities and required help of another person for five to seven activities of daily living: United States, 1985



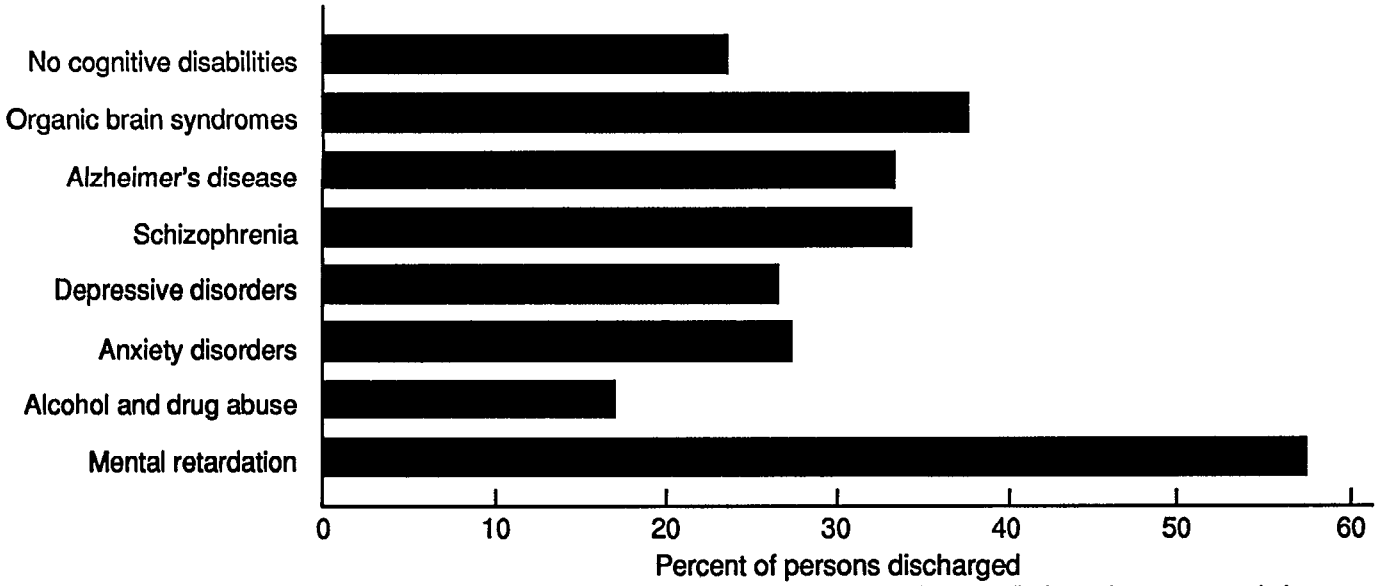
NOTES: Data based on personal interviews of the nursing home staff most knowledgeable about the residents sampled. Severe incontinence is defined as being incontinent in both bowel and bladder.
SOURCE: National Center for Health Statistics: Data from the National Nursing Home Survey.

Figure 38. Percent of nursing home residents 65 years of age and over who had selected cognitive disabilities and were severely incontinent: United States, 1985



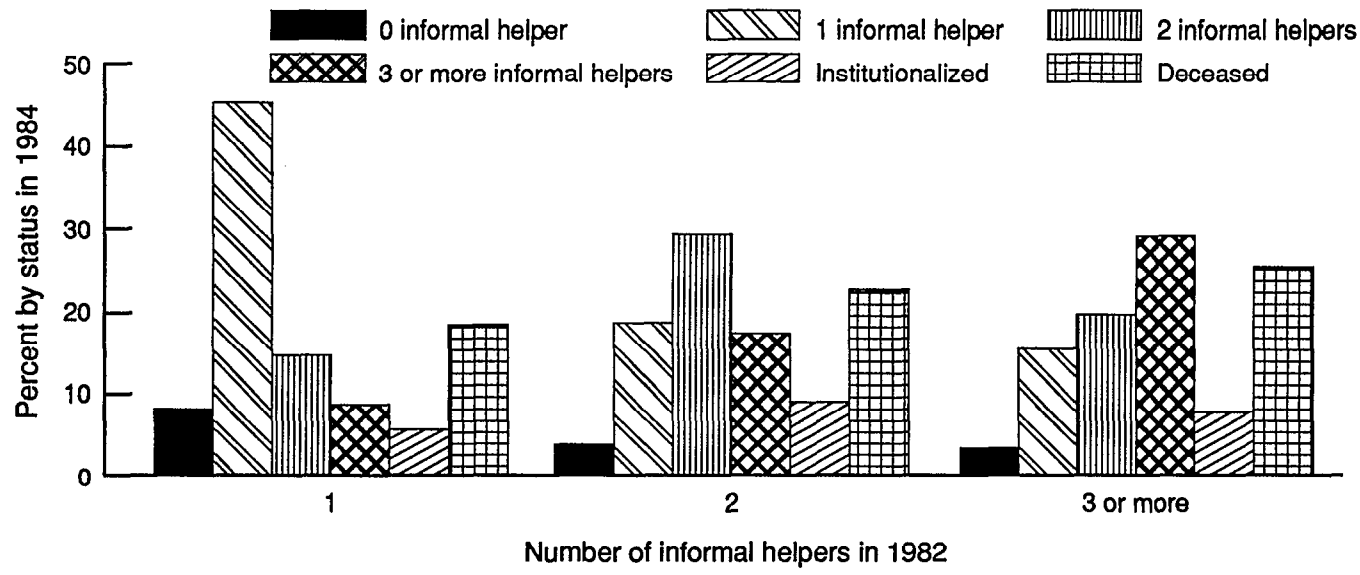
NOTES: Data based on personal interviews of the nursing home staff most knowledgeable about the residents sampled. Therapy received either inside or outside the nursing home by a licensed, registered, or professionally trained therapist. Social service therapy provided by social worker.
SOURCE: National Center for Health Statistics: Data from the National Nursing Home Survey.

Figure 39. Percent of nursing home residents 65 years of age and over who had selected cognitive disabilities, by type of therapy received in past month: United States, 1985



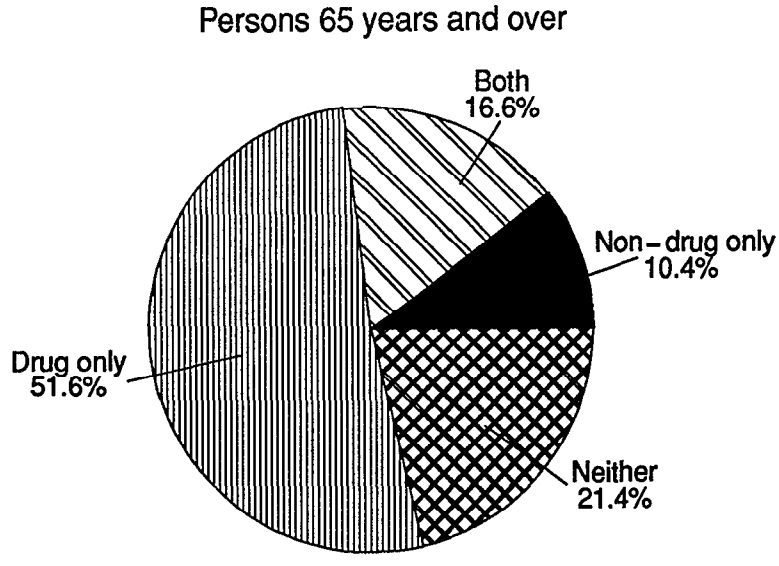
NOTE: Data based on personal interviews of the nursing home staff most knowledgeable about the discharged persons sampled.
SOURCE: National Center for Health Statistics: Data from the National Nursing Home Survey.

Figure 40. Percent of persons discharged from nursing homes, 65 years of age and over who had selected cognitive disabilities and whose length of stay was 1 year of more: United States, 1985



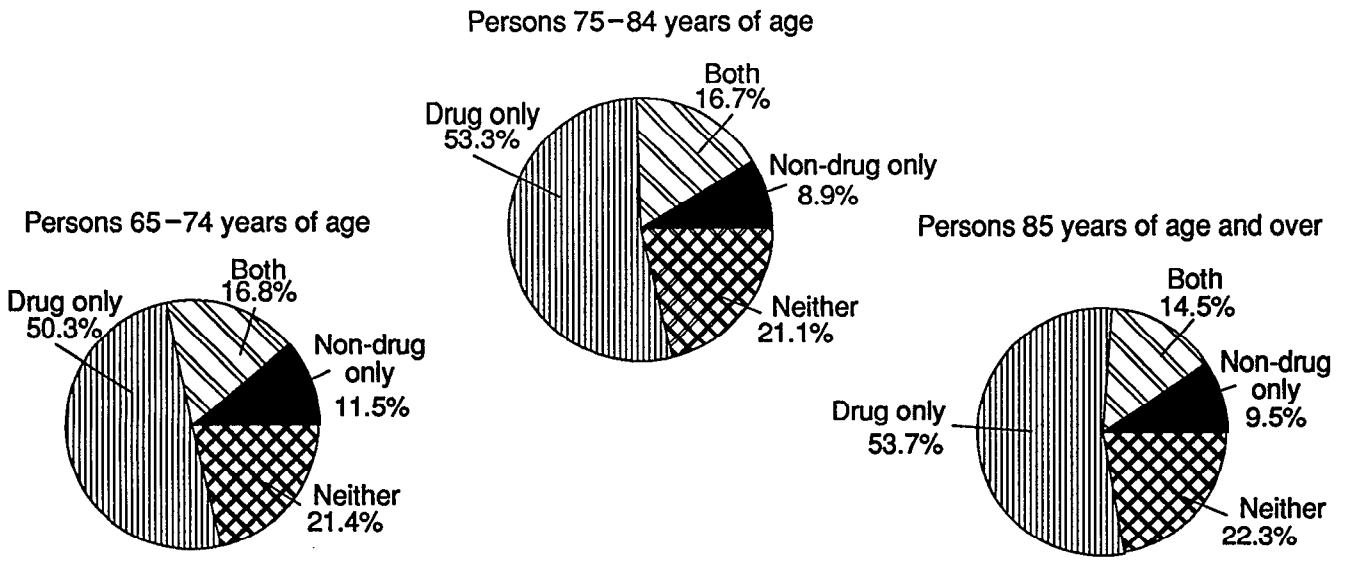
NOTE: Data are based on personal interviews of functionally impaired Medicare-eligible persons living in the community.
SOURCE: Health Care Financing Administration and National Institute on Aging. National Long-Term Care Survey, 1984.

Figure 41. Percent of frail persons 65 years of age and over using only informal helpers in 1982, by number of informal helpers or status in 1984: United States



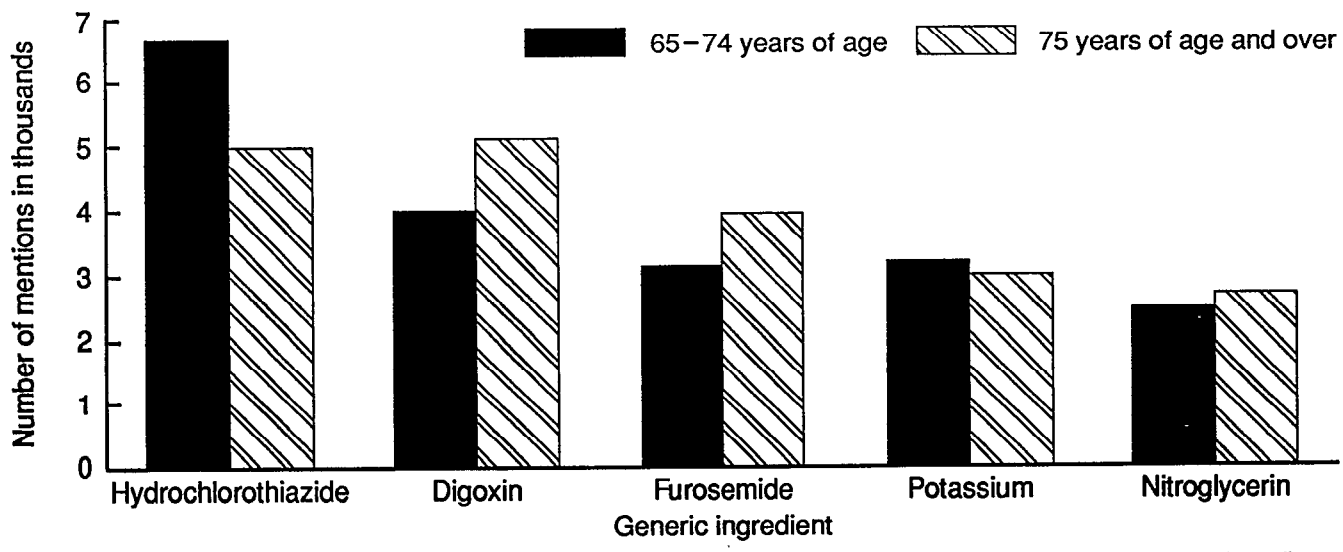
NOTE: Data are based on reporting by a sample of office-based physicians.
SOURCE: National Center for Health Statistics: Data from the National Ambulatory Medical Care Survey.

Figure 42. Percent distribution of persons 65 years of age and over seen by physicians in office-based practice, according to type of therapy received: United States, 1985



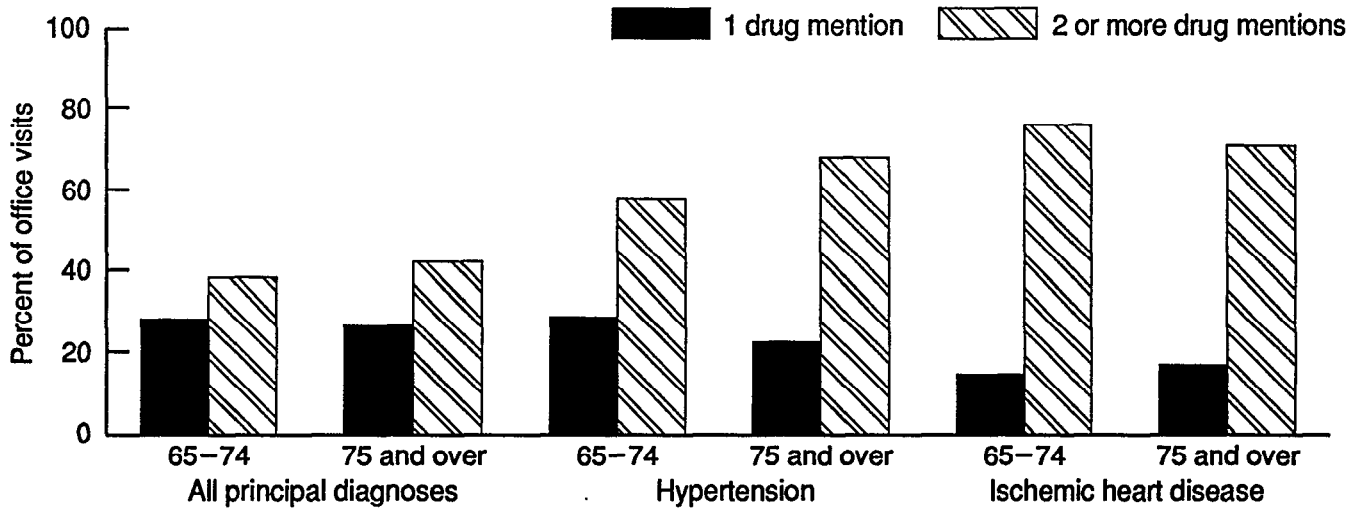
NOTE: Data are based on reporting by a sample of office-based physicians.
SOURCE: National Center for Health Statistics: Data from the National Ambulatory Medical Care Survey.

Figure 43. Percent distribution of persons 65 years of age and over seen by physicians in office-based practice, according to age group and type of therapy received: United States, 1985



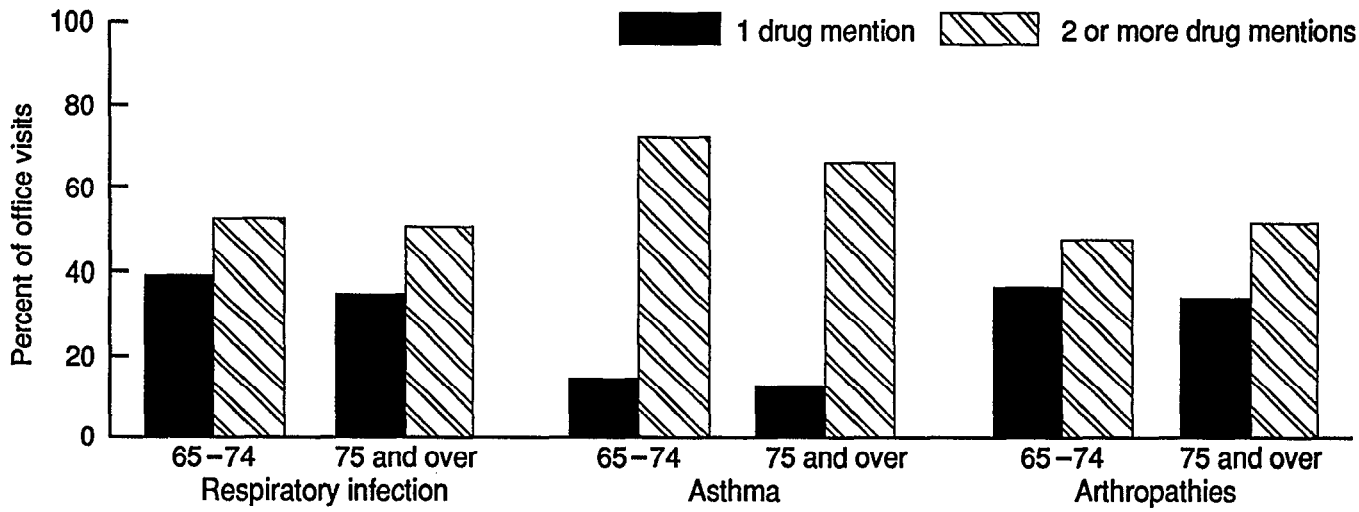
NOTES: Data are based on reporting by a sample of office-based physicians. Both mentions as the generic form of single-ingredient drugs and mentions as an ingredient of combination drugs are included. Vitamins, minerals, and vaccines are omitted.
SOURCE: National Center for Health Statistics: Data from the National Ambulatory Medical Care Survey.

Figure 44. Number of mentions of five generic ingredients most frequently mentioned by physicians in office-based practice for patients 65 years of age and over, by age: United States, 1985



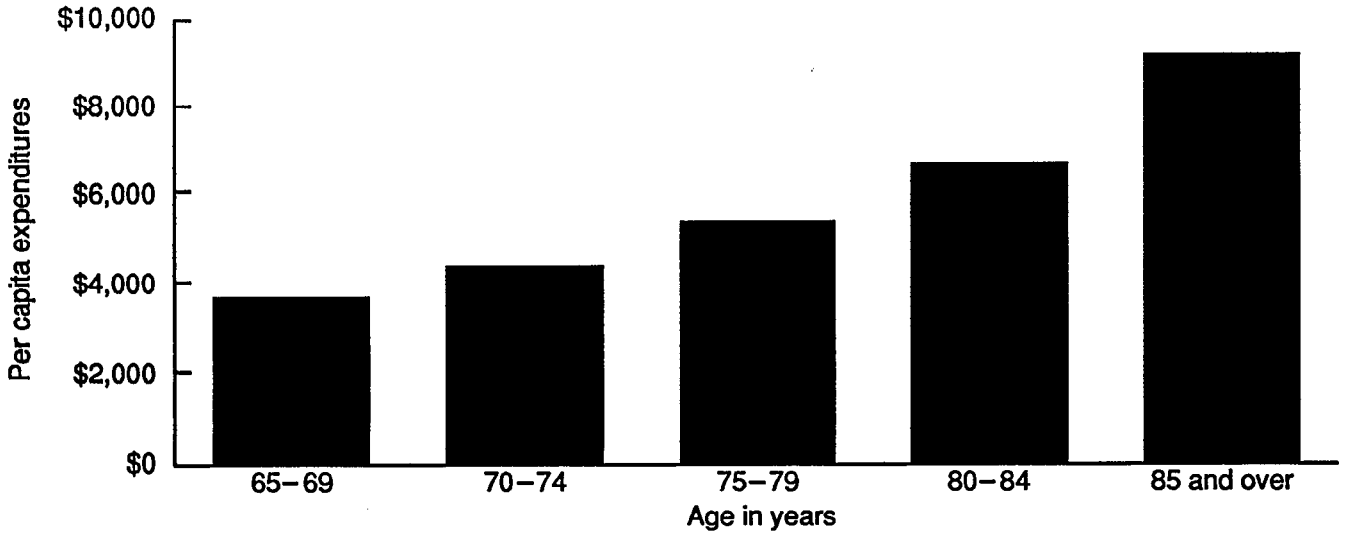
NOTES: Data are based on reporting by a sample of office-based physicians. Both mentions as the generic form of single-ingredient drugs and mentions as an ingredient of combination drugs are included. Vitamins, minerals, and vaccines are omitted. Only mentions of drugs specifically intended for the principal diagnosis are included. Mentions of drugs associated with other-listed diagnoses or utilized for any other reason are not included.
SOURCE: National Center for Health Statistics: Data from the National Ambulatory Medical Care Survey.

Figure 45. Percent of office visits to physicians by persons 65 years of age and over with mention of one drug or multiple drugs for all diagnoses, hypertension, and ischemic heart disease, by age: United States, 1985



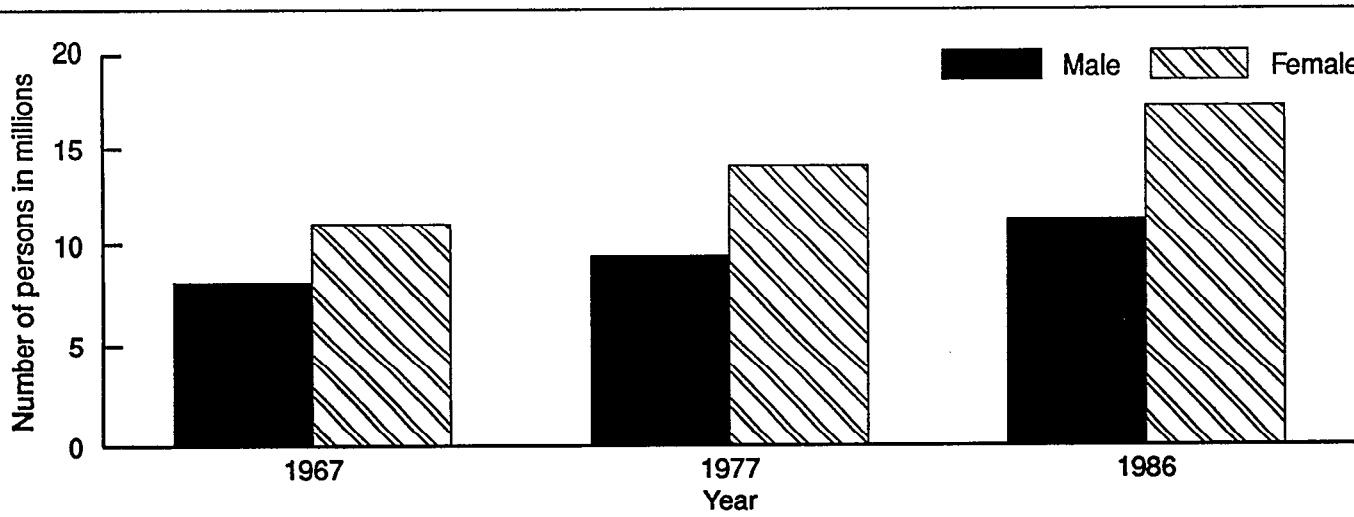
NOTES: Data are based on reporting by a sample of office-based physicians. Both mentions as the generic form of single-ingredient drugs and mentions as an ingredient of combination drugs are included. Vitamins, minerals, and vaccines are omitted. Only mentions of drugs specifically intended for the principal diagnosis are included. Mentions of drugs associated with other-listed diagnoses or utilized for any other reason are not included.
SOURCE: National Center for Health Statistics: Data from the National Ambulatory Medical Care Survey.

Figure 46. Percent of office visits to physicians by persons 65 years of age and over with mention of one drug or multiple drugs for respiratory infection, asthma, and arthropathies, by age: United States, 1985



SOURCE: Waldo D, Sonnefeld S, McKusick D, and Arnett R. Health expenditures by age group, 1977 and 1987. *Health Care Financing Review 10 (4): 111-120, 1989.*

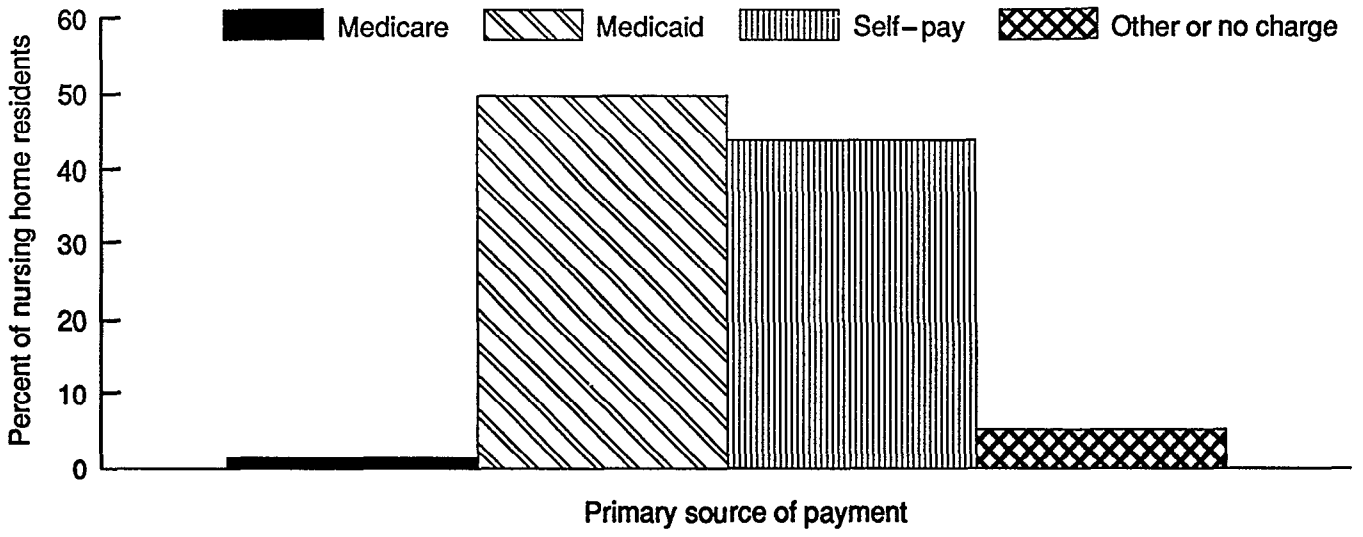
Figure 47. Per capita personal health care expenditures for persons 65 years of age and over, by age: United States, 1987



NOTES: Data are compiled by the Health Care Financing Administration. Data are as of July 1 of each year and include fee-for-service and health maintenance organization enrollees. Data include the United States, residence unknown, Puerto Rico, Virgin Islands, Guam, other outlying areas, and foreign countries. Some numbers in this figure have been revised and differ from those shown in previous editions of *Health, United States.*

SOURCES: National Center for Health Statistics: *Health, United States,* 1989; based on unpublished data from the Medicare Statistical System as prepared by the Bureau of Data Management and Strategy, Health Care Financing Administration.

Figure 48. Medicare enrollment for persons 65 years of age and over, by sex: 1967, 1977, and 1986



NOTES: Data are based on reporting by a sample of nursing homes. "Other sources" includes other government assistance or welfare, religious organizations, Veterans Administration contracts, initial payment-life care funds, and unknown.

SOURCE: National Center for Health Statistics: Data from the National Nursing Home Survey.

Figure 49. Percent of nursing home residents 65 years of age and over, by primary source of payment in month before interview: United States, 1985

Chapter 3
Special topics

by Sylvia E. Furner, Ph.D., University of Illinois at Chicago School of Public Health

In this section, data are presented that relate to three topics that are important in understanding the health of the older population. Data on black older Americans are valuable for understanding issues of disease etiology, access to health care, and resource allocation. Because musculoskeletal diseases are so prevalent in the older population, data on the association between these diseases and disability and the variation by age and sex are presented. Finally, the aging of the population is not restricted to the United States. Other countries are experiencing this increase in the older population, too, albeit at rates of increase that may differ.

Health of black older Americans

The increase in the size of the population 65 years of age and over has been accompanied by a diversification in the race and ethnicity of this segment of the population. Currently, black Americans comprise approximately 8 percent of the 65-and-over population; this is expected to increase to 10 percent by the year 2010. Although white Americans will continue to comprise the majority of the older population, the black American population is aging. Understanding whether there are differences by race in health status, level of functional ability, disease patterns, and health care use may help focus policy and resources. Although examination of the many race and ethnic groups that exist among the older population was a goal at the time of these analyses, the black older population was the only sample large enough to allow for estimates that were statistically reliable.

The importance of respondent-assessed health status has been previously discussed, but differences in this measure by race were not emphasized. At age 65 and over, significantly fewer black males and females rated their health as excellent or very good, compared with their white counterparts, and significantly more black than white people rated their health as fair or poor (figure 50).

The prevalence of selected chronic conditions is another measure of the health of the older population. Hypertension was a highly prevalent chronic condition in those examined among both the black and white populations 65 years of age and over, with rates of 474 per 1,000 and 382 per 1,000, respectively (figure 51). Although these rates appear unequal, there was no statistically significant difference between them. Ischemic heart disease, however, was less prevalent in black older persons than white older persons, while diabetes mellitus was more prevalent.

A majority of persons 70 years of age and over remained independent in ADL functioning

Note: The author wishes to acknowledge the contributions of Karen S. Blesch, M.S., Jacob Brody, M.D., and Toni Miles, M.D., Ph.D., from the University of Illinois at Chicago, Katherine Flegal, M.P.H., Ph.D., from NCHS, and Tamara Harris, M.D., M.S., from the National Institute on Aging, who were the authors of the chapters in the companion report, *Health Data on Older Americans: United States, 1992*, and Peter Ries and Harry Rosenberg, Ph.D., from NCHS, who reviewed the text on black older Americans.

for the 2-year period 1984–86 (figure 52) (see chapter 1 on health status for a fuller discussion of ADL's and IADL's). There was, however, a differential between black and white persons in the percent of those maintaining full functional status. Fewer black than white persons remained independent among both males and females. This pattern was also true for independence with IADL's.

The risk of death was lower among black persons with some level of ADL difficulty than among white persons, 10 versus 20 percent (figure 53). The same relationship was evident for persons with some level of IADL difficulty, 11 percent for black persons and 18 percent for white persons.

Mortality from all causes in the black older population exceeded that in the white older population until age 85 and over (figure 54). Among the oldest-old, those 85 and over, mortality rates were lower for black persons. Both black and white females experienced lower mortality rates than their male counterparts.

The discharge disposition of older persons from short-stay hospitals did not vary between black and white persons (figure 55). For both races and both sexes, the majority of discharges of persons 65 years of age and over were routine. Although there appeared to be a larger percent of black persons who died in the hospital, the difference was not statistically significant. A higher percent of females were discharged to long-term care, and this persisted in the two race categories.

Among black older Americans, one or more drugs were mentioned for 75 percent of the visits to office-based physicians by persons 65–74 years of age and 79 percent of visits by persons 75 years of age and over (figure 56). The percent of visits in which two or more drugs were mentioned increased with age for black older persons. Black older Americans had a higher percent of office visits associated with one or more drug mentions in both age groups, compared with white older Americans.

Vitamin and mineral supplement usage by black older persons for selected commonplace vitamins and minerals was considerably lower than by white older persons (figure 57). Only 13 percent of black persons 65 years of age and over used Vitamin C, in contrast to 34 percent of white older people. Similar usage differential was evident for Vitamin B12, iron, and calcium.

Hypertension was the most common comorbid condition with arthritis for both black and white older persons (figure 58). In the black older population, diabetes ranked next highest and heart disease ranked third. In the white older population, the opposite pattern prevailed: Heart disease ranked next highest to hypertension, and diabetes ranked third. Although the prevalence of heart disease did not vary significantly between the two groups, both hypertension and diabetes were more common in black older persons.

Musculoskeletal disorders

Musculoskeletal disorders and particularly arthritis are the most common chronic diseases affecting persons in late life. Estimating the proportion of persons with both arthritis and other musculoskeletal diseases is of public health interest because of the burden of disability and impaired quality of life associated with these disorders. Data presented in this section are derived from three different national surveys, each of which covers a different time period and age group.

Consultation with a physician regarding arthritis is an indication of disease severity because not all elderly persons with musculoskeletal problems seek medical care. In these samples, there were increasing numbers of persons reporting physician-diagnosed arthritis noted across

survey years for comparably aged groups (figure 59). This was true for both males and females.

Self-reported health status is another important measure of illness severity. Persons 65 years of age and over with arthritis were more likely to report their health as fair or poor (38 percent) than those without arthritis (21 percent) (figure 60). Persons with arthritis most often reported themselves as having fair or poor health for most ages except those 85 and over (figure 61).

Examining the patterns of joint involvement, disability, and comorbidity associated with arthritis is also of interest. Arthritis affecting the back and lower extremities is important because musculoskeletal disease referable to these areas may limit mobility. Among those reporting any joint pain, the back or neck was the most commonly reported painful location by both white and black persons aged 55–74 (figure 62) and males and females aged 65–74 (figure 63). Knee pain was more frequently reported by black than white persons. No other differences between race or sex groups in frequency of reported pain by site were evident.

Tasks that require back and leg mobility were more frequently reported as being difficult than other specific activities by persons 65 years of age and over (figures 64 and 65). The most commonly reported problem by both males and females was difficulty with walking. Bathing, transferring from bed to chair, and getting outside were also frequently reported as being difficult to perform.

Older persons are likely to have multiple chronic conditions. Among persons 55 years of age and over with arthritis, hypertension was the most commonly occurring condition for both black and white persons (figure 66). Heart disease was the second most common comorbid condition for white persons 55 years of age and over, and diabetes was the second most common comorbid condition for black persons in the same age category (figure 66). When all persons 65 years of age and over with arthritis were considered, hypertension was still the most common comorbid condition, and heart disease was second for all age groups (figure 67).

International aging

The changing age structure that is evident in the United States is not an isolated phenomenon. In most industrialized countries, older people are living longer, particularly at the oldest ages. In a comparison of life expectancy at age 65, using 1986 as the reference year, international differences were evident. Female life expectancy at age 65 ranged from 16.5 years in Israel to 19.7 years in Japan (figure 68). Females in Canada had the greatest expected remaining years of life at age 85 than any of the other countries, 6.7 years. Male life expectancy at age 65 ranged from 13.0 years in Belgium to 16.1 years in Japan (figure 69). Life expectancy at age 85 was greatest for males in Canada and the United States, 5.2 years.

Cause-specific mortality among persons 65 years of age and over, using 1984 as the reference year, shows that heart disease was the leading cause of death in the United States and many other countries, accounting for 33–43 percent of all deaths when it was the leading cause of death (figure 70). Cancer accounted for 16–25 percent of all deaths, and stroke accounted for 9–23 percent.

The proportion of the population that was over age 65 varied internationally (figure 71). In 1972–76, this proportion ranged from a low of 6 percent in Hong Kong to 15 percent in Sweden. In 1983–86, this proportion varied from 8 to 18 percent for the same two countries. An increase in the proportion of the population that is 65 years of age and over is evidence that that population is aging. Of all countries listed, only Belgium and France did not have an increase in that proportion.

Currently, in most countries, the proportionate contribution to all deaths made by persons aged 65 and over was well in excess of their representation in the population (figures 71 and 72). The proportion of deaths attributable to this age group during the period 1981–86 ranged from 59 to 81 percent.

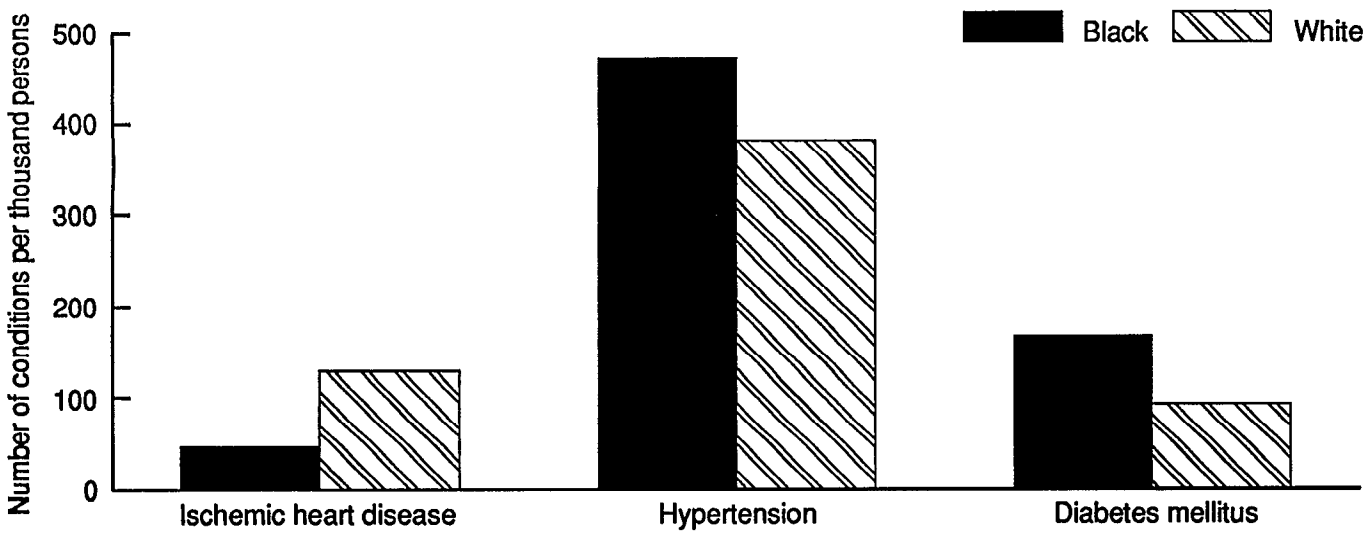
Aging in the United States

The total resident population in the United States was estimated to be 249 million in 1990 (figure 73). At the beginning of the 20th century, the population of the United States was 76 million, 39 million males and 37 million females. The population 65 years of age and over comprised 12.5 percent or 31 million of the total population in 1990 (figure 74). This represents a threefold increase since the turn of the century.

The most revealing aspect of the population change in the 20th century is the dramatic shift in the age composition. In particular, the segment of the population 65 years of age and over has increased steadily over time, with the greatest increases occurring between 1950 and 1980. For the decade of the 1980's, the average annual growth rate was 2.2 percent, still more than twice the corresponding rate for the total population. Included in the expansion of the older population is a disproportionate increase in the oldest-old, those 85 years of age and over. During the decade of the 1980's, the average annual growth rate of this group was 3.5 percent. Within the group aged 65 and over, the rates of increase have been greatest in the oldest age groups.

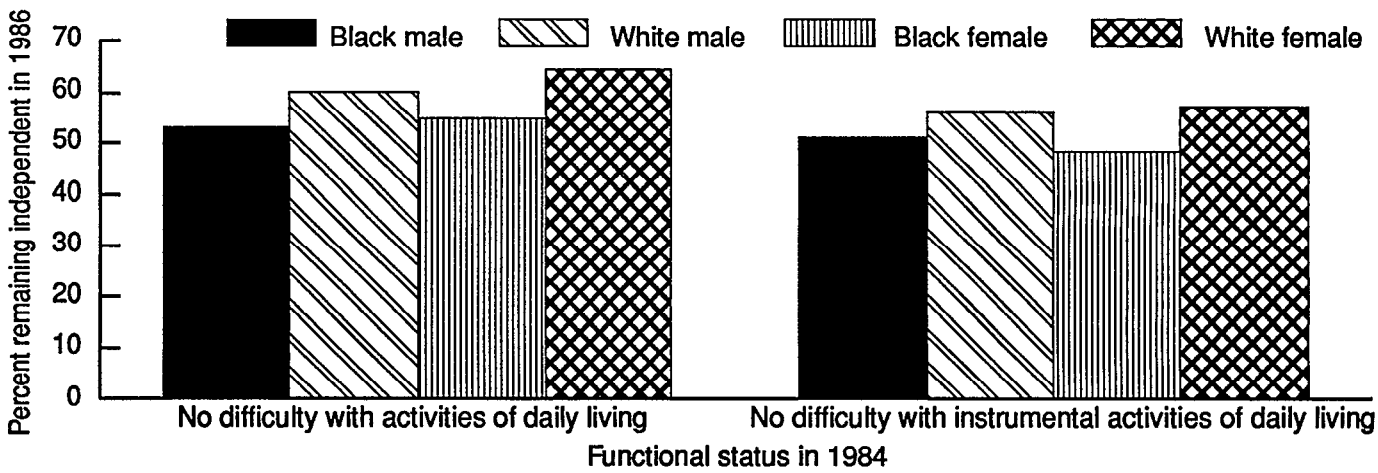
NOTES: Data are based on household interviews of the civilian noninstitutionalized population. These rates exclude unknown respondent-assessed health status. Percents may not add to 100 because of rounding.
SOURCE: National Center for Health Statistics: Data from the National Health Interview Survey.

Figure 50. Average annual percent distribution of persons 65 years of age and over, according to respondent-assessed health status, race, and sex: United States, 1985–87



NOTES: Data are based on household interviews of the civilian noninstitutionalized population. These rates are based on unduplicated counts: A person was counted only once for each condition, regardless of the number of mentions of that condition.
SOURCE: National Center for Health Statistics: Data from the National Health Interview Survey.

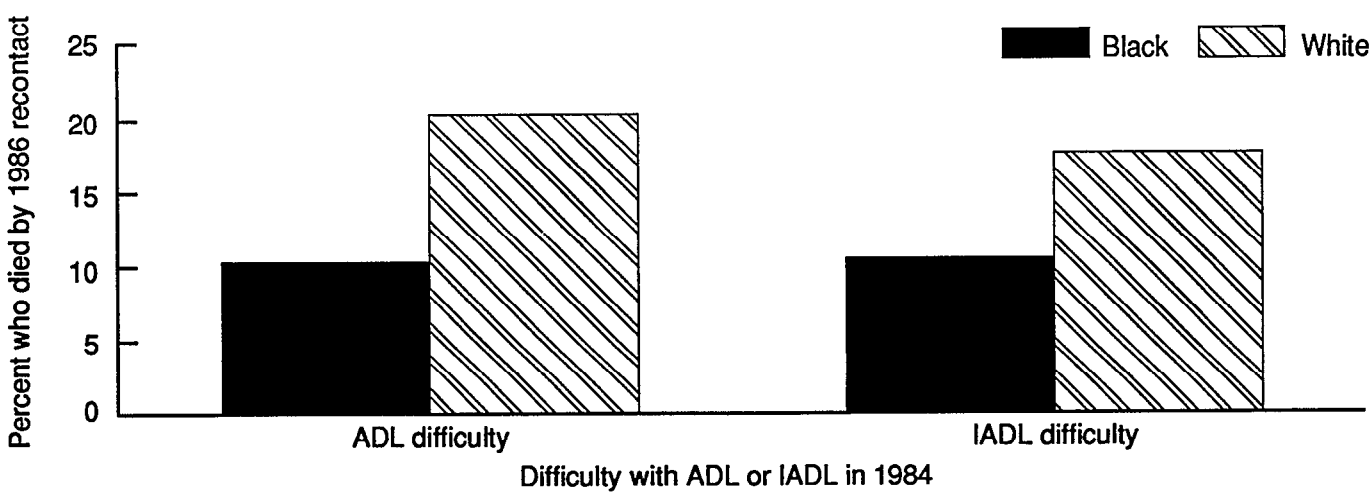
Figure 51. Average annual number of selected reported chronic conditions per 1,000 persons 65 years of age and over, by race: United States, 1985–87



NOTES: Data are based on 1986 telephone followup of 1984 household interviews of the civilian noninstitutionalized population. ADL is activity of daily living. IADL is instrumental activity of daily living. Persons reported as not performing an ADL were classified with those reported as having difficulty with that ADL. ADL's include eating, toileting, dressing, bathing, getting in and out of a bed or chair, walking, and getting outside. Persons reported as not performing an IADL were not classified with those reported as having difficulty with that IADL. IADL's include meal preparation, shopping, managing money, using the telephone, light housework, and heavy housework. Excludes persons for whom status of difficulty in 1984 was unknown.

SOURCE: National Center for Health Statistics: Data from the 1986 Longitudinal Study on Aging.

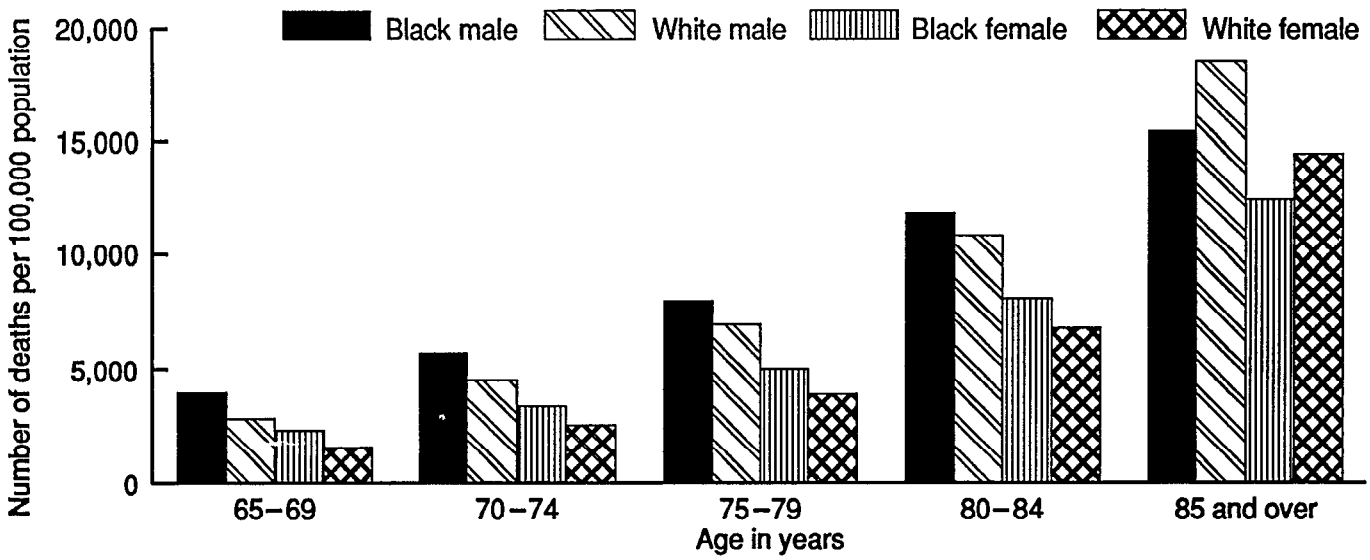
Figure 52. Percent of persons 70 years of age and over reporting no difficulty with activities of daily living or no difficulty with instrumental activities of daily living in 1984 and in 1986, by race and sex: United States



NOTES: Data are based on 1986 telephone followup of 1984 household interviews of the civilian noninstitutionalized population. ADL is activity of daily living. IADL is instrumental activity of daily living. Persons reported as not performing an ADL were classified with those reported as having difficulty with that ADL. ADL's include eating, toileting, dressing, bathing, getting in and out of a bed or chair, walking, and getting outside. Persons reported as not performing an IADL were not classified with those reported as having difficulty with that IADL. IADL's include meal preparation, shopping, managing money, using the telephone, light housework, and heavy housework. Excludes persons for whom status of difficulty in 1984 was unknown.

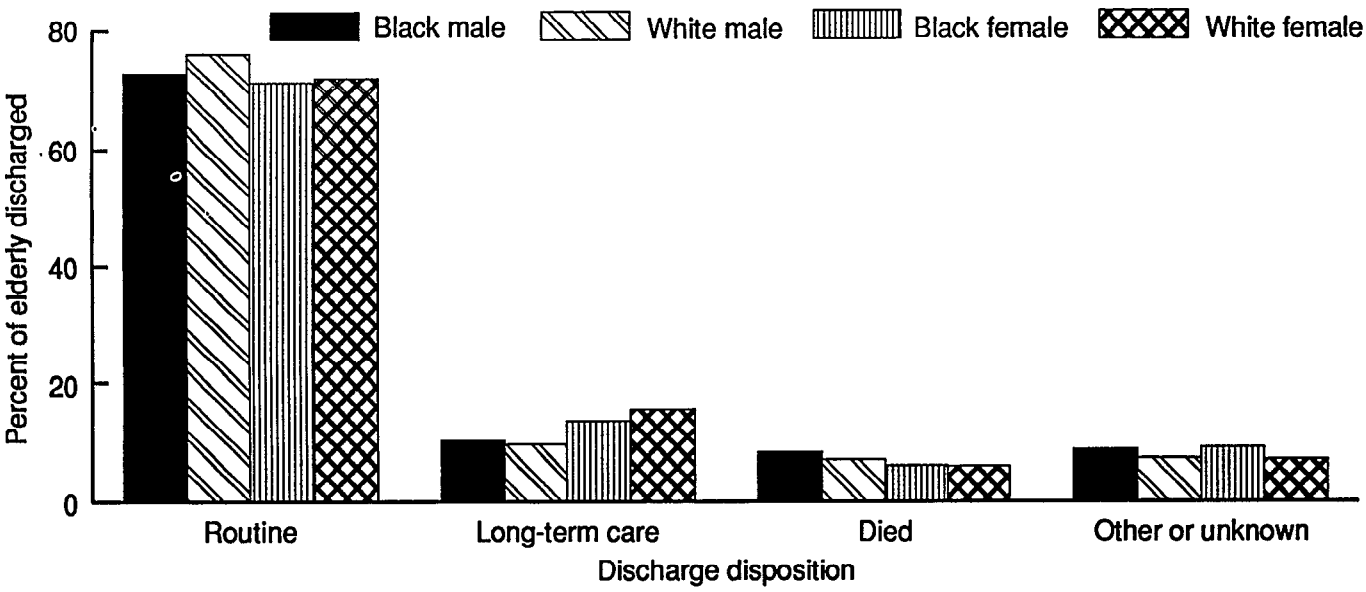
SOURCE: National Center for Health Statistics: Data from the 1986 Longitudinal Study on Aging.

Figure 53. Percent of persons 70 years of age and over reporting some difficulty with activities of daily living or some difficulty with instrumental activities of daily living in 1984, who had died by 1986 recontact: United States



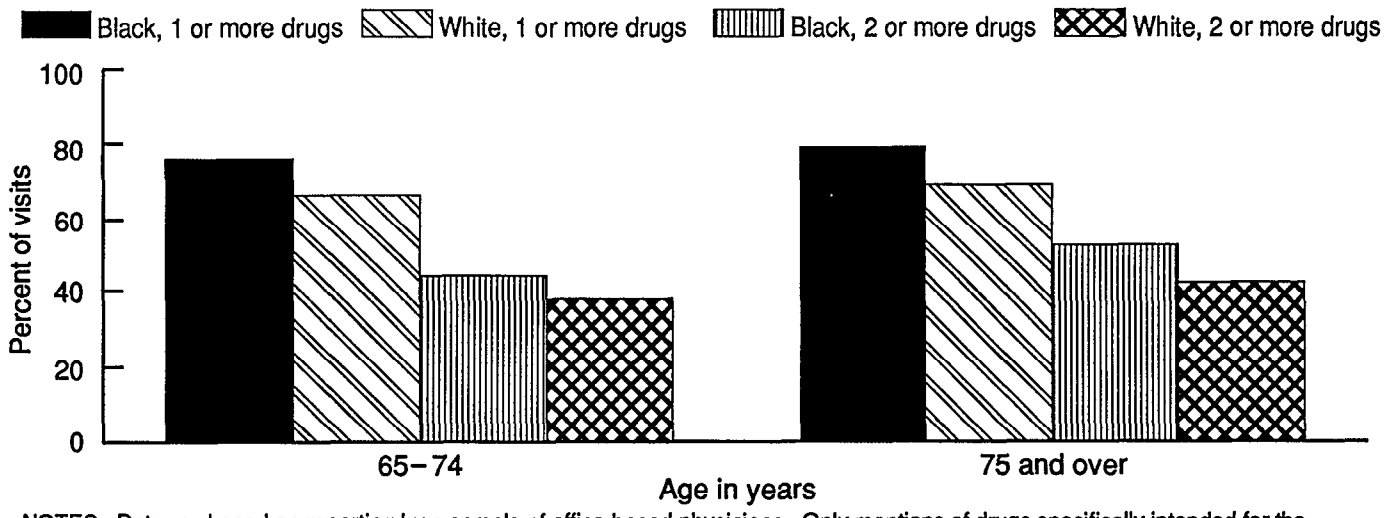
NOTE: Data are based on the National Vital Statistics System.
SOURCE: National Center for Health Statistics: Vital statistics of the United States, volume II, mortality, part A. Washington: Public Health Service, 1986.

Figure 54. Death rates from all causes for persons 65 years of age and over, by race, sex, and age: United States, 1986



NOTE: Discharges from non-Federal short-stay hospitals.
SOURCE: National Center for Health Statistics: Data from the National Hospital Discharge Survey.

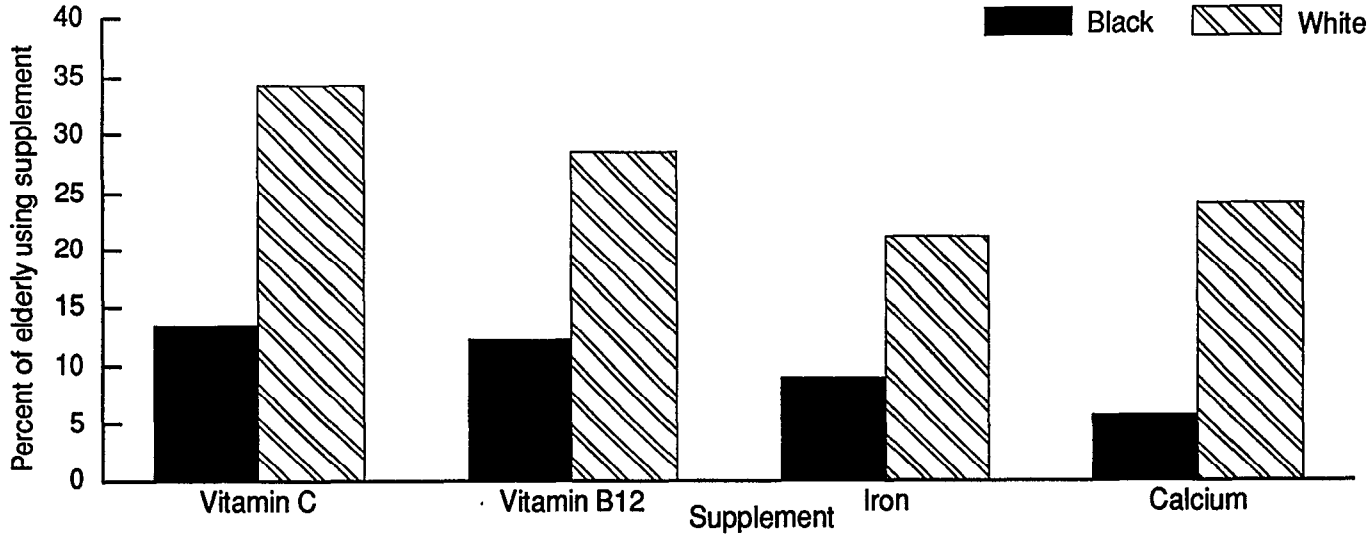
Figure 55. Percent distribution of persons 65 years of age and over discharged from short-stay hospitals, according to disposition status, race, and sex: United States, 1987



NOTES: Data are based on reporting by a sample of office-based physicians. Only mentions of drugs specifically intended for the principal (first-listed) diagnosis are included. Mentions of drugs associated with other-listed diagnoses or used for any other reason are not included. Both mentions as the generic form of a single-ingredient drug and mentions as an ingredient of combination drugs are included. Vitamins, minerals, and vaccines are omitted.

SOURCE: National Center for Health Statistics: Data from the National Ambulatory Medical Care Survey.

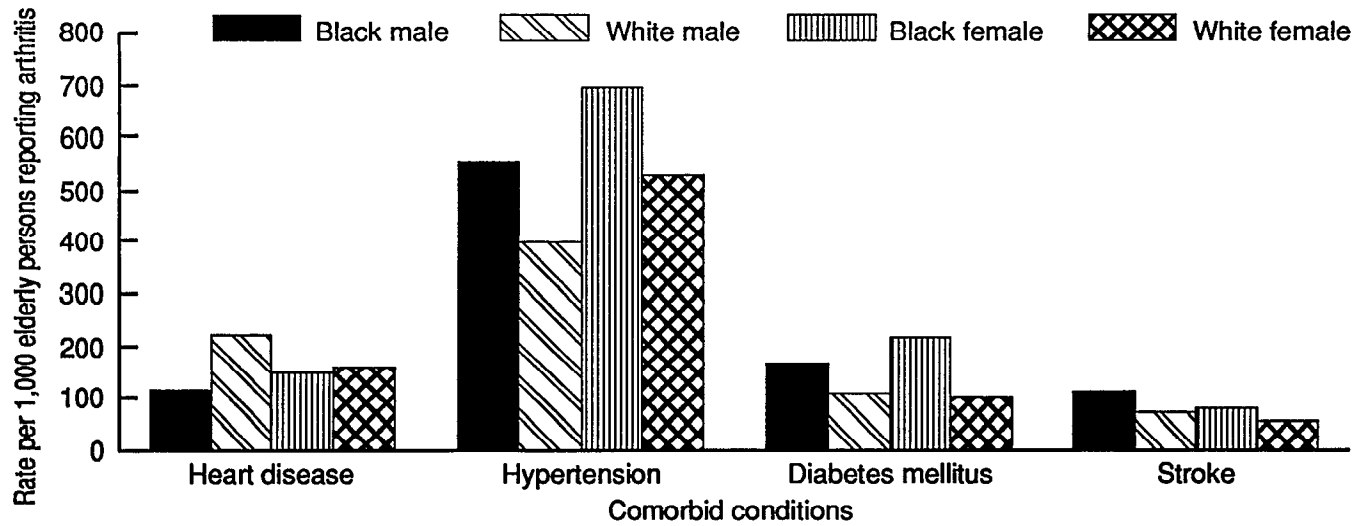
Figure 56. Percent of visits to office-based physicians for which one or more drugs were mentioned for persons 65 years of age and over, by race and age: United States, 1985



NOTES: Data are based on household interviews of the civilian noninstitutionalized population. Current usage includes those reporting nonprescription and prescription vitamin or mineral supplement use in the past 2 weeks.

SOURCE: National Center for Health Statistics: Data from the 1986 National Health Interview Supplement on Vitamins and Minerals.

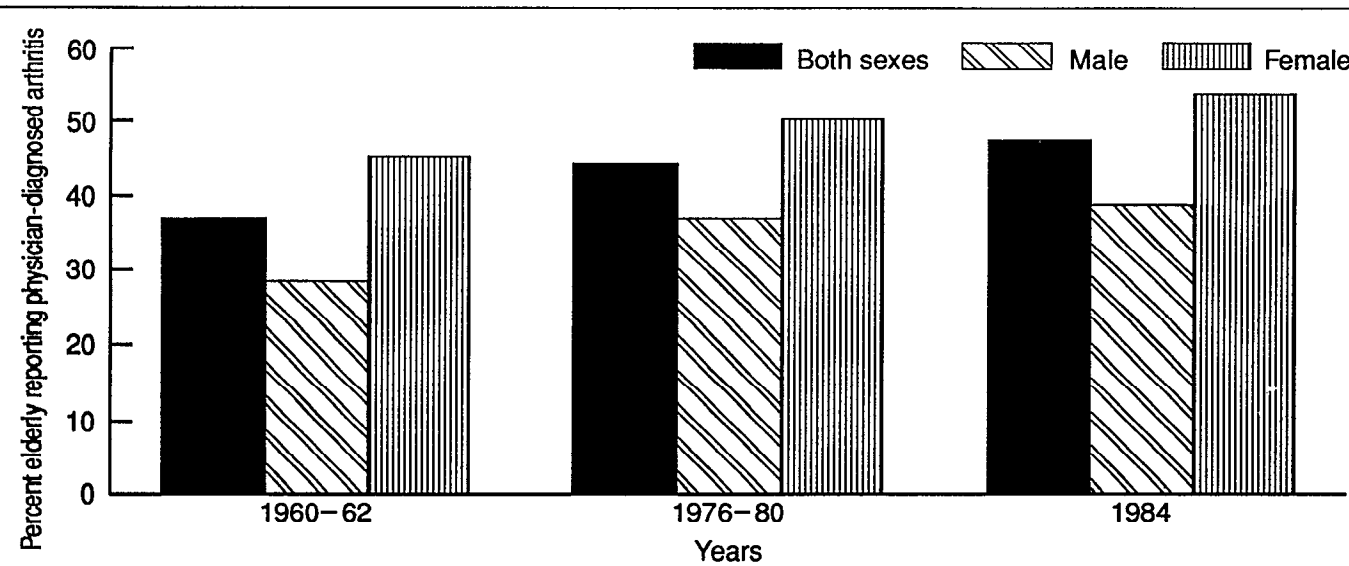
Figure 57. Percent of persons 65 years of age and over currently using selected vitamin or mineral supplements, by race: United States, 1986



NOTES: Data are based on household interviews of the civilian noninstitutionalized population. These rates exclude unknown respondent-assessed health status, unknown arthritis status, and proxy respondents. Heart disease includes rheumatic heart disease, coronary heart disease, angina, and myocardial infarction.

SOURCE: National Center for Health Statistics: Data from the 1984 National Health Interview Survey Supplement on Aging.

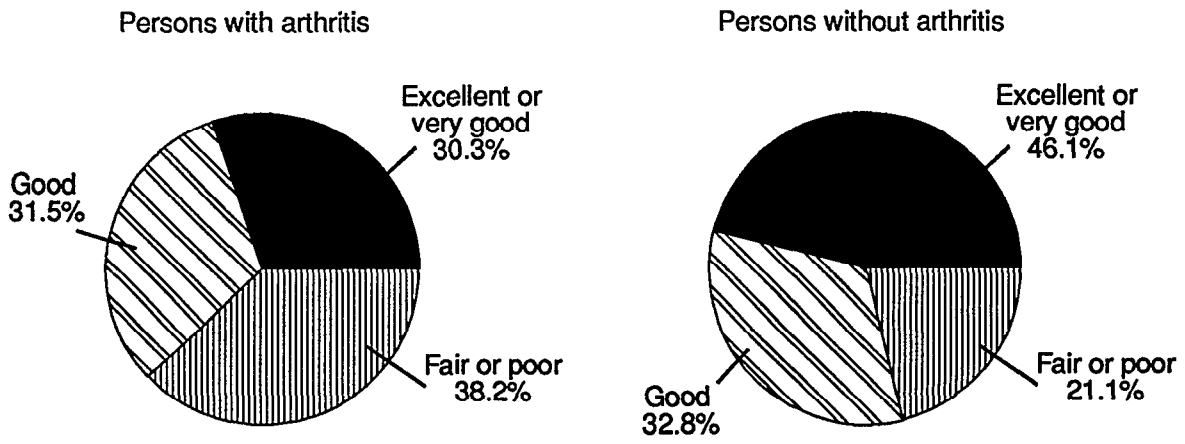
Figure 58. Rate of selected comorbid conditions for persons 65 years of age and over reporting arthritis, by race and sex: United States, 1984



NOTES: Data for 1960–84 are based on interviews of samples of the civilian noninstitutionalized population. Physician-diagnosed arthritis was determined by the specific question: "Doctor confirm or ever told respondent that he/she had arthritis?"

SOURCES: National Center for Health Statistics: 1960-62 data from the Health Examination Survey; 1976–80 data from the second National Health and Nutrition Examination Survey; 1984 data from the National Health Interview Survey Supplement on Aging.

Figure 59. Percent of persons 65 years of age and over reporting physician-diagnosed arthritis, by sex: United States, selected years

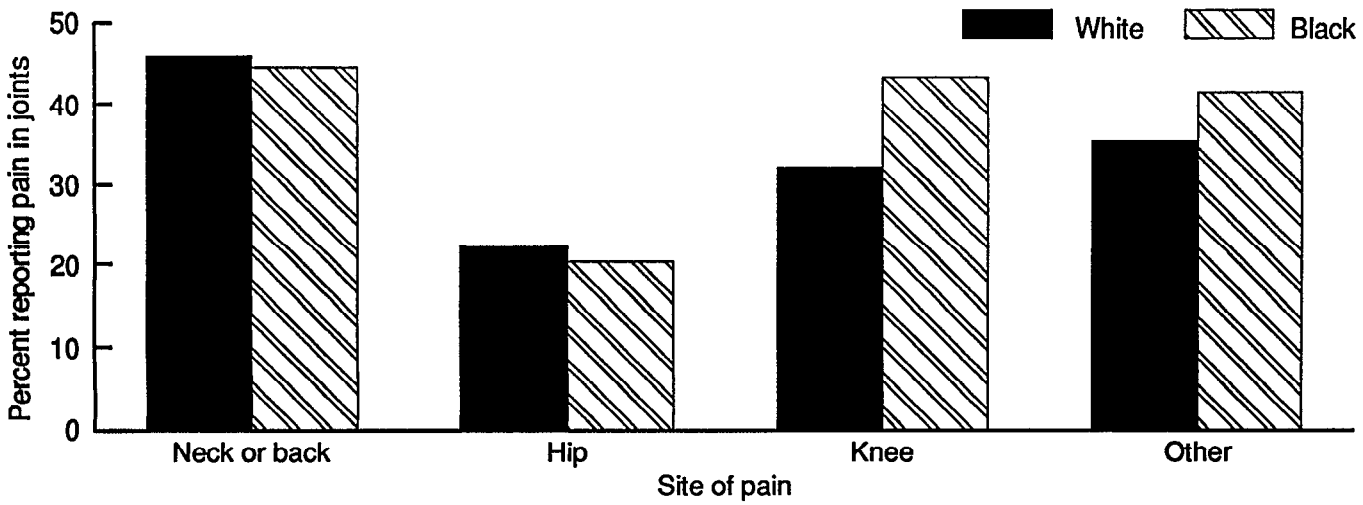


NOTES: Data are based on household interviews of the civilian noninstitutionalized population. Excludes unknown respondent-assessed health status, unknown arthritis status, and proxy respondents. Excludes races other than white and black.
SOURCE: National Center for Health Statistics: Data from the 1984 National Health Interview Survey Supplement on Aging.

Figure 60. Percent distribution of persons 65 years of age and over with and without arthritis, according to respondent-assessed health status: United States, 1984

NOTES: Data are based on household interviews of the civilian noninstitutionalized population. Excludes unknown respondent-assessed health status, unknown arthritis status, and proxy respondents. Percents may not add to 100 because of rounding. Excludes races other than white and black.
SOURCE: National Center for Health Statistics: Data from the 1984 National Health Interview Survey Supplement on Aging.

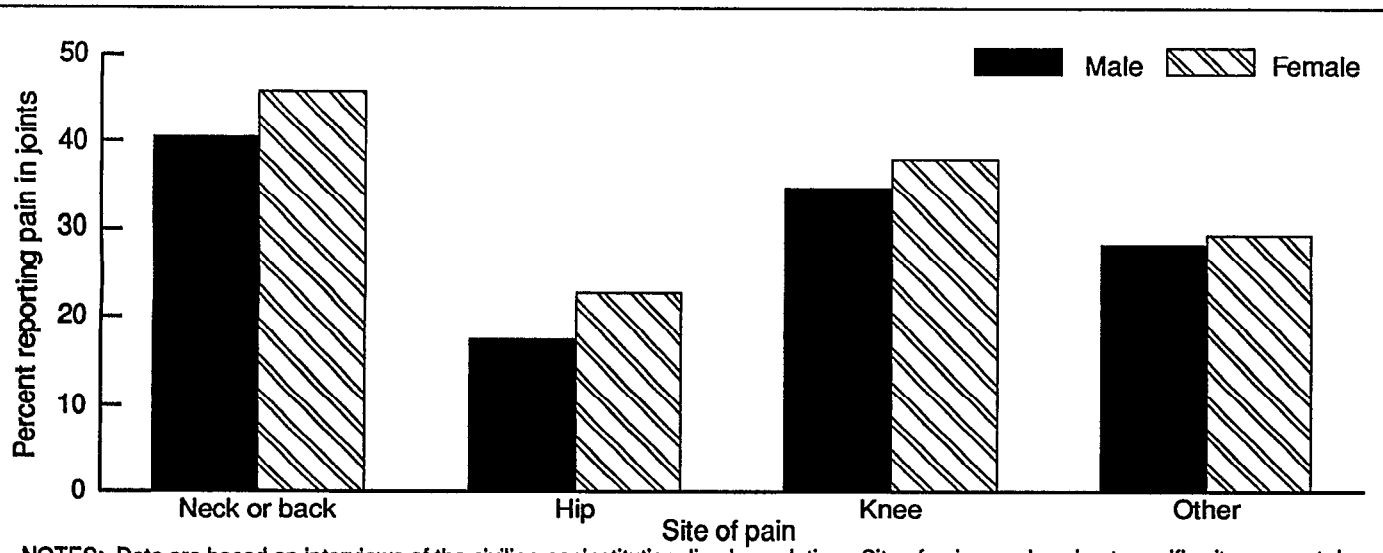
Figure 61. Percent distribution of persons 65 years of age and over reporting arthritis, according to respondent-assessed heath status and age: United States, 1984



NOTES: Data are based on interviews of the civilian noninstitutionalized population. Site of pain equals pain at specific site on most days for at least 1 month. "Other" includes fingers, wrist, elbow, shoulder, ankle, and foot. Percents may not add to 100 because of reports of multiple pain sites.

SOURCE: National Center for Health Statistics: Data from the 1971–75 National Health and Nutrition Examination Survey Arthritis Supplement.

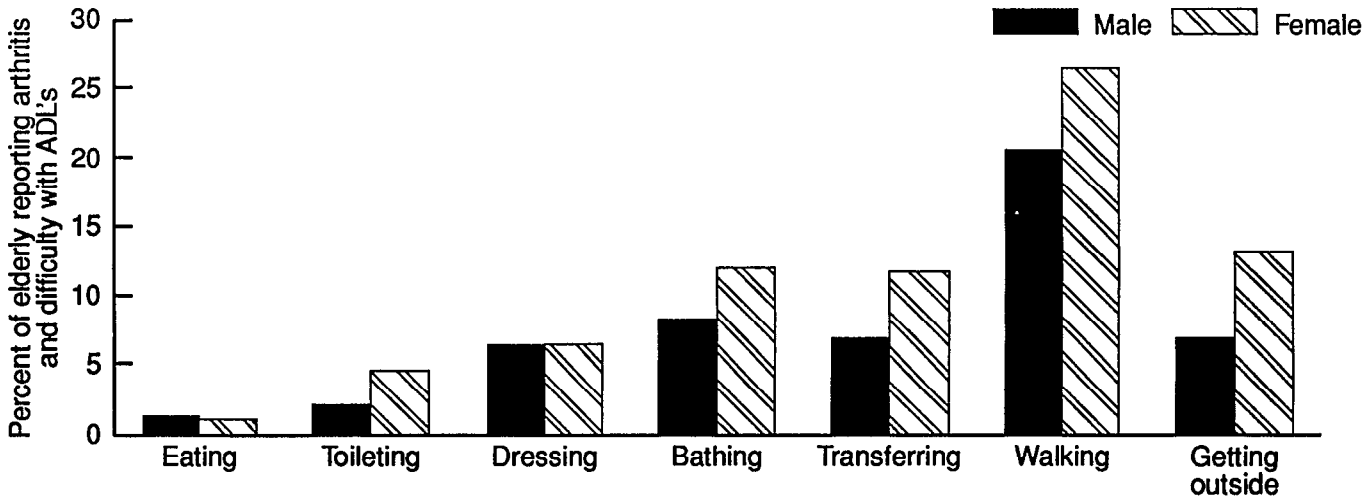
Figure 62. Percent of persons 55–74 years of age who reported any pain in joints, by site of pain and race: United States, 1971–75



NOTES: Data are based on interviews of the civilian noninstitutionalized population. Site of pain equals pain at specific site on most days for at least 1 month. "Other" includes fingers, wrist, elbow, shoulder, ankle, and foot. Percents may not add to 100 because of reports of multiple pain sites. Races other than white and black are excluded.

SOURCE: National Center for Health Statistics: Data from the 1971–75 National Health and Nutrition Examination Survey Arthritis Supplement.

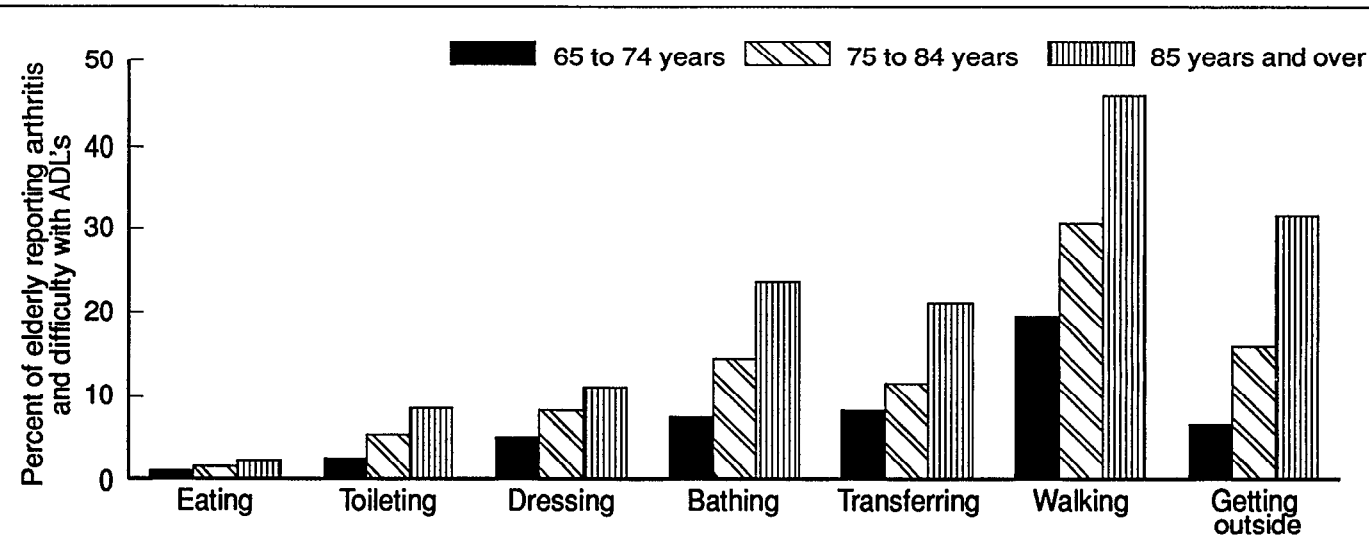
Figure 63. Percent of persons 65–74 years of age who reported any pain in joints, by site of pain and sex: United States, 1971–75



NOTES: Data are based on household interviews of the civilian noninstitutionalized population. ADL is activity of daily living. Excludes proxy respondents and those for whom information was missing on any of the ADL's. Transferring means getting in and out of a bed or chair. Excludes races other than white and black. Persons reported as not performing an ADL were classified with those reported as having difficulty with that ADL.

SOURCE: National Center for Health Statistics: Data from the 1984 National Health Interview Survey Supplement on Aging.

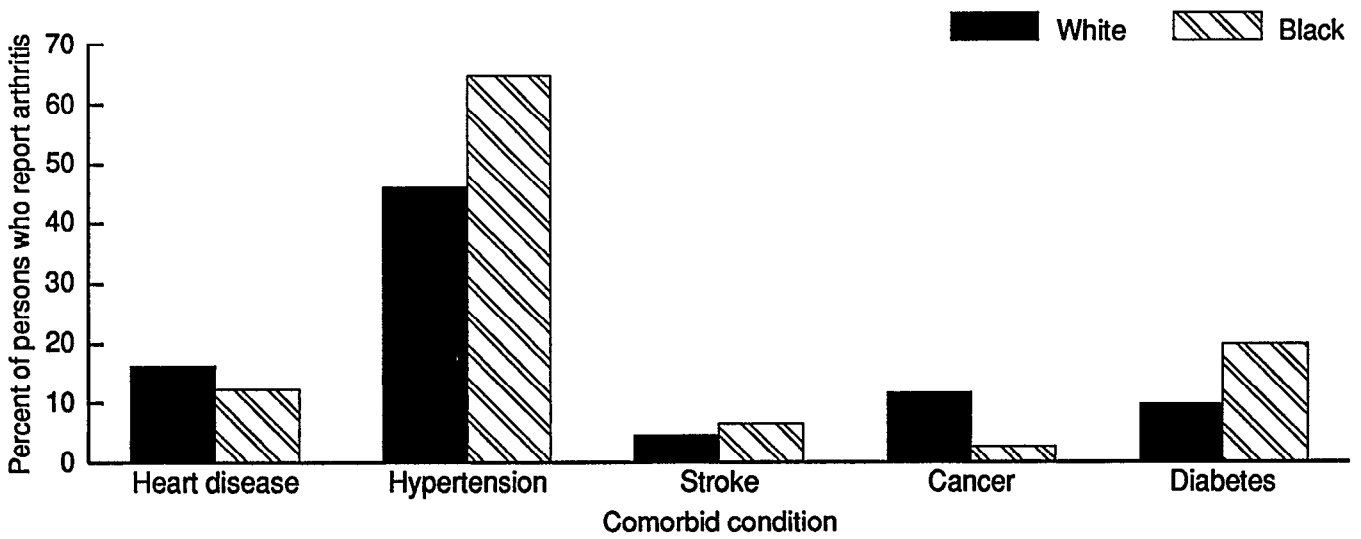
Figure 64. Percent of persons 65 years of age and over who report having arthritis and having difficulty with activities of daily living, by sex: United States, 1984



NOTES: Data are based on household interviews of the civilian noninstitutionalized population. ADL is activity of daily living. Excludes proxy respondents and those for whom information was missing on any of the ADL's. Transferring means getting in and out of a bed or chair. Excludes races other than white and black. Persons reported as not performing an ADL were classified with those reported as having difficulty with that ADL.

SOURCE: National Center for Health Statistics: Data from the 1984 National Health Interview Survey Supplement on Aging.

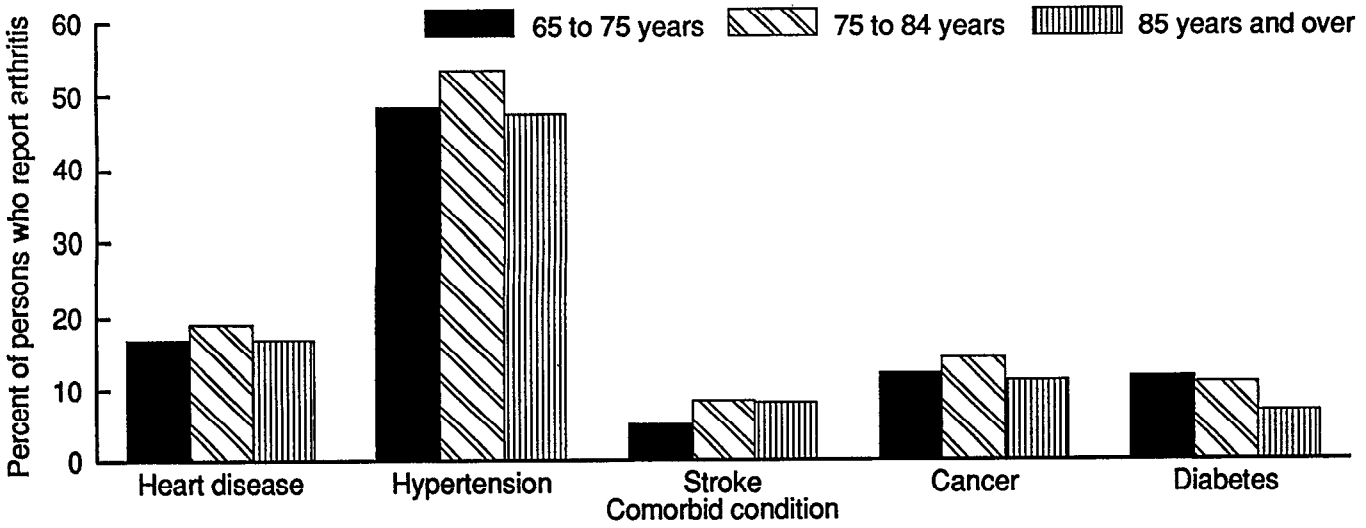
Figure 65. Percent of persons 65 years of age and over who report having arthritis and having difficulty with activities of daily living, by age: United States, 1984



NOTES: Data are based on household interviews of the civilian noninstitutionalized population. Excludes unknown respondent-assessed health status, unknown arthritis status, and proxy respondents. Heart disease includes rheumatic heart disease, coronary heart disease, angina, and myocardial infarction.

SOURCE: National Center for Health Statistics: Data from the 1984 National Health Interview Survey Supplement on Aging.

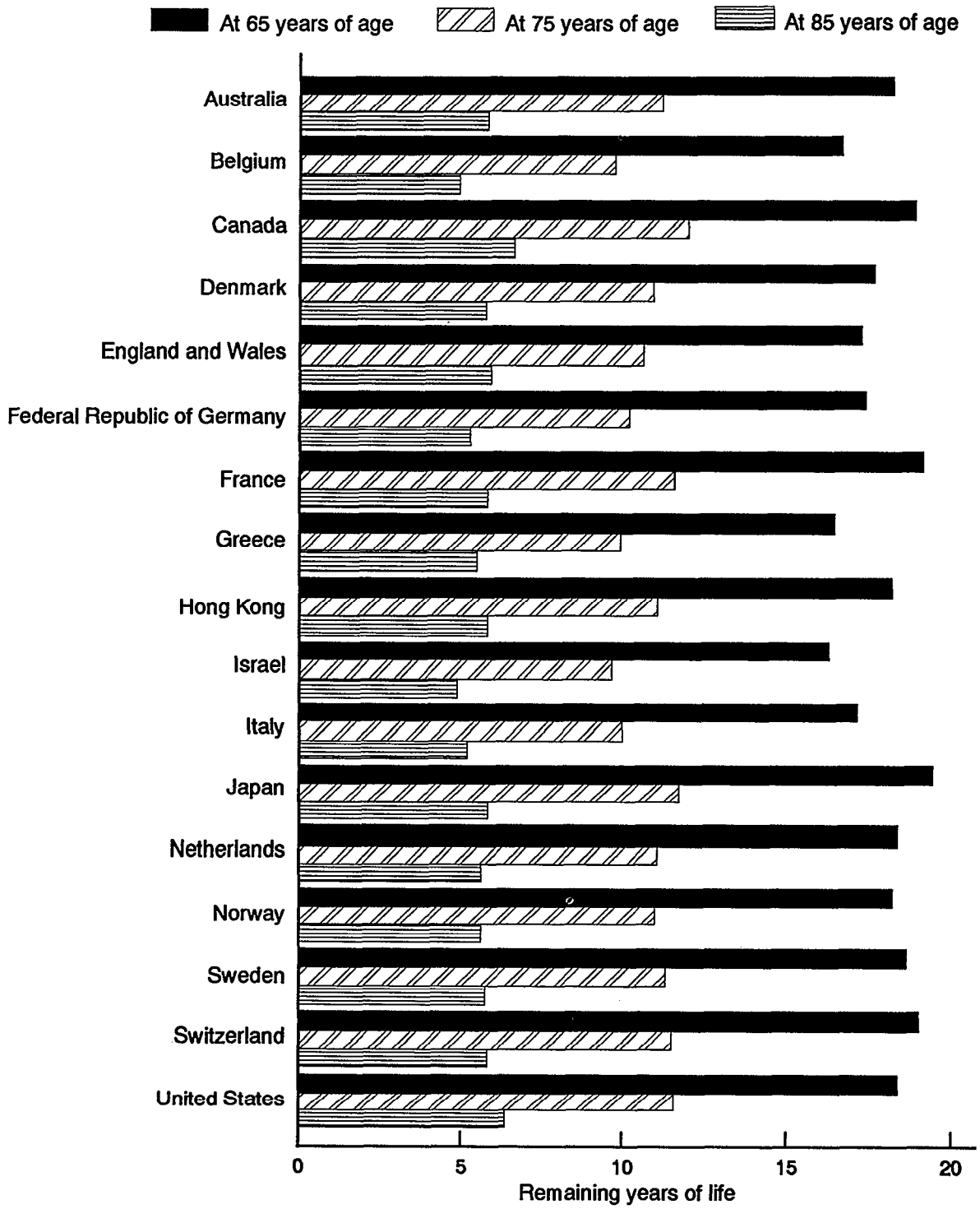
Figure 66. Percent of persons 55 years of age and over who report having arthritis and selected comorbid conditions, by race: United States, 1984



NOTES: Data are based on household interviews of the civilian noninstitutionalized population. Excludes unknown respondent-assessed health status, unknown arthritis status, and proxy respondents. Heart disease includes rheumatic heart disease, coronary heart disease, angina, and myocardial infarction. Excludes races other than white and black.

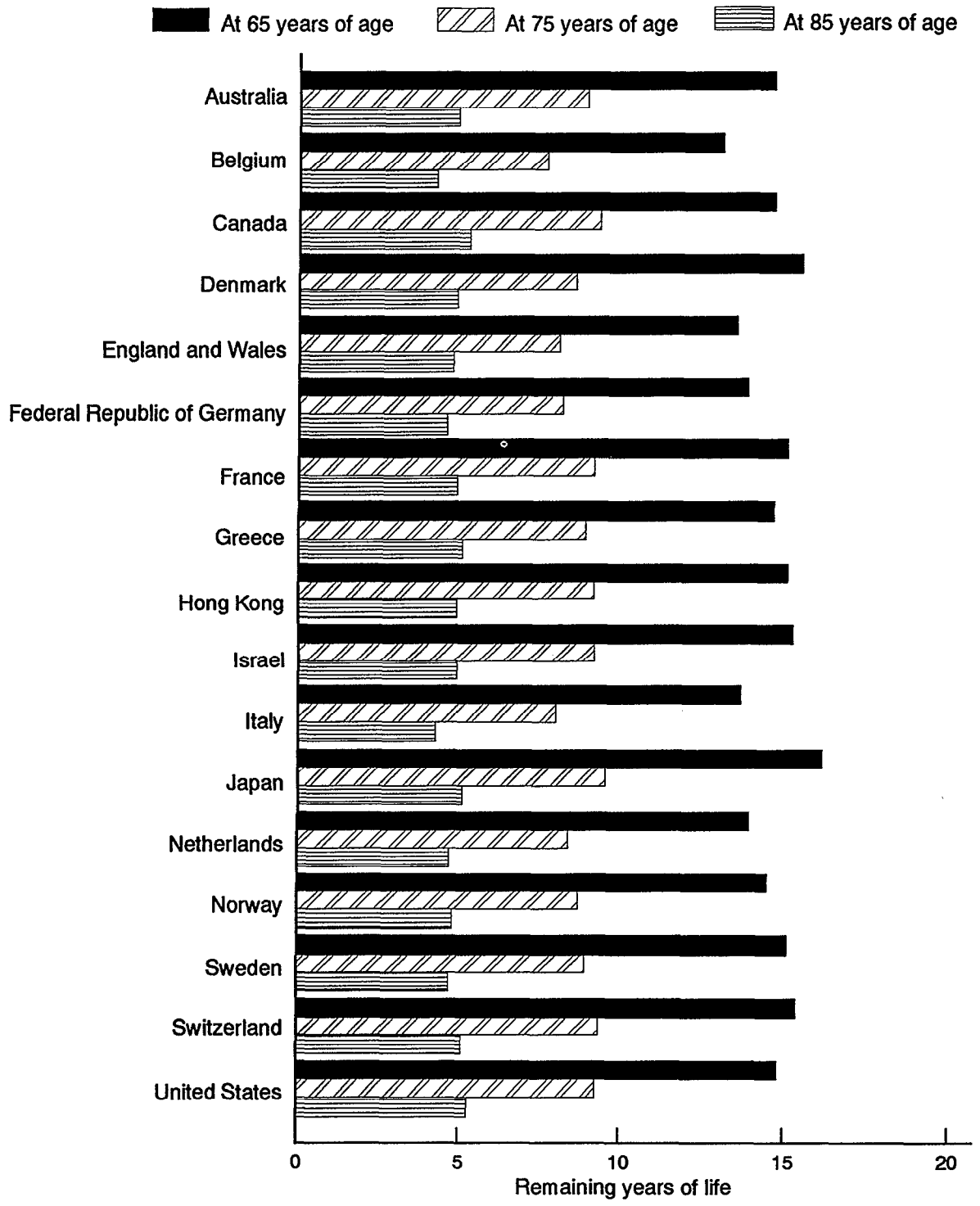
SOURCE: National Center for Health Statistics: Data from the 1984 National Health Interview Survey Supplement on Aging.

Figure 67. Percent of persons 65 years of age and over who report having arthritis and selected comorbid conditions, by age: United States, 1984



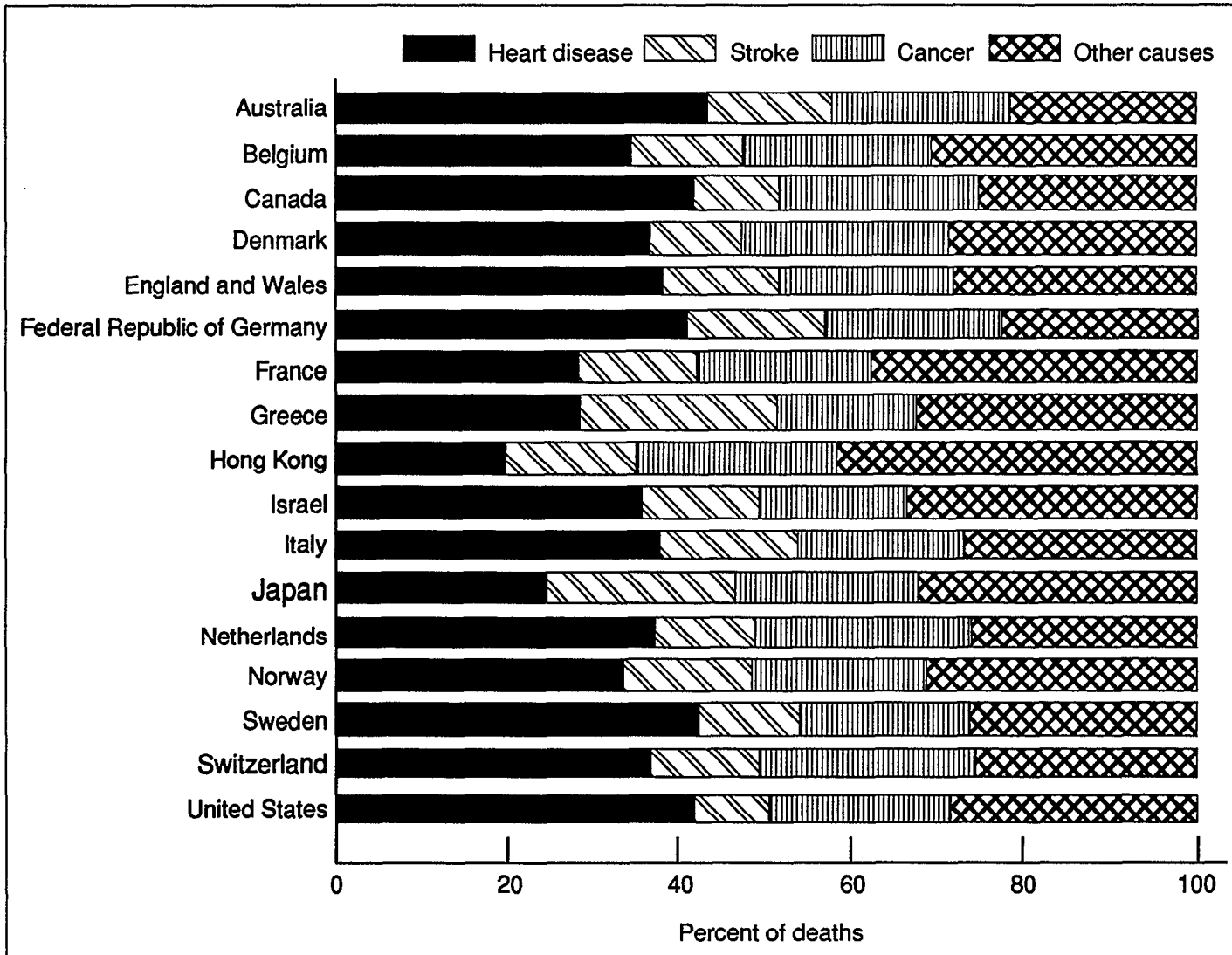
NOTE: Data closest to the 1986 reference period are presented.
SOURCES: United Nations: Demographic Yearbook, 1988, Pub. No. ST/ESA/STAT/SER.R/18. New York. 1990; U.S. data from National Center for Health Statistics: Vital statistics of the United States, vol II, mortality, part A. Washington: Public Health Service, 1988.

Figure 68. Average expected remaining years of life for females 65, 75, and 85 years of age: Selected countries, selected years



NOTE: Data closest to the 1986 reference period are presented.
SOURCES: United Nations: Demographic Yearbook, 1988, Pub. No. ST/ESA/STAT/SER.R/18. New York. 1990; U.S. data from National Center for Health Statistics: Vital statistics of the United States, vol II, mortality, part A. Washington: Public Health Service, 1988.

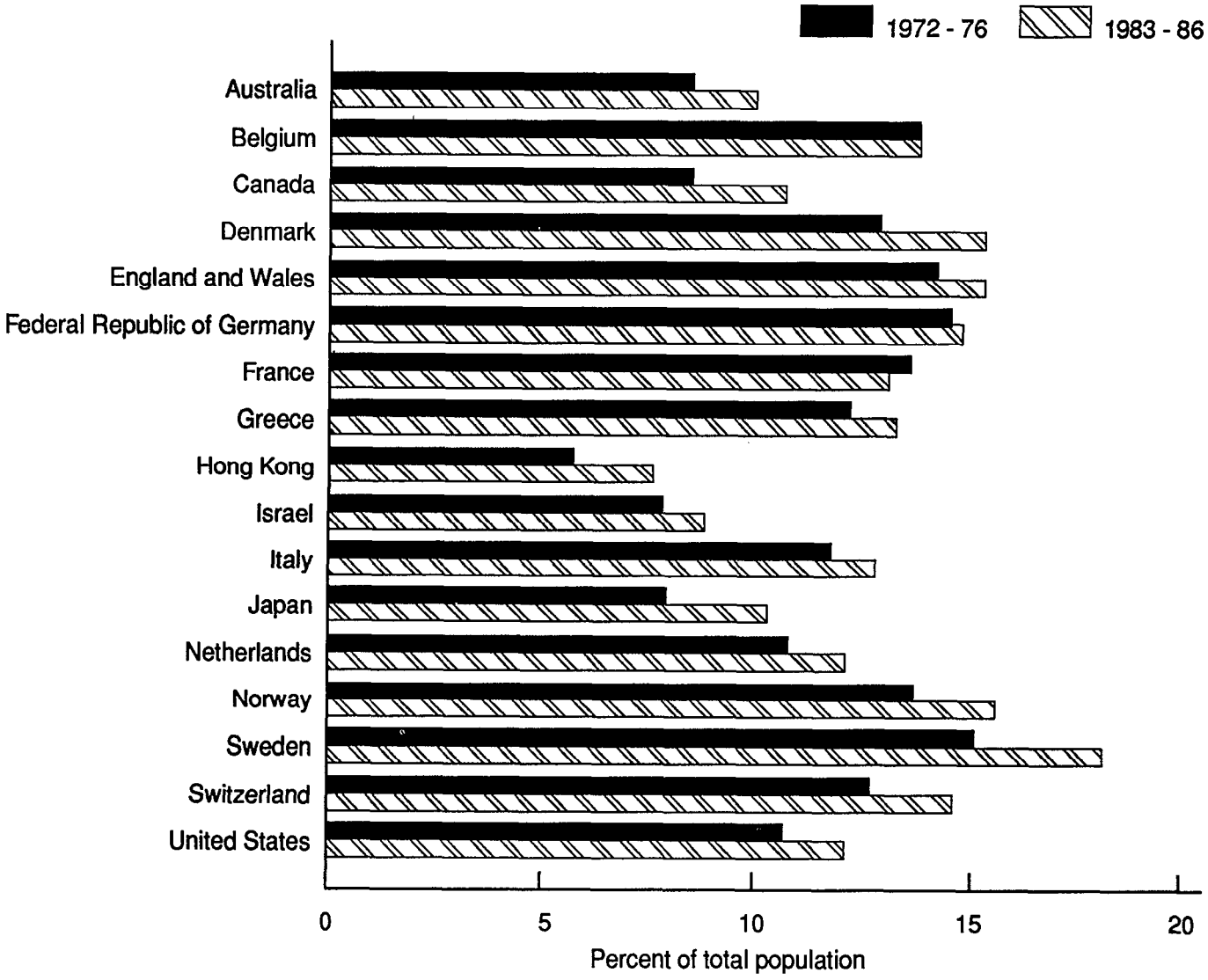
Figure 69. Average expected remaining years of life for males 65, 75, and 85 years of age: Selected countries, selected years



NOTE: Data closest to the 1984 reference period are presented.

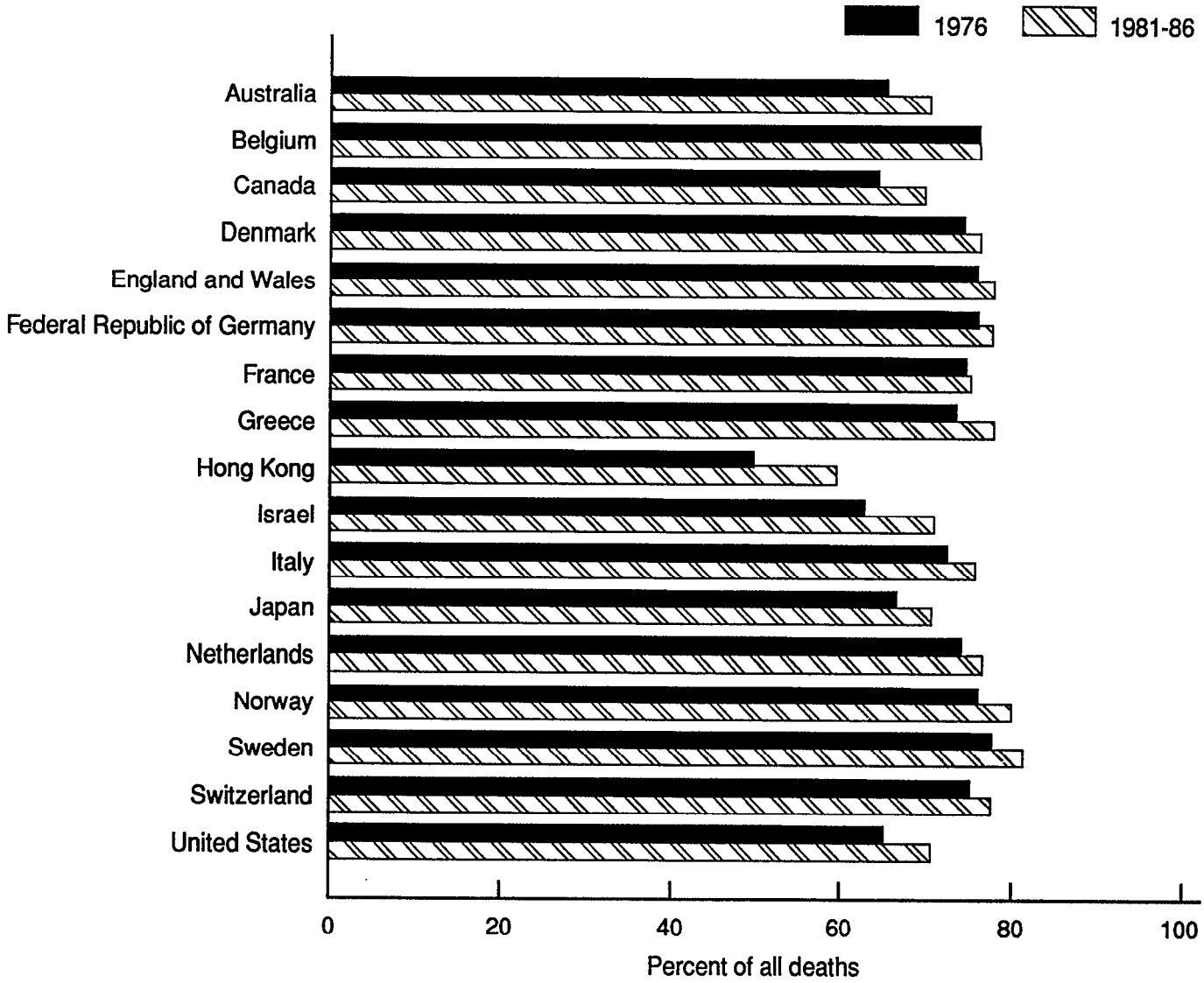
SOURCES: United Nations: Demographic Yearbook, 1985, Pub. No. ST/ESA/STAT/SER.R/15. New York. 1987; U.S. data from National Center for Health Statistics: Vital statistics of the United States, vol II, mortality, part A. Washington: Public Health Service, 1988.

Figure 70. Percent of deaths from heart disease, stroke, cancer, and all other causes for persons 65 years of age and over: Selected countries, selected years



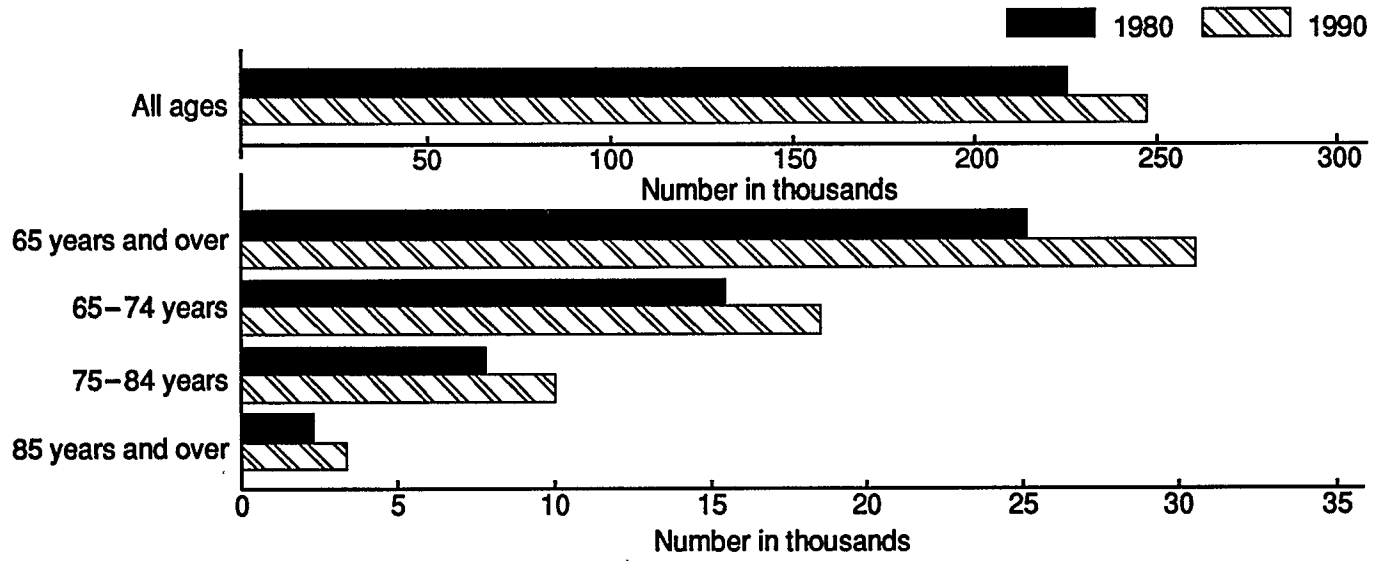
SOURCES: 1972-76 data: United Nations: Demographic Yearbook, 1976. Pub. No. ST/ESA/STAT/SER.R/4. New York. 1977. 1983-86 data: United Nations: Demographic Yearbook, 1986. Pub. No. ST/ESA/STAT/SER.R/16. New York, 1988.

Figure 71. Percent of total population that is 65 years of age and over: Selected countries, selected years



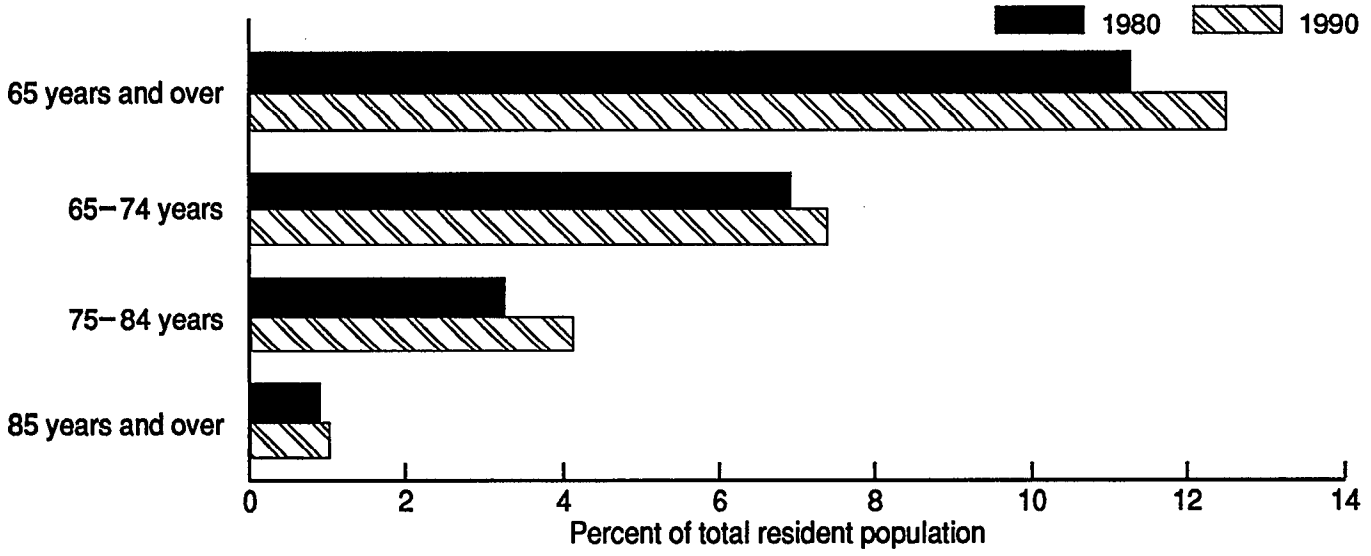
SOURCES: All data except United States 1981-86: United Nations: Demographic Yearbook, 1985. Pub. No. ST/ESA/STAT/SER.R/15. New York. 1987. United States 1981-86 data: National Center for Health Statistics: Vital statistics of the United States, vol II, mortality, part A.

Figure 72. Percent of deaths of persons 65 years of age and over as a percent of all deaths: Selected countries, selected years



NOTE: Data for 1990 are from the Census Bureau CPH-L-74 Modified Age-Race-Sex count files.
SOURCE: U.S. Bureau of the Census. Current population reports; series p-25, Washington: U.S. Department of Commerce and unpublished data.

Figure 73. Resident population 65 years of age and over, by age: United States, 1980-90



NOTE: Data for 1990 are from the Census Bureau CPH-L-74 Modified Age-Race-Sex count files.
SOURCE: U.S. Bureau of the Census. Current population reports; series p-25, Washington: U.S. Department of Commerce and unpublished data.

Figure 74. Percent distribution of resident population 65 years of age and over, according to age: United States, 1980–90

Appendix
Technical notes

Source and limitations of data

Introduction

This report presents data on various aspects of the health of older Americans. Much, but not all, of the data presented are from the ongoing data collection systems of the National Center for Health Statistics (NCHS). For an overview of these systems, see *Vital and Health Statistics*, Series 1, No. 23 (1).

Although a detailed description and comprehensive evaluation of each data source are beyond the scope of this appendix, users should be aware of the general strengths and weaknesses of the different data collection systems. For example, population-based surveys obtain socioeconomic data, data on family characteristics, and information on the impact of an illness, such as days lost from work or limitation of activity. Such surveys are limited by the amount of information a respondent remembers or is willing to report. Detailed medical information, such as precise diagnoses or the types of operations performed, may not be known and so will not be reported. Conversely, health care providers, such as physicians and hospitals, usually have good diagnostic information but little or no information about the socioeconomic characteristics of individuals or the impact of illnesses on individuals.

The population covered by different data collection systems may not be the same, and understanding the differences is critical to interpreting the data. Data on vital statistics and national expenditures cover the entire elderly population. Most data on morbidity and utilization of health resources cover only the noninstitutionalized population, for example, only those elderly living in the community.

The descriptive summaries of each data source are presented below, in alphabetical order by name of the data collection system. Summaries provide a general overview of study design, methods of data collection, and reliability and validity of the data. More complete and detailed discussions are found in the publications referenced at the end of each summary. In many cases, the publication is from the same time period as the data presented in this report.

Longitudinal Study of Aging

The Longitudinal Study of Aging (LSOA) is a collaborative endeavor conducted by NCHS and the National Institute on Aging (NIA). The LSOA is designed to measure changes in functional ability and in living arrangements (including movement into and out of nursing homes) of a cohort of older people living in the community in 1984. The LSOA provides baseline data for 1984 and followup information for the years 1986, 1988, and 1990 on 7,527 people who were aged 70 years or over when they participated in the Supplement on Aging (SOA) to the 1984 National Health Interview Survey (NHIS). The SOA is a survey that provides finer statistical measures of functional limitations and the presence of chronic health conditions among older persons. A more detailed description of the SOA is given in the section on the NHIS.

To obtain measures of change, elderly or their proxies were reinterviewed three times since 1984, and their records were matched—with their permission—to the National Death Index, the computerized records of deaths in the United States maintained by NCHS; the multiple cause-of-death file, maintained by NCHS; and the Medicare Automated Data Retrieval System (MADRS), maintained by the Health Care Financing Administration (HCFA).

The LSOA contains information on demographic and health characteristics, including disability measured by activities of daily living and instrumental activities of daily living; changes in those characteristics and reasons for change; and doctor, hospital, and nursing home use. The LSOA also contains information concerning hospitalization: length of stay, diagnoses, surgical procedures, and cost of hospitalization.

A description of the survey design, the methods used in estimation, and general qualifications of the data obtained from the survey are presented in *Vital and Health Statistics*, Series 1, No. 28 (2).

Medicare Statistical System

The Medicare Statistical System (MSS) of HCFA, Office of the Actuary, provides data for examining the program's effectiveness and for tracking the eligibility of enrollees and the benefits they use, the certification status of institutional providers, and the payments made for covered services. Records are maintained on about 33 million enrollees and 24,000 participating institutional providers; about 420 million bills for services are processed annually.

The MSS contains four major computer files: the health insurance master file, the service provider file, the Hospital Insurance (HI) claims file, and the Supplementary Medical Insurance (SMI) payment records file.

The health insurance master file contains records for each aged and disabled enrollee and includes data on type of entitlement, deductible status, benefit period status, and benefits used, as well as demographic information such as age, sex, race, and residence.

The service provider file contains information on hospitals, home health agencies, skilled nursing facilities, independent clinical laboratories, and suppliers of portable x ray or outpatient physical therapy services that participate in Medicare. For hospitals, data on number of beds, type of ownership, and other characteristics are included.

The HI claims file contains information on the beneficiaries' entitlement and their use of benefits during the benefit period for hospital, skilled nursing facility, and home health agency services.

The SMI payment record file provides information on whether the enrollee has met the deductible and on amounts paid for physicians' services and other SMI-covered services and supplies.

Data from the MSS provide information about enrollee use of benefits for a point in time or over an extended period. Statistical reports are produced on enrollment, characteristics of participating providers, payments, and services used. For further information on the MSS, see Health Care Financing Administration, Medicare Statistical File Manual (3).

National Ambulatory Medical Care Survey

The National Ambulatory Medical Care Survey (NAMCS) is a continuing national probability sample of ambulatory medical encounters conducted by NCHS. The scope of the survey covers physician-patient encounters in the offices of nonfederally employed physicians classified by the American Medical Association or American Osteopathic Association as "office-based patient care" physicians. Excluded are visits to hospital-based physicians; visits to specialists in anesthesiology, pathology, and radiology; and visits to physicians who are principally

engaged in teaching, research, or administration. Telephone contacts and nonoffice visits are also excluded.

A multistage probability design is employed. The first-stage sample consists of 84 primary sampling units (PSU's) in 1985 that were selected from about 1,900 such units, into which the United States has been divided. In each sample PSU, a sample of practicing non-Federal office-based physicians is selected from master files maintained by the American Medical Association and the American Osteopathic Association. The final stage involves systematic random samples of office visits during randomly assigned 7-day reporting periods. In 1985, the survey excluded Alaska and Hawaii.

For the 1985 survey, a sample of 5,032 physicians was selected. The physician response rate for 1985 was 70 percent, providing data on 71,594 patient records.

The estimation procedure used in NAMCS basically has three components: inflation by the reciprocal of the probability of selection, adjustment for nonresponse, and ratio adjustment to fixed totals.

For more detailed information on the design of NAMCS and the magnitude of sampling errors associated with NAMCS estimates, see *Advance Data From Vital and Health Statistics*, No. 128 (4).

National Health Interview Survey

The National Health Interview Survey (NHIS) is a continuing nationwide sample survey in which data are collected through personal household interviews conducted by NCHS. Information is obtained on personal and demographic characteristics, illnesses, injuries, impairments, chronic conditions, utilization of health resources, and other health topics. The household questionnaire is reviewed each year, with special health topics being added or deleted. For most health topics, data are collected over an entire calendar year.

The 1984 SOA to the NHIS is a survey specifically directed toward civilian noninstitutionalized persons 55 years of age and over. One of the objectives of the SOA was to provide finer statistical measures of functional limitations and the presence of chronic health conditions among older persons. Another objective of the SOA was to provide information about older people that could be used as baseline data for the LSOA. The SOA sample consisted of a systematic one-half sample of people in the 1984 NHIS households who were 55–64 years of age and all people in the 1984 NHIS households who were 65 years of age and over. For more detailed information in the design of the SOA, see *Vital and Health Statistics*, Series 1, No. 21 (5).

The sample design plan of the NHIS follows a multistage probability design that permits a continuous sampling of the civilian noninstitutionalized population residing in the United States. The survey is designed in such a way that the sample scheduled for each week is representative of the target population, and the weekly samples are additive over time. The response rate for the survey has been 95–98 percent over the years.

In 1985, the NHIS adopted several new sample design features although, conceptually, the sampling plan remained the same as the previous design. Two major changes included reducing the number of primary sampling locations from 376 to 198 for sampling efficiency and oversampling the black population to improve the precision of the statistics.

The sample was designed so that a typical NHIS sample for the data collection years 1985–94 will consist of approximately 7,500 segments containing about 59,000 assigned households. Of these households, an expected 10,000 will be vacant, demolished, or occupied by persons not in the target population of the survey. The expected sample of 49,000 occupied households will yield a probability sample of about 127,000 persons.

A description of the survey design, the methods used in estimation, and general qualifications of the data obtained from the survey are presented in *Vital and Health Statistics*, Series 10, No. 164 (6).

National Health and Nutrition Examination Survey

The National Health and Nutrition Examination Survey is conducted by NCHS. For the first program or cycle of the National Health Examination Survey (NHES I), 1960–62, data were collected on the total prevalence of certain chronic diseases as well as the distributions of various physical and physiological measures, including blood pressure and serum cholesterol levels. For that program, a highly stratified, multistage probability sample of 7,710 adults, of whom 86.5 percent were examined, was selected to represent the 111 million civilian noninstitutionalized adults 18–79 years of age in the United States at that time. The sample areas consisted of 42 primary sampling units from the 1,900 geographic units. In 1971, a nutrition surveillance component was added, and the survey name was changed to the National Health and Nutrition Examination Survey. For more information on NHES I, see *Vital and Health Statistics*, Series 11, No. 1 (7).

In the first National Health and Nutrition Examination Survey (NHANES I), conducted from 1971 through 1974, a major purpose was to measure and monitor indicators of the nutritional status of the American people through dietary intake data, biochemical tests, physical measurements, and clinical assessments for evidence of nutritional deficiency. Detailed examinations were given by dentists, ophthalmologists, and dermatologists, with an assessment of need for treatment. In addition, data were obtained for a subsample of adults on overall health care needs and behavior, and more detailed examination data were collected on cardiovascular, respiratory, arthritic, and hearing conditions.

The NHANES I target population was the civilian noninstitutionalized population 1–74 years of age residing in the coterminous United States, except for people residing on any of the reservation lands set aside for the use of Native Americans. The sample design was a multistage, stratified probability sample of clusters of persons in land-based segments. The sample areas consisted of 65 PSU's selected from the 1,900 PSU's in the coterminous United States. A subsample of persons 25–74 years of age was selected to receive the more detailed health examination. Groups at high risk of malnutrition were oversampled at known rates throughout the process.

Household interviews were completed for more than 96 percent of the 28,043 persons selected for the NHANES I sample, and about 75 percent (20,749) were examined.

For NHANES II, conducted from 1976 through 1980, the nutrition component was expanded from the one fielded for NHANES I. In the medical area, primary emphasis was placed on diabetes, kidney and liver functions, allergy, and speech pathology.

The NHANES II target population was the civilian noninstitutionalized population 6 months–74 years of age residing in the United States, including Alaska and Hawaii. NHANES II utilized a multistage probability design that involved selection of PSU's, segments (clusters of households) within PSU's, households, eligible persons, and, finally, sample persons. The sample design provided for oversampling among those persons 6 months–5 years of age, those 60–74 years of age, and those living in poverty areas.

A sample of 27,801 persons was selected for NHANES II. Of this sample, 20,322 (73.1 percent) were examined.

The estimation procedure used to produce national statistics for NHANES I and NHANES II involved inflation by the reciprocal of the

probability of selection, adjustment for nonresponse, and poststratified ratio adjustment to population totals. Sampling errors also were estimated to measure the reliability of the statistics.

For more information on NHANES I, see *Vital and Health Statistics*, Series 1, Nos. 10a (8), 10b (9), and 14 (10). For more information on NHANES II, see *Vital and Health Statistics*, Series 1, No. 15 (11). For information on nutritional applications of these surveys, see *Annual Review of Nutrition* (12).

National Hospital Discharge Survey

The National Hospital Discharge Survey (NHDS) is a continuing nationwide sample survey of short-stay hospitals in the United States conducted by NCHS. Before 1988, the scope of NHDS encompassed patients discharged from noninstitutional hospitals, exclusive of military and Veterans' Administration hospitals, located in the 50 States and the District of Columbia. Only hospitals having six or more beds for patient use and those in which the average length of stay for all patients is less than 30 days are included in the survey.

The original sample was selected in 1964 from a frame of short-stay hospitals listed in the National Master Facility Inventory. A two-stage stratified sample design was used, and hospitals were stratified according to bed size and geographic region. Sample hospitals were selected with probabilities ranging from certainty for the largest hospitals to 1 in 40 for the smallest hospitals. Within each sample hospital, a systematic random sample of discharges was selected from the daily listing sheet. Initially, the within-hospital sampling rates for selecting discharges varied inversely with the probability of hospital selection, so that the overall probability of selecting a discharge was approximately the same across the sample. Those rates were adjusted for individual hospitals in subsequent years to control the reporting burden of those hospitals.

In 1985, for the first time, two data collection procedures were used for the survey. The first was the traditional manual system of sample selection and data abstraction. In the manual system, sample selection and transcription of information from the hospital records to abstract forms were performed by either the hospital staff or representatives of NCHS or both. The second was an automated method, used in approximately 17 percent of the sample hospitals in 1985, involving the purchase of data tapes from commercial abstracting services. Upon receipt of these tapes, they were subject to NCHS sampling, editing, and weighting procedures.

The basic unit of estimation for NHDS is the sample patient abstract. The estimation procedure involves inflation by the reciprocal of the probability of selection, adjustment for nonresponding hospitals and missing abstracts, and ratio adjustments to fixed totals.

For more detailed information on the design of NHDS and the magnitude of sampling errors associated with NHDS estimates, see *Vital and Health Statistics*, Series 13, No. 99 (13).

National Long-Term Care Survey

The 1982 and 1984 National Long-Term Care Surveys (NLTCS) investigated the demographic characteristics, health and functioning, and patterns of assistance of a national sample of noninstitutionalized persons 65 years of age and over. A similar questionnaire for community-dwelling residents was used in both surveys. The 1982 survey was funded by the U.S. Department of Health and Human Services, Office of the Assistant Secretary for Planning and Evaluation (ASPE), and HCFA. The 1984 survey was funded by HCFA and NIA. Recently the data from the 1989 survey, funded by NIA and ASPE, were released.

In 1982, a random sample of approximately 36,000 persons drawn from the Master Medicare Beneficiary Files was screened to identify persons with functional limitations, defined as in-

ability to perform at least one activity of personal care or management of daily affairs for 3 months or more. More than 6,400 persons were identified and 96 percent were interviewed. These interviews and completed followup interviews of those remaining in the community in 1984 are the sources of data for the longitudinal analyses in this report.

National Nursing Home Survey

The 1985 National Nursing Home Survey (NNHS), as conducted by NCHS, covers data about the characteristics of the facilities and their staff, residents, and discharges. The scope of the 1985 NNHS included all types of nursing homes. The sample of 1,220 homes was selected from a sampling frame of 20,479 nursing and related care homes. The frame consisted of all homes in the 1982 National Master Facility Inventory (NMFI); homes identified in the 1982 Complement Survey of the NMFI as "missing" from the 1982 NMFI; facilities that opened for business between 1982 and June 1984; and hospital-based nursing homes obtained from HCFA. Information on each facility was collected through a personal interview with its administrator. Accountants were asked to either complete a questionnaire on expenditures or provide a financial statement. Resident data were provided by a nurse familiar with the care provided to the resident. The nurse relied on the medical record and personal knowledge of the resident. In addition to employee data that were collected during the interview with the administrator, a sample of registered nurses completed a self-administered questionnaire. Discharge data were based on information recorded in the medical record. Data were obtained from 1,079 facilities, 2,763 registered nurses, 5,243 current residents, and 6,023 discharges. Response rates were 93 percent for facilities, 68 percent for expenses, 80 percent for registered nurses, 97 percent for residents, and 95 percent for discharges. Additional data about the current and discharged residents were obtained in telephone interviews with next of kin. The NIA provided support for this component of the NNHS. The response rate was 90 percent for next of kin.

Statistics were derived by a ratio-estimation procedure. Statistics were adjusted for failure of a home to respond, failure to fill out one of the questionnaires, and failure to complete an item on a questionnaire. For more information on the 1985 NNHS, see *Vital and Health Statistics*, Series 13, No. 97 (14).

Mortality statistics: National Vital Statistics System

Through the National Vital Statistics System, NCHS collects and publishes data on births, deaths, marriages, and divorces in the United States. The Division of Vital Statistics obtains information on deaths from the registration offices of all States, New York City, the District of Columbia, Puerto Rico, the U.S. Virgin Islands, and Guam. Geographic coverage for deaths has been complete since 1933.

Until 1972, microfilm copies of all death certificates were received from all registration areas and processed by NCHS. Beginning in 1972, some States began sending their data to NCHS through the Cooperative Health Statistics System (CHSS). States that participated in the CHSS program processed 100 percent of their death records and sent the entire data file to NCHS on computer tapes. Currently, the data are sent to NCHS through the Vital Statistics Cooperative Program (VSCP), following the same procedures as the CHSS. The number of participating States grew from 6 in 1972 to 46 in 1984. All 50 States and the District of Columbia participated in the VSCP starting in 1985.

The standard certificates of birth, death, and fetal death recommended by NCHS are modified in each registration area to serve the area's needs. However, most certificates conform closely in content and arrangement to the standard

certificate, and all certificates contain a minimum data set specified by NCHS.

Provisional death rates by cause, age, race, and sex are estimated from the Current Mortality Sample. The Current Mortality Sample is a 10-percent systematic sample of death certificates received each month in the vital statistics offices in the 50 States, the District of Columbia, and the independent registration area of New York City. All death certificates received during the 1-month period are sampled regardless of the month or year in which the death occurred. For more information, see *Vital Statistics of the United States*, 1987, Vol. II, Part A (15) and Vol. II, Part B (16).

Population estimates for death rates

The U.S. Bureau of the Census publishes annual population estimates needed as denominators to calculate national death rates for the white and black populations.

Statistical considerations

Reliability of the survey estimates

Because many of the estimates in this report are based on a sample survey, they may differ somewhat from the figures that would have been obtained if a complete census had been taken using the same survey and processing procedures. There are two types of error possible in an estimate based on a sample survey: sampling and nonsampling errors. To the extent possible, these types of errors are kept to a minimum by methods built into the survey procedures.

Rounding of numbers

In published tables, the figures are rounded to the nearest thousand. Derived statistics, such as rates and percent distributions, are computed before the estimates on which these are based have been rounded to the nearest thousand.

Estimation of standard errors

The standard error is primarily a measure of sampling error, that is, the variations that might occur by chance because only a sample of the population is surveyed. The chances are about 68 in 100 that an estimate from the sample would differ from a complete census by less than the standard error. The chances are about 95 in 100 that the difference would be less than twice the standard error and about 99 in 100 that it would be less than 2.5 times as large.

Standard errors for the computed statistics on data from the NHIS, the SOA to the NHIS, the LSOA, and the NLTCS were estimated by use of two of the procedures from the statistical software developed by the Research Triangle Institute (17). These procedures, which can only be accessed through the Statistical Analysis System (SAS), were SESUDAAN and RTIFREQS (17). SESUDAAN was used for estimating the standard errors of means or proportions, and RTIFREQS was used to produce the estimates of standard errors for sample counts (17). These procedures use linearization methods, first-order Taylor series approximation, to obtain estimates of variances (17,18).

Standard errors for the computed statistics on data from the NAMCS, the NNHS, and the NHDS were derived from the figures of approximate relative standard errors in the particular survey's documentation. These standard errors are provided for a wide variety of estimates rather than for a particular statistic.

The data presented on mortality are the actual population figures, not estimates.

Relative standard errors

As in other NCHS documents, a particular estimate is considered statistically unreliable and is so indicated by an asterisk to the left of the estimate if the relative standard error (RSE) is

greater than 30 percent. The RSE of an estimate is obtained by dividing the standard error (SE) of the estimate by the estimate itself (19). The RSE is expressed as a percent of the estimate:

$$RSE = 100 \frac{SE(x)}{x}$$

Tests of significance

In this report, terms relating to differences, such as "higher" and "less," indicate that the differences are statistically significant (at 0.05 level of significance). Terms such as "similar" or "no difference" mean that no statistically significant difference exists between the estimates being compared. A lack of comment on the difference between any two estimates does not mean that the difference was tested and found not to be significant.

Statistical statement form

The validity of all statistical statements made in this document was evaluated according to protocols developed at NCHS (20). Statistical statements encountered herein are either descriptive or comparative (21). A descriptive statement is one in which only estimates of parameters are presented, and a comparative statement examines the relationship between parameters (21). Many of the statistical comparisons made in this document are single-comparison statements that do not specify the magnitude of the difference between the two parameters, for example, males 65 years of age and over have a higher death rate from ischemic heart disease than females 65 years of age and over (21). The statistical tests performed were two-tailed tests unless the analysts had an a priori one-tailed hypothesis. All statistical comparisons were tested at the 5-percent level of significance.

The format of the two-tailed statistical test is as follows:

$$Z = \left| \frac{X_m - X_f}{\sqrt{S^2_{x_m} + S^2_{x_f}}} \right| > 1.96$$

where X_m = death rate from ischemic heart disease for males

X_f = death rate from ischemic heart disease for females

$S^2_{x_m}$ = standard error of X_m

$S^2_{x_f}$ = standard error of X_f

If a one-tailed test was applicable, then the critical value used was 1.645.

Other statistical comparisons were multiple-comparison statements that do not specify the magnitudes of the differences between the pairs of parameters, for example, the days-of-care rate is higher for widowed persons than for married persons (21). The format of the statistical test is the same as above, however, the critical value, which depends on the number of possible pairwise comparisons, differs from the 1.96. Using the above example, there are five subdomains of marital status (married, single, widowed, divorced, or separated), two of which are being compared. Although the statement makes only one comparison, there are 10 possible pairwise comparisons for the marital status subdomains, and the appropriate critical value for a two-sided test would be 2.81 (21). Tables with the appropriate critical value for a particular combination of comparisons are available in other NCHS documents (21).

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Approximately 170 statistical tables containing data on older Americans are now available on diskettes. The tables are from a new report, "Health Data on Older Americans: United States, 1992," published by the National Center for Health Statistics.

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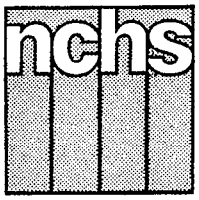

From the CENTERS FOR DISEASE CONTROL AND PREVENTION/National Center for Health Statistics

Health Data on Older Americans: United States, 1992

Series 3, No. 27
(PHS) 93-1411

Author: Van Nostrand, Joan

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The "graying" of America is a phenomenon of the 20th century that is without precedence. Americans are living longer lives. As age increases, perceptions of health decrease. These two conclusions about older Americans are among many of those discussed in a new report from the National Center for Health Statistics (NCHS). According to the report, life expectancy reached a high of 75.7 years (provisional data for 1991), a remarkable upturn from the 47.3 years of life expectancy noted at the turn of the century. Researchers are pondering whether these added years of life are ones of vigor or ones of dysfunction and disability. The relationship of these added years of life to health status is the topic of the new report, "Health Data on Older Americans: United States, 1992."

Support for preparation of the report was provided by the Federal Interagency Forum on Aging-Related Statistics, sponsored by the National Institute on Aging of the National Institutes of Health. The report is a cooperative activity between NCHS and the School of Public Health of the University of Illinois at Chicago through the Association of Schools of Public Health.

The report, "Health Data on Older Americans: United States, 1992," is a collage of data on the health of the elderly population residing in the United States. A combination of text and tables provides discussions on several specific topics. These include measures of health, functioning in activities and instrumental activities of daily living, mortality, living arrangements, acute care, long-term care, patterns of drug prescribing, costs and sources of health care, health of older black Americans, and international aging. The tables emphasize detailed age groups from the young-old (aged 65–74 years) to the oldest-old (aged 85 years and over). Data for those approaching older ages (persons 55–64 years) are included for comparison purposes.

Some of the report's more interesting highlights:

- Most adults, aged 65 years and over, reported no difficulty with either activities of daily living (ADL's) or instrumental activities of daily living (IADL's). About two-thirds of the total older population reported no difficulties with any of the ADL's or IADL's.
- Fewer elderly black females reported no ADL difficulties than their white counterparts; however, this difference by race did not hold for males.
- The presence of two or more limitations in basic ADL's and IADL's was associated with risk of death and nursing home residence.
- Medicare was the expected principal source of payment for 93 percent of hospital discharges for the population 65 years of age and over. For nursing home stays, Medicaid was the principal source of payment for 50 percent of the older population. For hospital discharges, self-payment was negligible (less than 1 percent). For nursing home stays, self-payment was substantial (44 percent).
- Death rates for diseases of the heart and cerebrovascular disease declined in virtually all of the race-sex groups during the 1980's, while death rates for malignant neoplasms (cancers) increased.
- Most of the increase in deaths from malignant neoplasms was a result of substantial increases in lung cancer death rates.

A 14-panel pocket edition of health data accompanies this new report. The pocket edition summarizes all the health topics covered in the report. In addition to the report and pocket edition, NCHS has made available for purchase a series of diskettes. The diskettes contain all 170 tables included in the report.

The report and accompanying pocket edition can be purchased from the U.S. Government Printing Office by completing the coupon on the back of this release. Ordering information for the diskettes is included on the back of this release.

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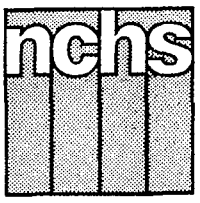

From the CENTERS FOR DISEASE CONTROL AND PREVENTION/National Center for Health Statistics

Common Beliefs About the Rural Elderly: What Do National Data Tell Us?

Series 3 No. 28
(PHS) 93–1412

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A new report about the rural elderly has just been released by the National Center for Health Statistics. The report "Common Beliefs About the Rural Elderly: What Do National Data Tell Us?" was supported by the Federal Interagency Forum on Aging-Related Statistics, sponsored by the National Institute on Aging.

Based on input from staff of the U.S. Senate Special Committee on Aging, 10 commonly held beliefs about the rural elderly in such areas as health, income, and housing were identified for analysis. The analysis focused on whether national data supported or debunked these preconceived notions. These common beliefs and a summary of the conclusions based on national data are presented in 64 charts in individual chapters of the report.

Highlights of the report show that:

- The elderly comprised about 15 percent of the nonmetropolitan population but only 12 percent of the metropolitan population.
- Elderly black persons in nonmetropolitan areas were more likely to be poor than those in metropolitan areas.
- Nonmetropolitan elderly were more likely to own homes than their metropolitan counterparts. However, nonmetropolitan homes were of lower value and in poorer physical condition.
- Nonmetropolitan elderly were twice as likely as metropolitan elderly to have to travel more than 30 minutes to reach their usual source of care.
- Nonmetropolitan elderly were neither healthier nor more active than their metropolitan counterparts. A greater percent of elderly in nonmetropolitan areas assessed their health as fair or poor.
- Elderly women in nonmetropolitan areas were more vulnerable to dying from breast cancer because a significantly lower percent had a clinical screening or a mammogram in the past year.

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