Recent Trends in Health Near the Age of Retirement: New Findings From the Health Interview Survey

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In recent years, mortality rates have been falling. One result of that decline is an increase in the proportion of the population that lives beyond the age of retirement. Decreased mortality has traditionally been taken as a sign of improved health status, but the same period has also seen a steady trend toward earlier retirement. Taken together, these two trends led to a decision to raise the "normal" retirement age gradually from age 65 to age 67. This article examines whether, as assumed, an increase in life expectancy should be accompanied by increasing age-specific health rates. A review of the literature shows that the health changes to be expected from the recent mortality decline are unclear. Data from the National Health Interview Survey are examined for groups aged 62–67 and 55–70 in the period 1969–81. A variety of measures of limitation, medical care utilization, and subjective health showed similar trends. Health generally declined during the first part of the period, but the trend, if any, was much less clear for more recent years. However, simple linear projections of health status change may be misleading.

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Summary

The normal retirement age, for social security purposes, is the age at which unreduced retired-worker benefits are payable. It was set at 65 when the original Social Security Act was passed in 1935. Since then, the only change in the social security retirement age has been to lower it; actuarily reduced benefits have been made available as early as age 62. However, a variety of unfavorable demographic and economic trends have put increasing pressure on the social security trust funds in recent years, and the 1983 Amendments to the Act provided that the retirement age shall gradually rise to 67 over the next 40 years. Under the terms of the new law, workers will not be required to wait any later for their benefits, but anyone who does not delay retirement will have a greater actuarial reduction in the amount.

The reasons why people retire earlier or later are not entirely clear. While individual decisions can reflect a wide variety of social and economic variables, in some cases retirement is compelled by health problems. The trend in recent years has been for people to live longer, but it is not clear that the additional years of life are healthy ones. When the 1983 amendments were enacted, concern was expressed that some workers would be less able than others to delay their retirement until the age of 68. The effect of the new provisions would be to penalize them financially for their health problems. Therefore, the 1983 amendments also provided that the Secretary of Health and Human Services

> shall conduct a comprehensive study and analysis of the implications of the changes made by this section in retirement age in the case of those individuals (affected by such changes) who, because they are engaged in physically demanding employment or because they are unable to extend their working careers for health reasons, may not benefit from improvements in longevity.

This paper has been prepared to provide background information for the mandated report. Its primary purpose is to examine recent trends in health that may give some indication of how many persons will not be able to work longer when the retirement age increases. The actual men and women who will retire after the turn of the century are of course too young now for their personal health experience to mean much. The approach taken here is to examine recent changes in the health of older age cohorts as a proxy measure that may suggest future trends in the health of this age group.

The focus on retirement means that this paper does not attempt to deal with trends in the entire population, or even the elderly. It is true that retirement occurs well above the median age of the population, but it also occurs well below the median age of the elderly. The age range of persons who might be adversely affected by the increased retirement age is fairly narrow, extending from 62 to 68 and a few months. Even allowing for the importance of retirement considerations to men and women *several years below the age of first eligibility for benefits and for those who would receive increased benefits by* delaying retirement, the age group that is of interest here extends only from about 55 to 70. When health data are published they are almost always aggregated into larger age intervals, and the intervals almost invariably break the population into subgroups at age 65, submerging the ages of greatest interest into categories with considerably older and younger average ages.

Therefore the major contribution of this study is to provide a detailed examination of patterns of changing health that have been observed using microdata collected by the National Health Interview Survey (NHIS), the best comprehensive source of health data time series for this population. They have been retabulated from microdata into 62–67 and 55–70 age intervals to focus on the groups of greatest interest. The results reported here have not been previously published.

The first section reviews recent trends in mortality, the labor-force participation of older workers, applications for retirement benefits, and the somewhat anomalous pattern of changes in disability (chapter 1). The current state of knowledge about mortality patterns and health trends is then discussed (chapter 2). Readers already familiar with these issues may wish to skip directly to chapters 3 and 4, which present the results derived from NHIS microdata.

Chapter 3 discusses the types of health variables available for all or most of the 1969–81 period on the NHIS files and their interpretation. Chapter 4 presents the original part of this paper, based on changes observed in the health data. In general, across a wide range of variables, health appears to have been worse in 1981 than it was in 1969. However, a closer look at the year-to-year changes does not suggest a systematic linear trend. Rather, health appears to have worsened during the earlier part of the period, then leveled off or begun to improve. The final stage of the analysis is a test of this pattern using a multivariate model which systematically tests whether the apparent pattern could arise by chance. Generally a quadratic component, which would predict a turnaround during the period under study, is found to explain a significant amount of the year-to-year variation in the health variables. This pattern of changes is rather surprising and raises some difficulities in interpretation, but it is very unlikely that it can be dismissed as simple random fluctuations in the data.

These results have not been suggested in earlier published analyses of health trends, though they are consistent with the recent and rather puzzling shifts in disability programs. Why this new health trend occurred and how long it will continue is a subject for further study, but chapter 5 reviews its implications for retirement policy. Briefly, if health improvements do continue then most older workers can be expected to be physically able to extend their worklives to age 67, and perhaps beyond, as the

retirement age is raised. However, the unexpected nature of these new trends and the lack of immediate explanations for their underlying causes suggest that it would be rash to extrapolate them 40 years into the future. If the results here show anything, it is the weakness of present understanding of causal linkages between measurable health in the recent past and the health of persons who will near the age of retirement in years to come.

Chapter One: Trends Since the Mid-sixties

Recent changes in retirement policy have been driven by somewhat contradictory demographic trends which might be expected to move in tandem because they are health-influenced, or at least health-related. They are reviewed here to put in context the patterns of changing health that are reported in the chapters that follow.

The sections of this chapter deal with the following trends. Mortality (section 1.1), after a decade and a half of stability, began an unexpected and sustained decline in 1963. Despite their increasing life expectancies, older workers have had lower and lower employment rates (section 1.2). Correspondingly, social security retired-worker benefits have been taken earlier and earlier (section 1.3). Disability rates, which should reflect the impact of changing health on work capacity more closely, did not parallel any of these other trends; after rising sharply during the first half of the seventies, they leveled off and fell somewhat (section 1.4).[1] Finally, section 1.5 summarizes a series of consequent legislative changes intended to protect the interests of the growing pool of potential older workers and to reverse, or at least mitigate, the unfavorable financial and social impact of these new trends.

1.1 Trends in Mortality

One of the most striking elements of the modern demographic transition has been the near-total elimination of deaths from acute infectious and parasitic diseases (Peery, 1975). In the United States the widespread introduction of sulfamide drugs and antibiotics largely completed this process in a particularly rapid burst of mortality reduction that ended in the early fifities (Crimmins, 1981; Duleep and Patrick, 1983). These are the diseases that caused most deaths among infants, children, and young adults; their mortality rates are now at historically very low levels. By mid-century, the main causes of death were no longer acute diseases but chronic, degenerative conditions that pose quite different and less tractable medical problems—heart disease, cancer, and stroke. Consequently, the great majority of deaths had become concentrated among the elderly, and by 1985 about 85 percent of deaths occurred at ages 55+ and 70 percent at 65+.

During the next decade and a half (1954–68), the long-standing trend toward lower mortality appeared to have ended. Death rates for women declined only slightly, while rates for men actually increased over the period. There appeared to be little room for improvement, barring some major medical breakthrough. Deaths from heart disease, cancer, and many other chronic diseases seem to reflect various long-term deleterious effects of environmental factors such as smoking, stressful lifestyle, and exposure to toxic substances (Knowles, 1977). If anything, these negative factors were worsening during the fifties and sixties, perhaps more for women than men. Therefore life expectancy at both birth and retirement age was expected to remain quite stable, or even to decline slightly, in the foreseeable future. A fairly typical view was expressed by Omran (1971), who proposed that the United States and other developed societies had reached the end stage of a series of demographic transitions, "the Age of Degenerative and Manmade Disease."

Instead, mortality rates began an unexpected and fairly rapid decline after 1968 that continues to this day. The increase in life expectancy has been widespread, affecting both sexes and a wide range of age groups (Crimmins, 1981; Fingerhut, 1982; Manton, 1982). It is primarily due to falling cardiovascular disease rates (not surprisingly, since these account for approximately half of all deaths), but deaths from other chronic causes have also been declining. Even the major exception, cancer, is causing fewer deaths than expected, considering that more persons avoid or survive other diseases and remain at risk.

This steady decline due to reduced chronic disease mor-

[1]This paper deals frequently with both years of age and calendar years. To avoid confusion and excessive wordiness when ranges are mentioned, I have adopted the convention throughout of spelling out calendar year decades (e.g., "fifties" is AD 1950–59) and giving age-decades in numerals (e.g., "50's" is ages 50–59).

For More Information

This article was originally prepared as one of three background papers to the Retirement Age Study. The views expressed here are those of the author and not necessarily those of the Social Security Administration; any errors are the responsibility of the author. Another paper can be found on page 31 of this issue and the third appeared in the October 1986 issue along with the report itself.

Technical appendices describing the data bases and techniques used to derive the estimates in the report as well as the background papers commissioned as part of the study are available from the Publications Staff, Office of Research and Statistics, Social Security Administration, Room 921, Universal North Building, 1875 Connecticut Avenue, N.W., Washington, D.C. 20009 or by calling (202) 673-5579.

tality was a new and unanticipated phenomenon. As with other major shifts in demographic trends (like the beginning and end of the baby boom), observers were rather slow to see its implications (Crimmins, 1983). In the mid-seventies, when the new trend was already well under way, two eminent demographers independently estimated ultimate plausible life expectancies given current medical knowledge and arrived at numbers not much higher than what were then current levels (Siegel, 1976; Bourgeois-Pichat, 1978). Official estimates by the Census Bureau and the Social Security Administration (SSA) actuaries were similarly cautious.

These expectations were rapidly overtaken by events. Siegel's projected "ultimate" life expectancy for women had already been exceeded by 1982, and it is now clear that official estimates made in the seventies were considerably too low. They have been significantly revised—most notably, a set of projections based on alternative, reduced mortality rates was issued by SSA's actuaries in 1981—but even these new estimates may prove to be rather conservative.

A decline in deaths from chronic disease is historically unprecedented, and the underlying causes are far from clear. This trend may taper off, or it may continue indefinitely. What is certain is that the present rapid growth of the elderly population will continue for several decades, whether the survival rate for older persons stabilizes or continues to improve, as the relatively large baby boom cohort reaches retirement age.

1.2 Trends in Labor-Force Activity

Because deaths are now highly concentrated at advanced ages, increases in life expectancy are largely increases in the average number of years spent after the age of retirement. Unless older Americans increase their labor-force activity in proportion, the dependency ratio of retired persons per worker will rise sharply in the early part of the next century. The burden on the social security system, and society in general, will grow in proportion. During the past several decades the trend has been very much in the direction of increasing dependency.

Mortality rates have traditionally been used as proxy measures of the overall health of populations and subgroups; indeed, except for recent years, they are virtually the only measures available to analysts. By this established standard, the steady rise in life expectancy since 1968 should indicate a steady and fairly substantial improvement in the health of older persons. To the extent that it does, the labor-force activity of older workers should have increased proportionately.

This has not occurred (table A). The patterns are somewhat different for older men and older women, but both have tended to work less, not more, during the recent mortality decline. Historically, men participated in the labor force at very high levels, generally about 90 percent or higher, until about the age of 65. Although the rate has been declining steadily since at least the beginning of the century, as recently as the forties, nearly half the men aged 65 or older were still working. This proportion fell rapidly to about one-fourth during the 1953–68 era of stable mortality. Among men aged 55–64, just below the age of "normal" retirement, labor-force rates were almost as stable as mortality rates, dropping very slightly from 87.9 percent to 84.3 percent over the same interval. During the current era of rapidly increasing life expectancy, the rate continued to decline consistently (though more slowly) among the oldest group of men, and began to drop quite rapidly among the 55–64 group. By 1982, their labor-force participation rate had fallen to 70.2 percent.

A corresponding trend has been partially masked among women by a separate long-range trend—independent of age—toward greater labor-force participation. Among the oldest women, whose rates were always very low, there was a slow and somewhat inconsistent increase until about 1960, and a moderate but steady decline since 1969. Women aged 55–64, like their younger counterparts, tended to work more until 1969 but have worked slightly less since then, despite a fairly substantial overall increase in labor-force participation among women over the period.

1.3 Trends in Retirement Benefits

As passed in 1935, the Social Security Act provided old-age benefits to all workers with sufficient "covered" employment (on which taxes had been paid) at age 65. These benefits were later made available not only to older workers who stop working entirely but also those with fairly low earnings (the specific level at which benefits begin to be offset by earnings and the percentage reduction formula have undergone adjustments over the years). Therefore trends in retirement benefit awards need not be the same as trends in labor-force participation at the same ages, but in practice they have been quite similar.

In 1956 women were enabled to receive actuarily reduced benefits earlier, at ages 62–64, and this option was extended to men in 1961.[2] During the period of rapid mortality decline the early retirement option has been taken by a growing part of the older population, to the point that "normal" retirement at 65 is now rather unusual.

As table B shows, retirement at 65 was already not especially common even at the beginning of the mortality decline. Soon after it had become available, the option of taking reduced retirement benefits before 65 was chosen by about half the men and two-thirds of the women.

Whether or not the subsequent mortality decline reflected improved health, it was accompanied by further steady increases in early retirement. By 1980, the minority

[2]The reduction adjusts amounts so that the lifetime benefits of persons retiring at different ages will be approximately the same, assuming that mortality rates are stable and do not differ between workers who retire earlier and later.

Table A.—Civilian labor-force participation rates, by sex and age, 1948–82

Year	Total, aged 16 or older		Aged 45–54		Aged 55–64		Aged 65 or older	
	Men	Women	Men	Women	Men	Women	Men	Women
1948	86.6	32.7	95.8	35.0	89.5	24.3	46.8	9.1
1949	86.4	33.1	95.6	35.9	87.5	25.3	47.0	9.6
1950	86.4	33.9	95.8	37.9	86.9	27.0	45.8	9.7
1951	86.5	34.6	95.9	39.6	87.2	27.6	44.9	8.9
1952	86.3	34.7	96.2	40.1	87.5	28.7	42.6	9.1
1953	86.0	34.4	96.5	40.4	87.9	29.1	41.6	10.0
1954	85.5	34.6	96.5	41.1	88.7	30.1	40.5	9.3
1955	85.3	35.7	96.5	43.8	87.9	32.5	39.6	10.6
1956	85.5	36.9	96.5	45.5	88.5	34.9	40.0	10.8
1957	84.8	36.9	96.3	46.5	87.5	34.5	37.5	10.5
1958	84.2	37.1	96.3	47.8	87.5	35.2	35.6	10.3
1959	83.7	37.1	96.0	49.0	87.4	36.6	34.2	10.2
1960	83.3	37.7	95.7	49.8	86.8	37.2	33.1	10.8
1961	82.9	38.1	95.6	50.1	87.3	37.9	31.7	10.7
1962	82.0	37.9	95.6	50.0	86.2	38.7	30.3	9.9
1963	81.4	38.3	95.7	50.6	86.2	39.7	28.4	9.6
1964	81.0	38.7	95.7	51.4	85.6	40.2	28.0	10.1
1965	80.7	39.3	95.6	50.9	84.6	41.1	27.9	10.0
1966	80.4	40.3	95.3	51.7	84.5	41.8	27.5	9.6
1967	80.4	41.1	95.2	51.8	84.4	42.0	27.1	9.6
1968	80.1	41.6	94.9	52.3	84.3	42.4	27.3	9.6
1969	79.8	42.7	94.6	53.8	83.4	43.1	27.2	9.9
1970	79.7	43.3	94.2	54.4	83.0	43.0	26.8	9.7
1971	79.1	43.3	93.9	54.3	82.2	42.9	25.5	9.5
1972	79.0	43.9	93.2	53.9	80.5	42.1	24.4	9.3
1973	78.8	44.7	93.0	53.7	78.3	41.1	22.8	8.9
1974	78.7	45.6	92.2	54.6	77.4	40.7	22.4	8.2
1975	77.9	46.3	92.1	54.6	75.8	41.0	21.7	8.3
1976	77.5	47.3	91.6	55.0	74.5	41.1	20.3	8.2
1977	77.7	48.4	91.2	55.8	74.0	41.0	20.1	8.1
1978	77.9	50.0	91.3	57.1	73.5	41.4	20.5	8.4
1979	77.9	51.0	91.4	58.4	73.0	41.9	20.0	8.3
1980	77.4	51.5	91.2	59.9	72.1	41.3	19.0	8.1
1981	77.0	52.1	91.4	61.1	70.6	41.4	18.4	8.0
1982	76.6	52.6	91.2	61.6	70.2	41.8	17.8	7.9

Source: Adapted from the **Handbook of Labor Statistics,** table 4.

of men and women who waited until age 65 had shrunk to only about half the 1968 levels—fewer than a quarter of the men and a sixth of the women. Thus the increase in life expectancy, which had been widely assumed to indicate improving health in the older population, coincided with decreasing contributions to the social security retirement system and an increase in the benefits drawn from it.

1.4 Trends in Disability and Work Impairment

It is possible, of course, that health has not been increasing in step with life expectancy. Disability rates provide a particularly interesting index of recent health changes. Disability is a rather elusive concept, but work impairments are central to it and health problems are a necessary and often sufficient component. The experience of programs that make payments on the basis of disability reflects a combination of perceived and objectively verified health-related impairments affecting withdrawal from the labor force. If death rates are indeed inversely related to health, then the mortality decline should have been paralleled by a decline in disability rates. Instead, changes in the number of persons apparently restricted in their ability to work have followed a different and distinctive pattern that has not been well explained.

1.4.a Disability insurance (DI) trends. By far the largest of the disability benefit programs is social security's disability insurance (DI), which has consistently used a relatively strict disability standard that emphasizes medical criteria. In addition to having a history of recent and substantial covered employment the Social Security Act requires that applicants must suffer from a "medically determinable physical or mental impairment" expected to last at least 12 months (or result in death) which renders them "considering age, education, and work experience" unable to engage in "any . . . substantial gainful work which exists in the national economy."[3] These standards were deliberately set by Congress to control costs and

[3] Standards are slightly less stringent for persons whose impairment results from blindness. These are a very small part of the disabled population, however.

Table B.—Trends in retirement: Estimated timing of receipt of first social security retirement benefit (percentages)

Year	Conversion from disability benefits	Immediately at 62	Other early retirement	"Normal" (aged 65 or older)
	Men			
1967	7.6	17.1	30.1	45.2
1968	8.1	20.2	28.5	43.2
1969	9.1	17.9	29.9	43.0
1970	9.3	19.0	30.5	41.1
1971	9.2	20.2	31.7	39.0
1972	9.8	21.7	30.4	38.0
1973	10.9	23.1	33.2	32.8
1974	11.8	25.6	32.7	29.9
1975	11.6	25.8	34.2	28.3
1976	13.0	27.4	33.7	25.9
1977	13.3	26.6	34.3	25.8
1978	15.6	28.6	38.9	23.9
1979	15.2	27.7	32.5	24.6
1980	14.8	30.0	33.0	22.2
	Women			
1967	4.3	34.4	30.9	30.5
1968	4.6	38.0	27.4	29.9
1969	5.1	34.8	30.4	29.7
1970	5.5	35.7	30.5	28.3
1971	5.4	35.7	30.8	28.0
1972	5.6	37.5	29.3	27.6
1973	6.1	38.1	31.2	24.6
1974	6.9	42.4	30.1	20.6
1975	7.5	41.6	30.5	20.4
1976	8.5	43.3	29.6	18.6
1977	9.0	41.6	31.0	18.4
1978	10.2	44.1	27.9	17.9
1979	10.5	43.5	28.4	17.6
1980	10.1	45.9	27.7	16.2

Source: Based on estimates prepared by Christine Irick (Program Analysis Staff, Social Security Administration). The figures in table B have been specifically revised to emphasize comparability between the benefit-based concept of "retirement" and the labor-force concept. Therefore, they differ somewhat from other published series of SSA statistics, which serve other purposes. The revisions include two adjustments:

(1) Some "retirements" at 65 are simply conversions of disabled-worker beneficiaries, who begin receiving benefits from the old-age trust fund rather than the disability fund at that age. These persons have left the labor force earlier (on average, about 8 years, but sometimes much earlier). They are separated out here.

(2) Many workers establish entitlement **before** their earnings fall to a low enough level to make any benefit payable. This is done for a variety of reasons to qualify for Medicare when working after 65, or to insure that payments are delivered promptly at the time of actual retirement. The 1982 New Beneficiary Survey was used here to approximate the actual age when the first benefit is paid. During 1980–81, in addition to the 16 percent of men and 11 percent of women entitled at 65 or later, another 7 percent and 5 percent had been entitled earlier but actually began drawing retirement benefits at 65. For illustrative purposes, this table assumes that the same proportion of apparent retirement at 63–64 was actually delayed for all other years.

to define disability narrowly and in as specific a form as possible to prevent the DI program from becoming a disguised version of unemployment or early retirement benefits. Other factors enter into eligibility for DI—requirements for a relatively substantial and recent history of covered employment exclude part of the population, and vocational factors figure in some awards to workers 55 or older—but decisions on eligibility are dominated by a medical standard.

Despite the emphasis on rigorous confirmation by "medically acceptable clinical and laboratory diagnostic techniques," the rate and number of covered workers qualifying for benefits have been rather volatile. After unexpectedly slow growth during the early sixties, the disability rolls began to grow rapidly. In the decade after 1965 the ratio of disability benefit awards to covered workers rose steadily and substantially, doubling for most age and sex groups. This upsurge was paralleled in other, independently administered programs, so that by 1975 disability transfer payments had nearly doubled as a share of GNP [gross national product] (Sunshine, 1981).

The trend then reversed as unexpectedly as it had begun. Awards rather consistently declined through the late seventies and early eighties (table C), and by September 1982 new awards of disabled-worker benefits were at less than 40 percent of the 1975 level. Consequently the number of persons receiving benefits peaked in 1978 and fell 7.3 percent by 1982. Since 1982 the trend appears to have turned upward once again, though the growth has not yet become rapid. Again, this slowing or reversal of growth has been paralleled in other disability programs and appears to reflect general social trends rather than any specific administrative or legally prescribed features of the DI program.

1.4.b Possible causes. Eligibility for disability benefits is defined largely in terms of work-limiting health problems, but the trends in awards experienced over the last 20 years are difficult to relate to any other health measures. Certainly mortality was falling throughout both the growth and decline of awards. Various explanations that have been put forward may account for part of the variations in DI, but no one of them provides an entirely (or even substantially) convincing description of both the increases in the early seventies and the decreases afterward.

First, the number of persons with sufficient covered employment has increased since the late sixties, primarily due to 1972 legislative changes that made it easier for

Table C.—Growth of the social security disability insurance program, 1965–84

Year	Insured workers (in millions)	Awards to disabled workers (in thousands)	Disabled workers receiving benefits (in thousands)
1965	53.3	253	988
1966	55.0	278	1097
1967	55.7	301	1193
1968	56.9	323	1295
1969	70.1	345	1394
1970	72.4	350	1493
1971	74.5	416	1648
1972	76.1	455	1833
1973	77.8	492	2017
1974	80.4	536	2237
1975	83.3	592	2489
1976	85.3	551	2670
1977	87.0	569	2837
1978	89.3	464	2880
1979	93.7	417	2871
1980	98.0	397	2861
1981	100.4	345	2777
1982	102.5	299	2604
1983	103.7	311	2569
1984	106.6	357	2597

Source: **Social Security Bulletin, Annual Statistical Supplement,** 1985, tables 30, 35, and 62; and **Social Security Bulletin,** May 1985, tables M–11 and M–16.

younger workers to qualify and to increasing work activity among women. But these groups do not account for the greater part of awards, and the pattern of growth and decline has also characterized the older men who have always been most likely both to be insured and to receive benefits.

Second, program growth was initially consistent with the increasing attractiveness of average benefit amounts relative to average earnings, though investigators differ as to whether the effect was large (e.g., Parsons, 1980) or small (e.g., Haveman and Wolfe, 1981). These models work relatively well for the late sixties and early seventies, but are much less consistent with the subsequent decline in both applications and awards when unemployment was fairly high and price-indexed benefits were increasing relative to wages.

A third explanation often advanced, though not in quantitative form, is that much of the change resulted from variations in administrative laxity and rigor (or, from another perspective, generosity and efficiency). This hypothesis is much more difficult to support or refute rigorously, because it may rest on implicit, largely unrecorded changes in the pervasive bureaucratic culture of program administrators. Still, it is notable that the growth phase persisted through the Johnson, Nixon, and early Ford administrations, and the decline phase through the later Ford, Carter, and Reagan administrations. Certainly the program trends cannot easily be related to any prevailing, explicit political philosophy at policy-making levels. The fact that very similar trends were observed in non-Federal public- and private-sector programs also weakens this argument.

A fourth model emphasizes growing public awareness of the existence of the DI program. SSA's surveys have shown that the program was not well-known in the sixties, but awareness had greatly increased by the time of the last survey in 1978. The surge and fall in applications is consistent with a one-time clearing of a backlog of eligible applicants, followed by a drop back to a more stable, "normal" rate of incidence that is now reflected by benefit applications without much lag. However, this model has also yet to be quantified in testable form, and it is not entirely consistent with surveys of the disabled population. If the pool of eligibles was being drained during the past two decades, the number of seriously disabled persons **not** receiving benefits should have fallen while the number of beneficiaries rose. Instead, both of these seriously disabled groups grew in absolute numbers and as a percentage of the work-impaired population between 1966 and 1978 (though the beneficiaries did indeed increase more rapidly).

1.4.c Work impairment in the general population. The DI program definition of disability is of course a relatively narrow one, and considerable change could occur in shorter-term or less completely work-impairing limitations without being reflected in social security statistics. From time to time different surveys of the national population have asked questions about one or another form of work limitation. Because variations in the wording or context of these items may affect the levels of limitation that they elicit (as discussed below), table D presents results from a selected subset of surveys during the past two decades that asked very similar and essentially comparable questions about whether health "limits the kind or amount of work" that can be done. The results certainly do not indicate a clear trend.

Despite the similarities in question wording, some part of these considerable variations may only reflect differences in methodology. The highest rates were reported in the social security surveys, in which respondents first reported on a wide range of diseases and limitations (perhaps making these problems more salient) before asking about restrictions on work capacity; the lowest rates were reported in the Census and the CPS [Current Population Survey], which asked the disability items out of context in a series of items dealing with other subjects.

A further cause for uncertainty is that self-reported status is not very stable at the individual level even when the methodology is held constant. McNeil and Sater (1978), summarizing follow-up reporting from 1980 Census pretests and the 1972 SSA survey sample (drawn from the 1970 Census), demonstrated that the small overall changes were net results of substantial gross changes in self-classification which more or less cancelled each other out. Similarly, follow-up interviews in 1969 found a surprising 28 percent of the sample who had claimed to have work impairments, and discussed them at length in the

Table D.—Survey measures of U.S. work impairment rates

Year	Percent impaired	Source	Age range	Coverage
1966	17.2	Social Security Survey of the Disabled	18–64	Civilian Noninstitutional
1967	13.0	Survey of Economic Opportunity	14–64	Civilian Noninstitutional
1970	9.4	Decennial Census (5 percent sample)	18–64	Entire United States
1972	14.3	Social Security Survey of the Disabled and Nondisabled	20–64	Civilian Noninstitutional
1976	13.3	Survey of Income and Education	18–64	Civilian Noninstitutional
1978	17.2	Social Security Survey of Disability and Work	18–64	Civilian Noninstitutional
1979	12.9	Income Survey Development Program Research Panel	16–64	Civilian Noninstitutional
1980	8.6	Decennial Census (16 percent sample)	18–64	Entire United States
1981	9.0	Current Population Survey	18–64	Civilian Noninstitutional
1983	10.0	Survey of Income and Program Participation	16–64	Civilian nonfarm Noninstitutional

1966 survey, denied ever having been disabled 3 years later.

The conflicting levels of work disability reported during the past two decades cannot easily be reconciled with each other. More to the point, neither do they seem to explain what has happened to disability benefit programs. What is certain is that fluctuations in disability, whether defined by self-reports or the more rigorously specified process of SSA certification, have not shown a consistent relationship with either the upward trend in life expectancy or the downward trend in labor-force participation over the past 15 years. This is, at least, suggestive evidence that neither trend has been closely paralleled by trends in the sort of ill-health that affects work capacity.

1.5 Trends in Legislative Responses

The 1983 amendments, though novel in their specific provisions, are typical of legislative responses to the rapid growth of the population near or above the customary age of retirement. Several have provided directly for the interests of the growing number of older potential workers. Notably, amendments to the Age Discrimination in Employment Act in 1978 generally prohibited mandatory retirement before the age of 70; the Act also prohibits arbitrary age discrimination in hiring, discharge, pay, promotions, fringe benefits, and other aspects of employment for workers aged 40–70. More recently, the Job Training Partnership Act (which replaced the old CETA) of 1983 requires that 3 percent of the funds provided the States for training and employment-related services be set aside for separate programs to assist workers age 55+.

These assist older workers who continue working, but fewer and fewer are doing so. Even now, despite the sharp increase in the proportion of women working and the large influx of the Baby Boom cohort into the labor force, the ratio of retired persons to active workers has been rising steadily.[4] Most of this rise reflects the maturing of the social security system rather than the maturing of the population—that is, the past extensions of social security coverage to most jobs in the national economy mean that nearly everyone nearing retirement age now has a significant history of covered employment. Barring very drastic changes in age-specific mortality rates or in net immigration, the upsurge in births after 1945 and the subsequent sharp decline since 1965 assure that the population will mature significantly as well. As the relative size of the older population increases in the next seveal decades, considerably greater and more financially pressing ratio increases become nearly certain in the foreseeable future. This has led to a number of amendments to the Social Security Act which were directed primarily at providing further incentives for extended worklives.

[4] In 1973, 154 persons drew social security retirement benefits for every thousand workers with reported social security taxable earnings. By 1983, there were 186 beneficiaries per thousand.

Disincentives for retired-worker beneficiaries to continue working have been relaxed. Before 1968, an earnings test reduced benefits dollar for dollar above an exempt earnings amount for anyone under the age of 72 (the few still working at more advanced ages had no reduction). The reduction factor was then halved, so that only one benefit dollar was lost for every two in earnings. In 1972 the exempted amounts were increased and indexed. The 1977 amendments raised these exempt amounts still further for persons 65–72. The age at which all earnings are exempted was lowered to 70 effective in 1983, and effective in 1990 the offset will be reduced to only $1 for every $3 in excess earnings.

In 1972 retiring workers also became entitled to a benefit increase of 1 percent for each year that benefits were **not** drawn between the ages of 65 and 72. This delayed retirement credit (DRC) was tripled in 1977 to 3 percent for workers born after 1916; before the change took effect the credit was altered to apply only between the ages of 65 and 70 as part of a liberalization that completely exempted earnings at ages above 70. The 1983 amendments provided that the DRC be gradually increased to 8 percent for each year benefits are not drawn after whatever "normal" retirement age is in effect for workers born after 1937.

Finally, the 1983 amendments also provided that this "normal" retirement age, when 100 percent of the primary insurance amount (PIA) calculated by the benefit formula is payable, be raised in several small steps to 66 around the turn of the century and to 67 around 2020. Workers will still be able to begin receiving benefits at 62, as so many currently choose to do, but their amounts will be further reduced: only 70 percent of the PIA in 2022, compared with 80 percent today.

There is not much direct empirical evidence on how effective all these incentives will be in reversing the trend toward a shorter worklife. The substantial liberalization of the earnings offset in the early seventies does not seem to have had a large effect (Vroman, 1983). The delayed retirement credits offered until now have been much smaller than the coming increases, the still lower effective tax rate on earnings will not be in effect until 1989, and the retirement age increases will not begin until the turn of the century.

A[n] extensive body of retirement research dealing with economic incentives, recently reviewed in this context by Sammartino (1985), suggests that the behavioral responses of older workers to these new provisions will be quite small, probably amounting to no more than 3 months' postponement of retirement. However, healthy workers are in a better position to take advantage of their altered incentives. Anyone whose health is bad enough to limit work (within the range of jobs appropriate to previous training and experience) is more likely to experience only the negative sanctions, adding insult to existing injury, unless other programs or provisions (e.g., the DI pro-

gram) provide alternative benefits. Very likely adjustments and allowances will be made as these incentives and disincentives are slowly phased in, but the extent of poor health around the age range 62–67 sets limits to their potential impact.

Chapter Two: What Do We Know About Health and Mortality?

The commonsense interpretation of falling death rates has been that they imply greater health, but more recent and more sophisticated interpretations draw very different implications for concurrent health trends (section 2.1). Direct measures of health in the U.S. population are rather scarce, especially when changes over time are of primary interest (2.2). The best source of health data, the National Health Interview Survey, has been analyzed with suggestive results (2.3), but conclusions drawn from published findings must be interpreted cautiously due to by problems of aggregation and health indicator interpretation (2.4).

2.1 Causes of Declining Mortality

As Omran (1977) has observed, the elimination of infectious disease as the primary cause of death may have fundamentally changed the meaning of mortality as a health measure. The medical implications of the new pattern of mortality, now dominated by chronic conditions, have been a matter of some dispute. The demographic and medical literature bearing on this subject is, of course, extensive, and an exhaustive review is far beyond the scope of this paper. Several recent explanatory models are summarized below to highlight the wide range of potential health changes accompanying changes in mortality that would be expected on the basis of different theoretical approaches.

2.1.a The failures of success? On the one hand, Gruenberg (1977) has suggested in a well-known paper of the same title that we are now suffering from the "failures of success." Mortality has been postponed not by curing or avoiding the underlying causes of death but by curbing the lethality of their side-effects and sequalae, such as pneumonia. The additional persons who are now alive at advanced ages are not healthy; instead they are sick persons whose problems can be kept under control at a level of severity short of death. The incidence of disease is more or less unchanged, but the prolongation of survival at the individual level has raised the general prevalence of most chronic diseases. Somewhat similarly, in an often-cited article, Kramer (1980) has pointed out that most chronic conditions have higher age-specific rates among the elderly than younger age-groups and so, whatever the underlying causes of delayed mortality, modern societies are undergoing a "pandemic" of chronic physical and mental diseases as the average age of the population increases.

Has medical progress been "failing" the elderly in this sense? Unquestionably medical technology that prolongs the duration of lethal disease will increase its prevalence, and has in fact done so to some degree, but it is not clear that direct medical intervention has been the primary cause of the reduction in deaths. Most of the conditions with which Gruenberg makes his point most forcefully—Down's syndrome, spina bifida, diabetes, senile brain disease—have fairly low prevalence rates and cannot have made a major contribution to changes in mortality or retirement.

As for the major "killer" diseases whose decline in recent years has been lowering the death rate—heart disease, hypertension, strokes, kidney disease—modern medicine has indeed been much more successful in controlling or mitigating their effects than in preventing or curing them (Thomas, 1977) but it is the extent of the mitigation that is crucial. For the purposes of extending or restoring the ability to work, complete cures are not necessary, and it is uncertain whether these diseases are generally being controlled below or above the threshold of disability. Certainly some common and potentially dangerous conditions (high blood pressure is a good example) respond well enough to treatment that normal functioning can often continue quite unimpaired without increased medical risk. This may not be a complete "success" but it is hardly a "failure," either.

2.1.b Compression of mortality? An alternative and much more optimistic interpretation of recent mortality trends is that both morbidity and mortality are becoming compressed near the upper end of the natural potential lifespan (Fries, 1980; Fries and Crapo, 1981) with an increasing part of the potential lifespan being spent in good health. Fries assumes that the decrease in chronic disease mortality reflects the prevention or postponement of morbidity through changes in lifestyle: "increased exercise, lower weight, and growth in personal autonomy and personal responsibility for health."

He is not alone in doing so. Knowles (1977) has emphasized that exceptionally long life spans are significantly related to basic personal habits (regular breakfasts, adequate sleep, no smoking, etc.), and that most of the major causes of death, especially cancers, have been linked to nutritional and environmental factors that reflect idiosyncratic variations in personal behavior and experience.

Even the earlier near-elimination of infectious disease has been attributed to environmental rather than medical factors. McKeown (1976), reviewing the timing of the mortality decline in England and Wales, concluded that most mortality improvements preceded the development of effective forms of medical treatment, and can be attributed primarily to increased general health due to better nutrition; even the reduction in exposure to infection thanks to improved sanitation and public health measures seems to have played a minor role. McKinlay and McKinlay (1977) have reviewed the dates of disease de-

clines and the introduction of specific medical measures in the United States and reach similar conclusions. Omran (1977), attempting to explain the transition to a modern mortality pattern in the U.S., also argues that before the introduction of sulfa and antibiotic drugs in the 1980's and 1940's the only medical intervention that had a direct impact on public health was smallpox vaccination.

Some of Fries' conclusions about the compression of mortality and its causes are not well supported by the available evidence, especially where they rest on a supposed natural maximum life expectancy of about 85 (Scheider and Brody, 1983), but the studies cited above provide circumstantial evidence for his suggestion that morbidity is being compressed into more advanced ages. Evidently acute as well as chronic diseases have historically been reduced by changes in nonmedical background characteristics such as personal histories of exercise and diet.

2.1.c A dynamic equilibrium? The system of death reporting in the United States can be used to test both the failure-success and the mortality-compression models (Manton, 1982; Manton and Stallard, 1982; Wing and Manton, 1981). Results are not entirely consistent with either. Death certificates report both a single underlying cause of each death and other associated conditions that may have been present. Most diseases are becoming more frequently mentioned as associated (present but **not** lethal) rather than underlying (present **and** lethal) causes. That is, other things being equal, most diseases are increasingly prevalent but decreasingly severe in their impact.

This is at odds with both the compressed-morbidity assumption that increased vitality is delaying the onset of disease and the failure-success assumption that the onset or progress of disease continues unaffected, with only the lethal side-effects under increased control. Manton and his associates analyze these findings using a "dynamic equilibrium" model, which emphasizes that whether or not the incidence of chronic disease will continue at its former rate, the progression of disease from onset to fatal outcome has certainly been drawn out.

This equilibrium model provides a more developed and more structured framework for examining the relative impact of the different factors (disease incidence, prevention, and control of effects) that interact dynamically to determine trends in illness and death. It provides somewhat less clear guidance in terms of how to interpret recent health and mortality trends in terms of willingness or ability to work. The cause-of-death data demonstrate that older persons are likely to be suffering from more diseases than they were in the past, but the crucial question is: Just how seriously are they affected?

The primary issue in work, disability, and retirement is not whether disease is present but whether it is severe enough to seriously limit or prevent work. If the disease progresses very slowly or its progress can be effectively controlled by medical treatment, then health is reasonably good for workforce purposes. If chronic diseases are being arrested at a late or more serious stage, then a growing proportion of older persons is effectively becoming disabled. Declining mortality is compatible with almost any trend in work capacity. To see whether older workers are more or less able to delay retirement, now and in the future, it is necessary to measure health and activity limitations directly, rather than inferring them from death rates.

2.2 Direct Measures of Changes in Health

Many different measurements of health have been made over the past two decades, but few of them are sufficiently continuous or comparable to generate good trend data, especially for the rather narrow age range of interest here. Moreover, the pattern of changes discussed in the previous chapter strongly suggest that it is very desirable to examine cross-year changes in fine detail. If data are available for only two points in time, then the most that can be observed is a simple linear increase or decrease, and in the real world events are often more complex. Health variables may have been lagging or preceding other variables, or changing their relationship with them, and it would be interesting to verify whether this has really been the case.

These criteria—health-relatedness and frequent measurement—rule out most of the data bases at hand. Two of them are initially attractive, but have serious limitations when closely examined. First, the disability surveys carried out by SSA in 1966, 1972, and 1978 had a particularly useful focus on present and past work limitations, together with their medical and functional correlates. However, in 1966 interviews were conducted only with persons who reported some work (or housework) limitation: The sample sizes become rather small if only the older workers are examined; there are a number of problems of comparability between years; and most awkwardly of all, persons aged 65 or older were excluded from the sample in all 3 years.

Second, the National Center for Health Statistics [NCHS] has conducted a number of clinical examination surveys—various waves of the National Health Examination Survey (NHES) and its successor, the National Health and Nutrition Examination Survey (NHANES). The standard procedure—which has involved medical testing and measurements by travelling "caravans" of trailers and health professionals that assemble into clinics at sample sites—has attained relatively high response rates (90 percent or better) by offering financial incentives. Three survey waves (in the early sixties, and the early and late seventies) included the older population in their sample. Still, rather few points in time have been separately observed, the number of clinical variables is rather limited, and changes in laboratory and diagnostic techniques and differences in coding of results mean that examination data are not of much use for the purpose at hand.

The original portions of this study are therefore based exclusively on data collected by the NHIS. It has three

major advantages. First, it has always had a health focus and has routinely asked several standard items on limitations and work activity. Second, the samples are relatively large and support analyses of fairly small subgroups. Third, the survey has been conducted continuously since 1957 (a portion of the sample is interviewed every 2 weeks) so that an unbroken time series is available.

The NHIS also has several drawbacks. Over the years a number of changes have been introduced, with major redesigns in 1969 and 1982. These reduce the comparability of before-and-after comparisons (Wilson and Drury, 1984). Until the most recent redesign, for example, most nonworking women were not asked about any health limitations on their ability to work. Occupational and other background data are not available for the retired. Income information is minimal and collected in a categorical form that prevents intrayear comparisons during inflationary periods (which the seventies certainly were). Other relevant data elements were collected inconsistently, or only in certain years.

One further potential problem, whose impact is uncertain, is that specific questions have not been systematically asked about the effects of mental disorders. These appear to contribute to a significant minority of work impairments, though they are much less concentrated in older age ranges than most disabling conditions. To the extent that older workers might selectively underreport the effects of mental impairments (in questions dealing with ability to work, restriction of usual activity, hospitalization, and self-rated health), the NHIS may not reflect the recent past altogether accurately.

The NHIS shares with other survey-derived data sources a more general problem: It measures levels of ill health in the population, while the focus of interest is retirement that is a function of individual ill health. The group of particular policy interest comprises workers who fall into the crack (so to speak) between health problems so concentrated that they are taken care of by existing disability programs, and health problems so diffuse that retirement can be postponed. This involves the distribution as well as the overall prevalence of health problems. The NHIS data are not too well suited to the task of sorting out the persons who fall into this somewhat ambiguous category. Questions on ability to work or carry out usual activities tend to eliminate the unimpaired, but an uncertain fraction of the remainder are not, in fact, of much interest because they would meet existing standards of disability.[5] These NHIS data are not a very precise measure of whether levels of reported poor health have become more or less concentrated over time, which would have some effect on their implications for retirement policy.

2.3 Earlier Analyses Based on the NHIS

Despite these problems, the NHIS is easily the best source of health and limitation trend data, and it is rather surprising that so little has been done with it. Three studies have recently used the NHIS to look at health and work limitations among the elderly attributable to specific types of disease.[6]

Colvez and Blanchet (1981) used published NHIS data to examine disability trends over the period 1966–76 (for some variables, only to 1974). They used the NHIS counts of days spent in bed and days of restricted activity as a measure of "short-term disability" and restriction in usual activity as a measure of "long-term disability." Only the broad age categories used in NCHS publications were analyzed; those including the older population were 45–64 and 65+.

All measures of "disability" in this two-point-in-time analysis showed an increase over the period, with greater increases in the most severe form. The more severe forms generally increased among older persons; however, men aged 45–64 reported less restriction in main activity but significantly more who could not carry it out at all, while women aged 65+ reported only insignificant increases in both.

Both sexes in the 45–64 group reported increases in the limitation of major activity due to diabetes, musculoskelatal disorders other than arthritis, and circulatory diseases excluding heart disease. It is notable that these causes are not, in general, among the most dangerous of "killer" diseases. Men also attributed more to heart conditions and women to malignant neoplasms. There were significant increases in the 65+ group only with diabetes and miscellaneous circulatory problems: Women attributed significantly less limitation to mental and nervous conditions.

Verbrugge (1984) has carried out a similar but more extensive analysis of the published data. Her series covers a longer span (1958–81) but is again constrained to use very broad age categories. She finds an increase in total restricted activity for older persons, though the trend is much less pronounced for bed disability days. Major-activity limitations have generally been rising among those 45–64, but not among the oldest 65+ group.

Both "killer" and "nonkiller" chronic diseases tend to be more prevalent and more limiting. Generally the pattern is one of increasing morbidity over the past two decades. Verbrugge attributes this to greater awareness due

[5] On the other hand, this disposes of what might otherwise seem to be another drawback of survey data—that they exclude the institutionalized population from coverage. The institutionalized, though a very small fraction of the entire population are much more likely to be in poor health. But anyone sick enough to be institutionalized has a particularly good chance to qualify for disability benefits, so the exclusion is unlikely to introduce much bias into estimates for the purpose at hand.

[6] Mention might also be made of Feldman (1982), who used a variety of HIS-based tabulations, along with others from the 1978 SSA Disability Survey, the 1976 Survey of Income and Education, and national vital statistics, to present a number of the disability and mortality-related trends of the kind discussed in chapter 1 above.

to earlier diagnosis, lower mortality, and perhaps earlier accommodation to the effects of disease.

Newquist and Robinson (1983) have used previously unpublished data for the combined years 1978–79 to examine the health status of older persons. Their results necessarily cannot show trends but have the advantage that they are broken down into narrower 10-year intervals. Moreover, they examine a larger number of possible indicators than the two studies mentioned above (though the general result is that they confirm the earlier, more narrowly based conclusions).

Newquist and Robinson's tabulations demonstrate that, as one would expect, health problems are somewhat more common among persons aged 65+ and a sizable minority report work limitations and functional impairments. However, the increase with age is quite gradual and there is no sudden upsurge in disease or impairment at 65. In addition, the distribution of limitations is uneven, so that large numbers of older persons are quite able-bodied by the usual indicators.

2.4 Problems of Variable Interpretation

All three of these studies exploit less of the potentially interesting detail actually collected by the NHIS than one would like for present purposes. The use of the conventional age-break at 65 is particularly unfortunate. It is most unlikely that the retirement age for social security purposes will be dropped below 62, and voluntary retirement of any kind is quite rare before the late 50's. Similarly, the scheduled increase in the retirement age is only by 2 years, to 67, and very few persons work into their 70's. The group of greatest interest therefore lies across, rather than on one side, of age 65.

Other difficulties involve how the variables measured by the NHIS are interpreted. The analyst must necessarily use answers to the questions that were actually asked, rather than to the questions he or she would have liked to ask, but there is perhaps too great a readiness to take one for the other.

The restricted activity days and restrictions in usual activity used by Colvez and Blanchet, for example, are not direct measures of work disability, though they have something to do with it. One of the most likely accommodations to impairment is to scale down "usual" activities to make them less demanding. An elderly person who passes the time away sitting on the front porch and watching the world go by is less likely to have to change daily routine when health worsens than someone who regularly drives an hour into town and spends the day restocking shelves.

Similar problems surround the other health-related NHIS variables. They should be taken for what they are, rather than being too quickly identified with other, more interesting, variables. It is particularly important to be sensitive to possible confounding factors when patterns of differences between years of ages, which may be accompanied by systematic changes in biases, are being examined. This is the focus of the next chapter.

Chapter Three: The National Health Interview Survey Data

The results presented in the following chapters are based on an analysis of person-level records from the 1969–81 NHIS Public Use Files (section 3.1). The set of variables bearing on health and retirement that remained reasonably constant in the NHIS over this period is smaller than one might like. Still, there are several that promise to be useful, and this chapter therefore goes on to review the salient strengths and weaknesses of measures of labor-force activity (3.2), perceived limitations (3.3), medical care utilization (3.4), and subjectively assessed health (3.5). Each variable type, and specific measures used in the NHIS during 1969–81, is discussed in turn as a possible indicator of recent changes near the age of retirement.

3.1 The NHIS Public Use Microdata

When this study began, microdata were available for the years 1969 through 1981. Conveniently, this period comprises all the years between the first and second major redesigns of the NHIS, and the comparability of data from different years is generally very good.

Selected variables were extracted for everyone aged 55–70 at the time of interview. As discussed earlier, the primary focus of this study is the population aged 62–67 that will be faced with a choice between working longer or receiving reduced retirement benefits. However, to assess the effect of increasing age on the various health measures, and to provide a check on apparent trends based on substantially larger samples for each year, this age span was extended to include persons as young as 55 and as old as 70.

Table E shows the raw, unweighted number of sample

Table E.—Raw count of unweighted cases in National Health Interview Survey public use files

Survey year	Men aged		Women aged	
	62–67	55–70	62–67	55–70
1969	2,719	7,826	3,154	9,202
1970	2,492	7,002	2,931	8,174
1971	2,825	8,186	3,409	9,683
1972	2,946	8,324	3,491	9,625
1973	2,561	7,451	3,039	8,691
1974	2,571	7,333	3,144	8,534
1975	2,490	7,356	3,067	8,612
1976	2,471	7,134	3,028	8,629
1977	2,572	7,215	3,031	8,489
1978	2,493	7,016	2,996	8,328
1979	2,475	7,149	3,118	8,618
1980	2,405	6,922	2,928	8,130
1981	2,519	7,183	2,956	8,369

men and women interviewed in each year. Throughout the analyses, men and women are examined separately. They were offered significantly different response categories on the key usual activity variable, which significantly affected reported limitations. Moreover, sex differences in health, mortality, and disease are well established. Other major demographic classifiers, particularly race, are also known to be associated with such differences. They were not examined separately here because of their relatively peripheral implications for retirement policy. Social security has traditionally treated men and women differently, while it has not discriminated on the basis of other characteristics. Distinctions are no longer made explicitly on the basis of gender, but widespread differences in earnings histories mean that program features such as spousal benefits affect men and women quite differently, and these sex differentials are likely to continue as an integral consideration when future policy changes are made. Other demographic distinctions are much less central to the program.

3.2 Labor-Force Activity

As mentioned earlier, the NHIS labor-force data leave something to be desired. Current labor-force status is coded in the "usual activity" variable. This is quite satisfactory for establishing who is currently working. For those who are out of the labor force, comparability with other data is not as good. Men have the choice of reporting either "retired for health reasons" or "retired for other reasons," except that all retirement was grouped together in 1969.[7] Women who are not working, however, also have the option of reporting "housework," and most of them take it. It is therefore not possible to compare men and women on such interesting issues as how many retirements have been health-related, or indeed to examine women at all for retirement reasons.

The complete lack of retrospective data also limits what can be done. Because it is impossible to say when someone who is now retired last worked, the distinction between retirement for health and retirement for other reasons loses much of its meaning at more advanced ages. Many persons who retired for nonhealth reasons may have subsequently suffered health problems that would keep them from returning to work. Similarly, occupation and industry information is available only for current workers, so retirement rates from different types of jobs can only be estimated indirectly and, unfortunately, it is impossible to say whether health-related retirements are more or less common from particular job categories.

Another apparent measure of health, **work loss days,** essentially reflects labor-force participation rates. It may be an effective health measure in groups whose rates are high (such as men under 55) but health-related work loss days among the relatively small working minority of the older population (whose health is probably atypical) are rather difficult to interpret. Anyone who has stopped working because of health can be said to have lost all possible work days, but is completely missed by this measure.

3.3 Measures of Limitation

The limitation questions, which have often been taken as disability measures, require some qualification. One of the most commonly used, derived from a series of standard questions in the NHIS interview, classifies the sample into four categories:

Cannot perform usual activity
Can perform usual activity, but limited in amount and kind
Can perform usual activity, but limited in outside ac tivity
Not limited.

This **usual activity limitation** can indeed be taken as a measure of work disability for the NHIS men; the only usual activity they can refer to is work, even among the retired. However, because most women who are not working at advanced ages give "housework" as their usual activity, this variable seems to be measuring something else among women. Gender differences in the distribution of limitations may exist, of course, but the rather striking differences between men and women strongly suggest that housework is generally a less demanding activity. Men and women probably cannot be compared using this variable.[8]

A series of questions about the last two weeks concern the number of days in which illness or injury forced each person

to stay in bed all or most of the day
to miss work (if employed)
to "cut down on things" he or she usually does.

The **bed days** measure is probably the most reliable indicator of impairment. Whether working or retired, whether faced with a demanding routine or a minimal one, few people are likely to confine themselves to bed unless they feel it to be necessary.

Restricted activity days (which have been used in some studies as a measure of "disability days") are also relevant to everyone and are presumably a more sensitive measure of marginal impairments, but they are a less satisfactory comparative measure because the probability that they will be reported can differ substantially at a given level of impairment, according to how demanding the "usual" routine may be.

[7]A very small percentage of men and women in this older age range reported "something else," and a few cases are coded "unknown."

[8]Comparisons will be possible for later years. As part of the 1982 revision, the HIS now asks an explicit work limitation question of men and women, regardless of their reported usual activity.

A final measure derived from this question sequence is the **number of chronic conditions causing limitation** (available only for the years 1969–78). It is presented here rather tentatively because the relative importance of the different factors that it reflects is not clear.

On the one hand, both the failure-success and dynamic equilibrium models suggest that the number of underlying chronic problems should be increasingly over time, while the mortality-compression model implies the opposite. If people continue to become ill at the usual rate (that is, incidence rates are unchanged) but control of the lethal effects or a slowing of the progression of disease is keeping them alive longer, then the number of chronic conditions (the prevalence rate) in the population should rise steadily. If control of disease is not significantly improved but the onset of disease is being delayed, then the age-standardized prevalence rates should be declining.

On the other hand, this variable is based on respondent perceptions. Apparent changes may be significantly affected by changes in the level of health awareness and accommodation to disease. If there is an increasing readiness to cut back on work (that is, increasing affordability and social acceptability of adopting the "sick role") then more and more conditions will be reported as limiting, even if their overall prevalence and severity is unchanged.

Moreover, while many disabling problems are all too obvious, some (notably the relatively common circulatory problems) may have few acute symptoms. Cutting back on work may be medically advisable as a precautionary measure, but it will not happen as long as the problem is undiagnosed. There is some evidence that changing public self-awareness may be a significant factor. One of the findings of the NCHS examination studies was that the prevalence of high blood pressure changed little during the sixties, but the number of persons aware that they had the problem almost doubled (Crimmins, 1981). Changes in the lag between onset and victim awareness may have been significant for other conditions in the period under study.

3.4 Measures of Medical Care Utilization

This class of variables comprises the number of **doctor visits,** nights spent in hospital, and hospital admissions during the past 12 months. From the latter two, a fourth measure of average duration of hospital stay can be derived.

These measures are not entirely free from problems of telescoping recall and inconsistent understanding of the questions. For example, the NHIS attempts to standardize the concept of "doctor visit" by asking the following sequence:

> During the past 2 weeks how many times did you see a medical doctor?
>
> During that 2-week period, did anyone in the family go to a doctor's office or clinic for shots, X-rays, tests, or examinations?
>
> During that period, did anyone in the family get any medical advice from a doctor over the telephone?

Despite the rather specific nature of these questions, methodological work with the NHIS has shown substantial differences in reporting (Givens and Moss, 1981). Added follow-up questions revealed considerable differences in the extent to which people take the questions about "medical doctors" to apply to ophthalmologists and psychiatrists.

Even assuming that reporting problems do not seriously distort the true number of doctor visits, this variable is probably the most difficult utilization measure to interpret. Access to doctors may be significantly affected by nonmedical factors that have changed in recent years, such as the availability of physicians in specific geographic areas and the extent of health insurance coverage. Moreover, large numbers of visits amount to no more than "seeing the doctor" for reassurance, and for transitory respiratory and intestinal problems that can neither be treated with modern medical technology nor have any long-term implications for work impairment (Thomas, 1977).

These ambiguities are rather less severe for the hospital variables. **Hospital nights,** and even more **episodes of hospitalization,** are relatively memorable events that are presumably less subject to omission or distortion in respondent reporting. Moreover, admission to hospitals is usually taken on the authority of a physician and is more likely to reflect the presence of a clinically diagnosed nontrivial health problem. It may, however, also be affected by differential insurance and Medicare coverage, and trends in medical opinion favoring longer or shorter stays for particular conditions, or outpatient rather than inpatient care.

Though the utilization measures have these potential weaknesses, a recent study shows that they have some face validity as indicators of general health. Shapiro and Roos (1982) used records drawn from the Manitoba Department of Health and Social Development to compare retired and employed elderly persons. Because Manitoba provides full reimbursement for medical services, these records presumably provide reasonably complete data set for a representative sample. Retired persons saw doctors with about the same frequency as the employed, but were more likely to be hospitalized. Among both the employed and retired, frequency of doctor visits was positively associated with lower self-rated health and physician diagnoses of more serious illness. The greater extent of hospitalization was due to the fact that more retired persons had serious health conditions. Shapiro and Roos conclude that both physician and hospital services are used selectively according to medical need as defined by both normative and subjective standards.

3.5 Subjective Health Assessment

This final type of health variable has been collected by the NHIS since 1972. The specific question wording has been:

> Compared to other persons _____'s age, would you say that his health is excellent, good, fair, or poor?[9]

Similar or identical items have been used quite widely, and there is substantial evidence that they relate well to health as measured by other more objective (and often difficult to assess) health standards. Ware et al. (1978) have summarized the findings of 39 empirical studies and found frequent significant associations between general health status and such variables as functional status, subsequent mortality, chronic health problems, mental health, physician assessments, social interaction, health knowledge, and medical care utilization. Later studies have continued to provide evidence for the validity of this relatively simple measure.

It does, however, have some drawbacks for trend analysis. Health is explicitly measured relative to "other persons your age." Similar relative assessments of income have found remarkable stability even when countries with substantially different real incomes, or years separated by significant real income changes, are being compared. Apparently people make these judgments relative to conditions around them at the moment, and therefore no great subjective changes are to be expected even if, e.g., health is deteriorating steadily.

Still, the norm with which present health is being compared is lagged to some extent, and it reflects at least the recent past. If health really does decline with age, there should be a consistent tendency to find this week's health not quite as good as it has "normally" been recently; this would lead in turn to a decline in average status with age. This is precisely what NCHS has found—average perceived health declines slowly until the most advanced ages, when it rises somewhat (Ries, 1983). Apparently the oldest respondents use a different standard, becoming more and more aware that most persons their age are no longer living. Similarly, if health has been generally improving or declining then modest changes in average health would be expected.

Chapter Four: Trends Observed in the NHIS Data

This chapter first presents trends in the NHIS health variables discussed in the preceding chapter for the near-retirement population (section 4.1). The somewhat unexpected pattern that emerges is then tested statistically, using a general linear model at both the person and time-series level, to establish whether they can be explained away as random fluctuations (section 4.2).

The primary focus is on the direction of changes over time that can be observed during the years 1969–81 for which microdata are available. To the extent that consistent patterns appear, they suggest whether persons nearing retirement will be more or less healthy than they are now when the retirement age is increased. Age and cohort trends (or at least patterns of differences) can also be examined, at least in principle.

Age differences are reviewed, though more briefly, to establish that ill health does indeed generally increase with age. This tends to validate the measures; indeed, if no systematic increases were to appear, the only important conclusion this paper could reach would be that health is not relevant to raising the retirement age.

No attempt is made to examine cohort differences here. It is likely, indeed almost certain, that a lifetime's experience of different period effects causes different birth cohorts to have different levels of good and bad health, and to make different retirement decisions as they approach old age. Extrapolations from the experience of persons born around the beginning of the First World War, whose status can be examined here, to the likely experience of the later-born cohorts who will face a higher retirement age must always be somewhat tentative.

However, the theoretical problems in disentangling age, period, and cohort effects are formidable, and the range of cohorts that can be observed using these data is very narrow in any case. The experience of persons during the ages 62–67 can be seen in the years 1969–81 only for cohorts born during 1907–14. Not only is this range so narrow that little systematic variation is likely to appear, but there are no very strong grounds for believing that they could be extrapolated to cohorts born much later.

4.1 Changes in the Health Variables

Results are presented in this section in tables which generally present detailed counts of levels of each dependent variable for each year for both the narrow 62–67 age group and the broader, larger-based 55–70 group by sex. All estimates are based on weighted data.

4.1.a Work and retirement. As noted in section 3.2 above, differences in the way the NHIS treated men and women before the 1982 revision mean that only the results for men can readily be compared to other trend data. They contain few surprises (table F).[10] Over the period, the percentage working does decline steadily and the percentage retired increases. What is odd is the close match be-

[9]Note that this item is asked not only for the person being interviewed, but also for other household members not present. Methodological tests varying respondent rules in the HIS (Kovar and Wilson, 1976) have shown that proxy reporting does not substantially change the pattern of observed health, though some shifts are apparent between "excellent" and "good," at one end of the health continuum, and "fair" and "poor" at the other.

[10]Some of the values presented in tables F–L differ slightly from those in the previously released version of this paper because of a previously undetected problem with the weighting algorithm. The corrected weighted estimates are presented here.

Table F.—Percent of persons with specified labor-force status

Survey year	Working, aged		Retired for health reasons, aged		Retired for other reasons, aged	
	62–67	55–70	62–67	55–70	62–67	55–70
	Men					
1970	57.9	69.3	15.7	11.3	23.8	15.9
1971	56.0	68.0	14.4	11.0	25.8	17.0
1972	54.5	66.9	15.0	11.0	26.1	17.4
1973	49.6	64.5	18.1	12.4	29.1	19.4
1974	48.2	63.2	17.2	13.1	30.8	19.8
1975	45.3	60.6	18.0	13.5	32.4	21.0
1976	42.9	58.9	19.1	13.9	34.0	22.4
1977	44.3	58.3	19.5	15.0	32.9	22.3
1978	43.9	58.3	18.8	14.5	34.2	22.7
1979	42.1	57.0	19.6	15.0	34.4	23.4
1980	43.0	56.8	20.0	15.6	34.0	23.3
1981	38.5	55.7	20.4	15.1	38.1	24.5
	Women					
1970	23.9	32.4	1.0	0.8	1.8	1.2
1971	22.9	30.7	1.2	.8	1.4	.9
1972	22.3	30.6	.8	.6	1.5	.9
1973	22.5	30.8	1.3	.8	1.8	1.0
1974	22.1	30.6	1.2	.9	1.9	1.2
1975	22.3	29.6	1.2	1.0	2.2	1.3
1976	20.5	28.9	1.2	1.0	2.8	1.8
1977	21.7	29.7	1.4	1.1	2.8	1.8
1978	20.8	29.7	1.6	1.3	3.4	2.2
1979	21.4	29.4	1.9	1.5	3.3	2.3
1980	22.0	30.4	1.7	1.3	4.3	2.6
1981	20.9	30.9	1.6	1.3	4.0	3.0

tween the relative growth in the percentages who are retired for health and nonhealth reasons.

If the trend toward earlier retirement has been caused by poor health, then the health-retired group should be growing relative to the group retired for other reasons. If, alternatively, earlier retirement reflects variables independent of health—more attractive benefits, greater social acceptability, or whatever—then the health-retired group would grow more slowly. Of course several exogenous variables, some reflecting health and some not, may have been working simultaneously and cancelling each other out during the seventies, but it is odd that they kept in such close step.

4.1.b Limitations. In keeping with the increase in health-related retirement, limitations in **usual activity** have been increasing both with age and over time. The different response categories available to men and women lead to rather large reported sex differences. When the response differences are offset by combining all forms of limitation (completely unable to carry out major activity; limited in major activity; limited only in other activities), then men and women are quite similar (table G). Over time both sexes show a similar pattern of fairly rapid increases during the early seventies and slower and more erratic increases in the late seventies.

When limitation is measured by the **number of days spent mostly in bed** during the past two weeks, no clear trend appears for the 62–67 group between 1969 and 1981 (table H). The number of bed days fluctuated considerably from year to year (and not always in the same direction for men and women, which makes short-term factors such as influenza epidemics a less plausible explanation). To the extent that a trend appears, bed disability tended to rise until 1976 or 1977 and has tended to decrease since. The number of **restricted activity days** reported has tended to increase over the years, though less consistently so after 1975.

The average number of **limiting chronic conditions** shows a more definite pattern of historical changes, whether based on the impaired or the population as a whole (table I). Among both men and women, the relative number of disabling conditions rose steadily during the period 1969–74, then stabilized and showed signs of decline by 1978.[11] This does not fit any of the mortality models well, but the parallel with trends in the disability benefit programs is interesting.

4.1.c Utilization. The **number of doctor visits** during the past year has a less well-defined pattern and does not correspond to the upward trends in retirement and reported limitations. Year-to-year fluctuations over the period have been very substantial, though there has been some suggestion of a decrease in the most recent years. Perhaps all that can be said is that the doctor visit variable does not present any support for the notion that health has been deteriorating in this older group.

The **nights spent in hospital** and **number of hospital**

[11]Given this apparent turnabout, it is especially unfortunate that the "number of limiting conditions" variables does not appear on the file after 1978.

Table G.—Percent of men and women with specific degrees of limitation

Survey year	Cannot perform usual activity, aged		Limited in major activity, aged		Limited in other activity, aged	
	62–67	55–70	62–67	55–70	62–67	55–70
	Men					
1969	17.65	13.65	12.95	12.57	3.20	3.23
1970	18.66	14.42	13.28	12.38	3.65	4.10
1971	17.56	13.85	14.12	12.79	3.72	3.97
1972	18.33	14.07	14.26	13.14	3.73	4.48
1973	20.34	15.39	14.96	13.68	3.40	4.56
1974	21.39	16.92	13.61	13.51	4.90	5.30
1975	21.12	17.46	13.09	12.72	4.58	4.80
1976	22.14	17.44	13.19	12.25	4.73	5.12
1977	22.82	18.52	12.79	12.24	4.35	4.32
1978	21.58	18.09	13.12	11.84	4.57	4.79
1979	22.02	18.49	12.65	11.88	4.97	5.37
1980	21.70	18.82	13.43	12.47	4.70	4.77
1981	23.86	19.21	12.19	11.49	4.25	4.52
	Women					
1969	3.46	3.16	19.31	17.02	4.31	4.09
1970	3.48	3.17	18.46	17.91	5.60	5.26
1971	3.37	2.80	19.57	17.95	5.40	5.23
1972	3.18	2.82	20.51	18.30	5.59	5.32
1973	3.49	3.12	22.28	20.35	6.02	5.83
1974	4.10	3.36	22.23	20.78	5.76	5.77
1975	4.37	3.46	23.18	21.24	6.10	5.90
1976	4.39	3.62	22.49	20.63	6.47	6.41
1977	3.66	3.36	20.39	19.46	6.14	5.37
1978	4.44	3.63	22.10	19.70	6.58	6.30
1979	4.52	3.79	21.74	20.29	7.15	6.82
1980	3.93	3.62	22.27	20.65	6.69	6.16
1981	4.09	3.86	23.17	19.95	7.00	6.30

admissions variables are measuring very similar phenomena, and their trends are very similar. Their derivative, **average hospital stay,** is somewhat distinctive, but differences are apparent between men and women: Men are more likely to use hospitals at any age under consideration. The trends over time also differ somewhat. Because the average stay has been declining fairly steadily in the 62–67 age group, trends in hospital nights are not the same as trends in hospital admissions.[12] Women tended to be admitted more frequently into the early seventies, then leveled off, so that the number of nights has been declining. The general upward trend in admissions persisted for men at least until the late seventies, so that the number of hospital nights for them only decreased in the last 3 years under study.

4.1.d Perceived health status. Shifts among the reported health levels have been small and rather erratic from year to year, more or less offsetting one another (table J). The mean rating has therefore remained quite stable, though for both men and women there is some indication of a tendency for health to worsen that bottomed out in 1974, followed by a more recent, opposite tendency for health to improve.

4.1.e Age differentials. As mentioned earlier, this paper is not primarily concerned with demonstrating that health generally deteriorates with age; this assumption, which is central to retirement age policies, is quite well established. However, as a check on whether the variables which are taken to be health indicators here are in fact serving that purpose, table K summarizes differences by year of age for men and women.

With most measures, a rather consistent trend toward poorer health as age increases duly appears. It is interesting that no "cliffs" of suddenly diminished health appear to signal a natural age of retirement. Several variables display distinctive features that are worth noting.

The "usual activity" by which men judge their limitation is work. The proportion who cannot perform this activity at all rises rather steadily from one out of nine at age 55 to about one out of four at 70. The increases in percentages reporting less severe limitation are much smaller and more erratic. The pattern for women is quite different. The percentage whose limitation is complete does increase with age, but is always very small (rates for 70-year-old women are only about half those for 55-year-old men). Instead, there is a larger and more systematic increase in the percentage reporting less severe limitation; evidently it is difficult to be so severely impaired as to completely perclude any housework. It is also noteworthy that even at age 70, a large majority of men and women do not consider themselves to be limited in any activities at all.

The number of limiting chronic conditions does increase as a function of age, but the rise mostly reflects a growing fraction of the population who report a limitation and are asked about its cause. When the mean number is calcu-

[12]This decline in average stay over the period is something of a surprise. It may only reflect a prevailing trend in medical practice toward outpatient care, but it certainly suggests that if the health of older persons has been changing in any way, it has been getting better.

Table H.—Measures of impairment during past two weeks

Survey year	Mean days of restricted activity, by age		Mean days spent all or mostly in bed, by age	
	62–67	55–70	62–67	55–70
	Men			
1969	0.99	0.91	0.37	0.32
1970	1.03	.90	.40	.32
1971	1.00	.92	.34	.32
1972	1.06	1.02	.39	.35
1973	1.07	.97	.38	.32
1974	1.15	1.09	.39	.37
1975	1.14	1.10	.38	.34
1976	1.26	1.15	.47	.40
1977	1.02	1.00	.32	.34
1978	1.06	1.12	.41	.37
1979	1.15	1.13	.42	.34
1980	1.12	1.20	.32	.34
1981	1.17	1.18	.35	.34
	Women			
1969	1.09	1.00	0.35	0.36
1970	1.03	1.01	.46	.43
1971	1.05	1.02	.37	.37
1972	1.26	1.16	.44	.40
1973	1.15	1.04	.39	.36
1974	1.25	1.19	.44	.40
1975	1.26	1.17	.38	.40
1976	1.34	1.27	.46	.44
1977	1.30	1.21	.51	.43
1978	1.46	1.32	.47	.45
1979	1.39	1.30	.44	.41
1980	1.35	1.31	.39	.42
1981	1.33	1.25	.44	.41

Table I.—Average number of limiting chronic conditions

Survey year	All persons, by age		Persons with limitations, by age	
	62–67	55–70	62–67	55–70
	Men			
1969	0.452	0.396	1.337	1.354
1970	.504	.434	1.420	1.400
1971	.507	.440	1.448	1.447
1972	.537	.460	1.477	1.455
1973	.577	.492	1.499	1.472
1974	.627	.559	1.576	1.568
1975	.609	.542	1.571	1.548
1976	.618	.533	1.521	1.527
1977	.621	.542	1.560	1.548
1978	.602	.543	1.543	1.565
	Women			
1969	0.371	0.327	1.386	1.353
1970	.384	.361	1.411	1.397
1971	.393	.364	1.413	1.417
1972	.429	.385	1.453	1.457
1973	.505	.457	1.585	1.557
1974	.520	.481	1.632	1.610
1975	.549	.499	1.633	1.624
1976	.548	.492	1.635	1.594
1977	.484	.445	1.592	1.577
1978	.524	.473	1.587	1.585

lated only for the impaired (as shown in table L), little or no upward trend appears. This is a bit surprising. As age increases, chronic conditions should accumulate among the fraction who have been impaired for sometime; the average number in the whole group of impaired persons would be expected to rise. Perhaps the lack of systematic differences by age reflects a tendency to disregard the effects of health problems that appeared after impairment had already begun.

One factor that might tend to distort the relation between health and hospitalization is the significant increase in cost coverage when Medicare coverage begins at age 65.[13] If the effective cost falls substantially at 65, a rapid increase in hospitalization might be expected. The NHIS asks these questions about the previous year, but takes age as of the interview date, so the 65-year-olds in sample have spent part of the previous year eligible for Medicare and part not. The expected trend would therefore be a sharp rise through the ages 64 (none of the past year covered), 65 (some of the past year covered), and 66 (all of the past year covered). Something like this does appear for women, but not for men.

As in-house NCHS analyses have shown (Ries, 1983), both men and women tend to have somewhat lower health ratings as age increases over the range 55–70. Their stability is perhaps more impressive, however. The proportion reporting relatively poor health is quite small, even at 70, and the great majority at all ages consider themselves to be in "good" or "excellent" health. The greatest decline appears to take place before the earliest retirement age of 62, rather than after, and health is particularly stable through the 62–67 age range affected by raising the retirement age. The mean rating is always very close to 2, that is, "good." Moreover, it does not worsen consistently with age, especially among persons in their 60's.

4.2 Multivariate Tests of Significance

The review of period changes suggests that there were not one but two trends during the years 1969–81. During the first half of the seventies the trend was generally toward worsening health in the age groups near retirement age. During the later seventies the trend was toward stable, or perhaps even improving, health. Among the time series reviewed in Chapter 1, only the disability programs have shown a similar pattern. If the trend in general health really reversed during the seventies, this has three important consequences.

First, despite the seemingly contradictory trends since the late sixties, there could indeed be a direct (though lagged) link between lower age-specific mortality and better health in the longer run. Perhaps their interrelations were only obscured for a few years, as the new trend showed up on different indicators more quickly or slowly. Second, studies (such as those discussed in section 2.3) that compared cross-sectional health measures at different

[13]Persons who have been receiving disability benefits for two years (predominantly men) are covered at lower ages, and some who have too brief a history of covered employment are not covered at any age, but both groups are relatively small and should not affect the trend much.

Table J.—Measures of hospital utilization during past year, by age

Survey year	Doctor visits		Hospital admissions		Hospital nights		Average hospital stay	
	62–67	55–70	62–67	55–70	62–67	55–70	62–67	55–70
	Men							
1969	4.22	3.86	0.170	0.162	2.13	2.16	12.52	13.27
1970	4.80	4.39	.180	.161	2.10	1.90	11.67	11.82
1971	4.44	4.25	.193	.179	2.32	2.08	12.05	11.65
1972	4.71	4.30	.207	.189	2.24	2.17	10.82	11.47
1973	4.15	4.03	.185	.187	1.94	1.98	10.51	10.59
1974	4.23	4.20	.201	.198	2.15	2.22	10.67	11.22
1975	4.73	4.55	.214	.200	2.24	2.21	10.46	11.06
1976	4.58	4.40	.223	.204	2.36	2.18	10.57	10.71
1977	4.28	4.44	.215	.196	2.32	2.02	10.82	10.32
1978	4.79	4.65	.212	.195	2.31	2.01	10.94	10.33
1979	5.09	4.43	.220	.200	2.36	2.05	10.73	10.30
1980	4.12	4.07	.222	.202	2.06	1.96	9.28	9.74
1981	4.08	4.11	.221	.209	1.91	1.99	8.65	9.49
	Women							
1969	5.25	4.92	0.155	0.150	1.89	1.78	12.22	11.91
1970	4.80	4.76	.145	.150	1.55	1.60	10.69	10.67
1971	4.84	4.94	.173	.161	1.68	1.59	9.74	9.90
1972	5.24	5.08	.173	.163	2.04	1.76	11.79	10.79
1973	5.14	5.06	.186	.168	1.99	1.66	10.71	9.89
1974	5.03	4.96	.180	.172	1.95	1.76	10.83	10.24
1975	5.38	5.07	.176	.174	1.91	1.77	10.86	10.16
1976	5.22	5.18	.195	.183	1.84	1.74	9.39	9.54
1977	5.00	5.08	.177	.174	1.74	1.64	9.83	9.44
1978	5.41	5.52	.186	.183	1.79	1.71	9.63	9.36
1979	4.97	5.05	.172	.175	1.69	1.60	9.85	9.18
1980	4.93	4.70	.181	.177	1.63	1.62	8.99	9.12
1981	4.50	4.46	.189	.175	1.59	1.53	8.39	8.78

Table K.—Subjectively assessed health status and percent of persons in specified categories, by age

Survey year	Average status		Percent in excellent health		Percent in good health		Subtotal: Percent in either excellent or good health		Percent in fair health		Percent in poor health	
	62–67	55–70	62–67	55–70	62–67	55–70	62–67	55–70	62–67	55–70	62–67	55–70
	Men											
1972	2.07	2.04	32.87	33.75	37.43	38.32	70.30	72.08	20.51	19.25	8.38	8.01
1973	2.11	2.05	30.80	32.51	38.84	39.72	69.64	72.23	19.90	18.59	9.89	8.63
1974	2.19	2.11	28.44	30.92	36.59	37.87	65.04	68.79	23.63	20.87	10.57	9.73
1975	2.10	2.07	31.13	32.21	38.15	39.19	69.28	71.40	21.13	18.78	8.88	9.13
1976	2.16	2.07	28.98	31.78	36.89	39.43	65.87	71.20	24.36	19.88	8.93	8.33
1977	2.09	2.05	30.79	33.15	38.59	38.64	69.38	71.79	21.59	18.87	8.46	8.73
1978	2.09	2.05	31.35	32.46	38.54	39.69	69.90	72.14	20.45	18.56	9.20	8.80
1979	2.10	2.06	30.98	33.07	38.55	38.40	69.53	71.47	20.24	18.38	9.49	9.39
1980	2.09	2.04	31.43	34.03	39.02	37.92	70.45	71.96	19.45	18.25	9.68	9.39
1981	2.10	2.05	30.20	33.19	40.15	39.11	70.35	72.30	19.56	17.65	9.65	9.57
	Women											
1972	2.08	2.05	30.03	30.57	40.54	41.84	70.57	72.40	21.43	20.44	7.13	6.50
1973	2.12	2.08	28.37	29.25	40.18	41.43	68.55	70.68	23.41	21.57	7.37	7.16
1974	2.14	2.11	27.00	27.83	41.03	41.95	68.03	69.79	23.66	22.23	7.73	7.32
1975	2.07	2.06	29.69	29.43	41.87	43.15	71.56	72.58	20.75	20.23	7.15	6.48
1976	2.12	2.08	27.33	29.00	41.83	42.50	69.16	71.50	22.90	21.03	7.30	6.85
1977	2.10	2.07	28.31	29.41	41.93	42.78	70.24	72.19	21.82	20.22	7.04	6.88
1978	2.10	2.06	27.31	29.39	43.83	43.64	71.14	73.03	20.83	19.58	7.32	6.79
1979	2.13	2.09	26.78	28.90	42.65	41.95	69.44	70.85	22.59	21.20	7.21	7.11
1980	2.11	2.07	28.04	29.54	42.44	42.79	70.48	72.33	20.57	19.66	8.17	7.44
1981	2.09	2.05	28.11	29.48	43.04	43.56	71.15	73.04	21.26	19.84	7.07	6.60

points before and after the turnaround may have been somewhat misled by trends moving in opposite directions and misjudged the direction and amount of change. Charts 1–4 demonstrate this by plotting four variables (annual doctor visits, number of limiting chronic conditions, annual hospital admissions, and percent of persons with

Table L.—Age differences in selected health variables

Age	Complete limitation	Other limitation	Limiting conditions (if limited)	Bed days	Restricted days	Doctor visits	Hospital nights	Hospital admissions	Health status
	Men								
55	9.22	14.87	1.46	0.280	0.92	3.94	1.62	0.157	1.92
56	9.65	16.68	1.48	.288	.96	3.91	1.73	.167	1.96
57	10.48	16.15	1.46	.277	.90	3.87	1.76	.160	1.97
58	11.72	15.83	1.50	.288	1.00	4.14	2.04	.176	1.99
59	12.72	16.19	1.50	.337	1.04	4.19	1.95	.177	2.02
60	14.01	16.85	1.56	.328	1.05	4.22	1.98	.181	2.02
61	16.14	17.01	1.51	.334	1.13	4.21	2.01	.187	2.07
62	17.75	17.19	1.49	.372	1.08	4.23	2.02	.196	2.07
63	19.54	17.22	1.52	.380	1.10	4.73	2.14	.196	2.11
64	20.82	17.02	1.52	.394	1.12	4.52	2.20	.209	2.08
65	21.58	16.76	1.50	.377	1.13	4.55	2.21	.203	2.09
66	22.43	18.29	1.49	.370	1.03	4.26	2.30	.219	2.09
67	23.43	18.57	1.50	.389	1.11	4.60	2.31	.214	2.09
68	24.80	18.95	1.46	.418	1.27	4.61	2.59	.241	2.14
69	25.37	19.48	1.52	.382	1.14	4.61	2.57	.228	2.11
70	24.47	18.90	1.46	.434	1.21	4.69	2.51	.222	2.07
	Women								
55	2.20	20.03	1.48	0.35	61.01	4.66	1.41	0.152	1.97
56	2.17	20.07	1.45	.315	.92	4.66	1.41	.149	1.97
57	2.64	21.92	1.51	.376	1.12	5.07	1.38	.156	2.02
58	2.44	22.08	1.50	.381	1.03	4.82	1.44	.155	2.01
59	2.76	22.51	1.49	.384	1.04	4.70	1.37	.153	2.03
60	3.08	24.06	1.53	.375	1.09	4.78	1.62	.160	2.05
61	3.27	25.29	1.56	.400	1.15	4.98	1.34	.154	2.06
62	3.63	25.22	1.52	.418	1.18	5.10	1.49	.157	2.09
63	3.62	25.70	1.56	.383	1.20	4.90	1.66	.169	2.06
64	3.73	27.67	1.53	.434	1.30	5.00	1.69	.164	2.08
65	4.12	27.05	1.57	.442	1.24	5.03	1.83	.180	2.07
66	4.06	29.96	1.56	.493	1.40	5.20	2.15	.205	2.09
67	4.56	29.79	1.52	.400	1.26	5.07	1.97	.191	2.12
68	4.52	30.15	1.55	.462	1.32	5.22	2.22	.211	2.09
69	4.61	31.40	1.49	.470	1.39	5.55	2.02	.201	2.08
70	4.97	30.10	1.61	.476	1.46	5.35	2.30	.202	2.08

perceived excellent health) which demonstrated a significant trend change over the period. Extending the best-fitting linear trend line projects generally small changes and poorer health; extending the best-fitting quadratic line shows larger changes and improving future health. Third, and most important, if health has been improving for several years now in the older population, the implications for retirement policy are quite different than those based on earlier, less encouraging trend data.

So, it is important to establish whether the changes observed in section 3.1 are meaningful shifts in trend or merely suggestive fluctuations in the data. Multivariate procedures that provide precise tests of the significance of just such apparent trends are readily available.[14] This section reports the results of a number of analyses using a general linear model including orthogonal polynomials to examine higher-older trends. The specific statistical package employed was the SAS procedure GLM (Freund and Littell, 1981).

4.2.a Structure of the analysis. Applying these procedures to the set of health variables rapidly generates a very large number of potentially interpretable statistics. A selected set of are shown here (tables M and N) to summarize and highlight the importance of the primary results. For both men and women, two measures of significance are provided for 12 health measures, using three models at two levels of analysis.

The first level corresponds to the usual econometric time-series analysis. It uses as its fundamental unit a time series of measurements for each single year of age between 55 and 70, in each year between 1969 and 1981, separately by sex. The input data therefore consist of 208 year-age-sex aggregates, derived from weighted data but given equal weight when the linear model parameters are estimated. The second level is a population, rather than time-series measure using individual weighted sample cases as the basic unit of analysis. The two are by no means equivalent, because individual cases are much more variable than cell means. Moreover, persons vary along many more dimensions than the year, age, and sex variables used to construct the time series.

It should not be surprising that age and year explain less of the variance in health variables at the person level, despite the fact that the significance (i.e., the unlikelihood of differences appearing purely by chance) increases as the sample sizes grow from 208 year-age categories to roughly 100,000 sample cases of each sex.

[14]More accurately, these procedures give an exact estimate of the probability that the trends observed could have appeared by chance, given some general assumptions about the random distribution of other factors that can be considered irrelevant sources of "noise" (technically, "error") in the data.

Table M.—Linear and Quadratic Trends Over Time in Aggregate Health Data

Variable	Sex	R-square	p of linear	p of quadratic	linear parameter	p not = 0	quadratic parameter	p not = 0
Restricted days	M	0.2142	0.0001	0.3392	3.30001	0.3357	−0.00082	0.3392
	F	.2402	.0001	.0425	7.66254	.0418	−.00193	.0425
Bed days	M	.0247	.0724	.0715	3.36684	.0713	−.00085	.0715
	F	.0394	.0030	.2152	2.10701	.2134	−.00053	.2143
Loss days	M	.0979	.0001	.0834	−3.71334	.0826	.00094	.0834
	F	.0189	.0454	.3426	−1.04296	.3417	.00026	.3426
Doctor visits	M	.0474	.1839	.0010	37.07989	.0010	−.00938	.0010
	F	.0972	.3541	.0001	51.35711	.0001	−.01300	.0001
Hospital nights	M	.0142	.2676	.1183	13.32011	.1185	−.00337	.1183
	F	.0165	.1661	.1231	13.03803	.1234	−.00329	.1231
Hospital admissions	M	.1804	.0001	.0044	1.77392	.0043	−.00045	.0044
	F	.1213	.0001	.0067	1.49895	.0066	−.00038	.0067
Health status	M	.0086	.7103	.2103	3.50374	.2103	−.00089	.2103
	F	.0084	.4176	.3178	2.15856	.3180	−.00055	.3178
Activity limitations	M	.0781	.0001	.0592	255.83889	.0587	−.06465	.0592
	F	.1388	.0001	.0068	258.38798	.0067	−.06350	.0068
Limiting conditions	M	.2034	.0001	.0277	8.87170	.0274	−.00224	.0277
	F	.3177	.0001	.0001	12.86971	.0001	−.00326	.0001
Limiting conditions (if limited)	M	.5170	.0001	.0002	10.06108	.0002	−.00254	.0002
	F	.5413	.0001	.0001	19.81270	.0001	−.00501	.0001
Excellent health	M	.0313	.1843	.0334	−268.78258	.0334	.06802	.0334
	F	.0240	.6361	.0330	−192.22073	.0329	.04862	.0330
Poor health	M	.0415	.0041	.7659	−16.52079	.7673	.00421	.7659
	F	.0015	.8682	.6029	20.61570	.6028	−.00521	.6029

Table N.—Significance of Regression Equations and Explained Variance

		Year model				Age model				Combined model			
		Cell level		Case level		Cell level		Case level		Cell level		Case level	
Variable	Sex	F	R*2	F	R*2	F	R*2	F	R*2	F	R*2	F	R*2
Restricted days	M	0.0001	0.215	0.0001	0.0007	0.0001	0.163	0.0001	0.0006	0.0001	0.383	0.0001	0.0014
	F	.0001	.240	.0001	.0009	.0001	.389	.0001	.0016	.0001	.630	.0001	.0025
Bed days	M	.0398	.025	.0775	.0001	.0001	.210	.0001	.0006	.0001	.234	.0001	.0007
	F	.0057	.039	.0365	.0001	.0001	.214	.0001	.0005	.0001	.255	.0001	.0005
Loss days	M	.0001	.098	.0001	.0006	.0001	.572	.0001	.0033	.0001	.680	.0001	.0039
	F	.0862	.049	.0002	.0002	.0001	.666	.0001	.0028	.0001	.693	.0001	.0030
Doctor visits	M	.0019	.047	.0021	.0001	.0001	.182	.0001	.0005	.0001	.243	.0001	.0007
	F	.0001	.097	.0001	.0002	.0001	.163	.0001	.0003	.0001	.264	.0001	.0017
Hospital nights	M	.1601	.014	.1852	.0000	.0001	.351	.0001	.0009	.0001	.366	.0001	.0009
	F	.1173	.017	.0660	.0000	.0001	.488	.0001	.0016	.0001	.507	.0001	.0017
Hospital admissions	M	.0001	.180	.0001	.0006	.0001	.369	.0001	.0017	.0001	.587	.0001	.0023
	F	.0001	.121	.0001	.0004	.0001	.410	.0001	.0014	.0001	.545	.0001	.0018
Health status	M	.4251	.009	.0842	.0001	.0001	.627	.0001	.0045	.0001	.639	.0001	.0046
	F	.4369	.008	.1493	.0000	.0001	.479	.0001	.0022	.0001	.499	.0001	.0023
Activity limitation	M	.0001	.078	.0001	.0019	.0001	.835	.0001	.0196	.0001	.912	.0001	.0212
	F	.0001	.139	.0001	.0020	.0001	.704	.0001	.0098	.0001	.844	.0001	.0116
Limiting conditions	M	.0001	.517	.0001	.0036	.0001	.673	.0001	.0132	.0001	.876	.0001	.0167
	F	.0001	.318	.0001	.0045	.0001	.524	.0001	.0076	.0001	.842	.0001	.0119
Limiting conditions (if limited)	M	.0001	.517	.0001	.0060	.1805	.024	.0258	.0004	.0001	.548	.0001	.0064
	F	.0001	.541	.0001	.0104	.0097	.057	.0001	.0010	.0001	.603	.0001	.0114
Excellent health	M	.0436	.031	.0001	.0737	.0001	.525	.0001	.0018	.0001	.564	.0001	.0759
	F	.0917	.024	.0001	.0630	.0001	.291	.0001	.0005	.0001	.390	.0001	.0637
Poor health	M	.0153	.042	.0001	.0169	.0001	.181	.0001	.0006	.0001	.222	.0001	.0174
	F	.8612	.002	.0001	.0125	.0001	.175	.0001	.0003	.0001	.193	.0001	.0127

The overall relevance of any linear model can, of course, be assessed in two ways. The significance of the F ratio of mean squares of predicted and residual variance provides a test of whether the preditors have any significance; the null hypothesis tested is whether the coefficients differ significantly from zero. This is a test of statistical significance in the formal sense. The coefficient of determination (the r-squared statistic) measures what proportion in the total variance of the dependent variable is explained by the predictors. If the coefficient of determination is

Chart 1.—Trends in the number of annual doctor visits

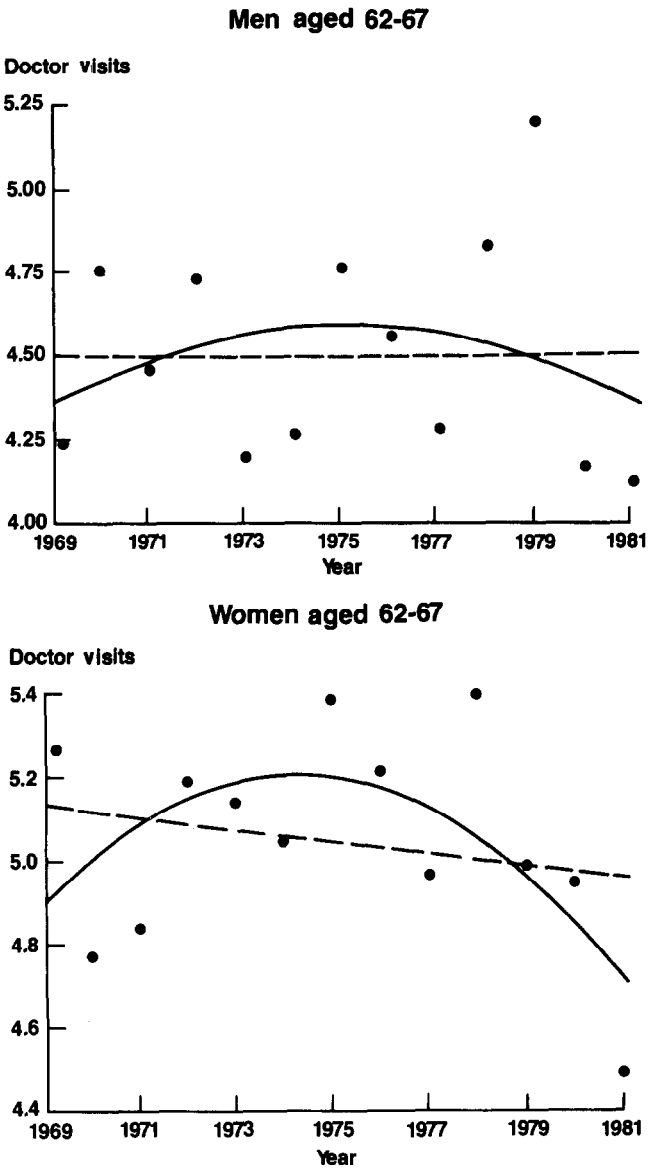
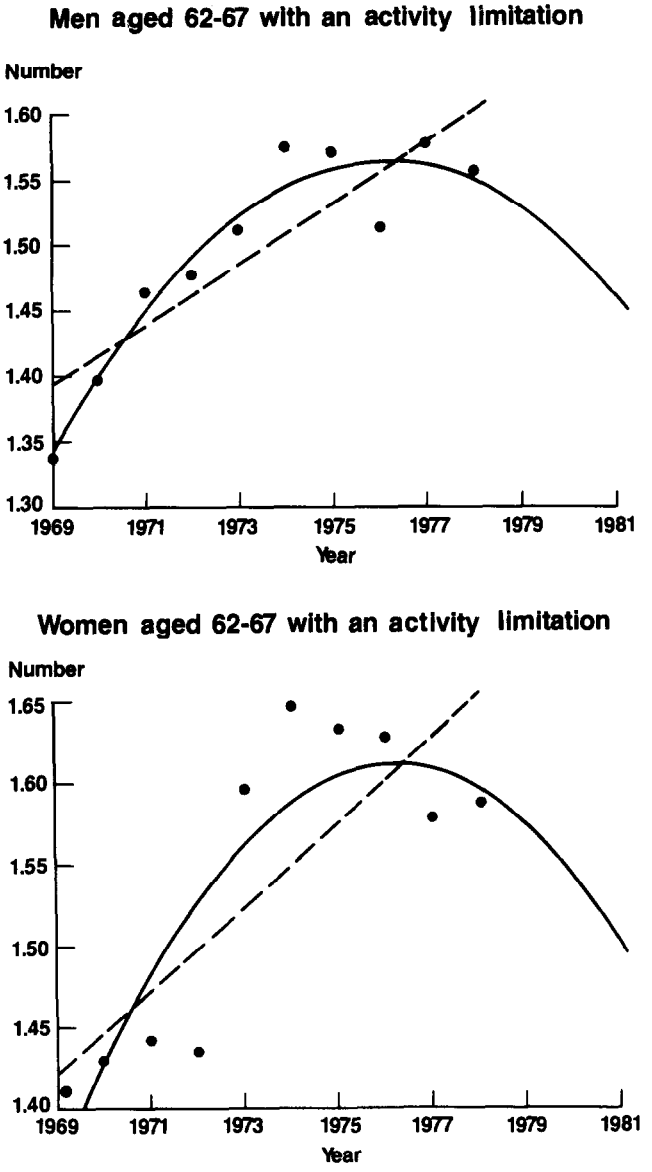


Chart 2.—Trends in the number of limiting chronic conditions



very small, then the predictors in the equation do not explain the dependent variable very significantly for any practical purpose, regardless of any formal significance. The distinction proves to be quite important here.

To avoid confounding age-specific period effects with any effects of changing age structure in the near-retirement population during the seventies, both period and age effects were combined into a trend model to which the time-series and individual data were separately fitted. In addition, each type of effect was tested separately.

The primary focus of this study is, of course, trends over time. In addition, most of the variables examined here provided at least a suggestion of a turnaround over the period. Therefore the period trend model

$$H_{ij} = \alpha_1 + \beta_1 Y_i + \beta_2 Y^2_i$$

(where H = a health variable at year i and age j, and Y is the year variable) regresses each health variable under consideration on both linear and quadratic year terms.

Polynomial age terms also seemed appropriate possibilities for inclusion. Commonsense observation suggests that in addition to a simple linear trend with age, a quadratic term may be justified here also. Some health problems and health-related limitations might worsen with age while most (or at least many) persons are still working, then tend to improve as most of them withdraw from the labor force and adjust to a presumably less stressful routine. Upward (or downward) trends are also likely to show three phases in this age range—one in the late 50's, when retirement is rare and increasing only slowly; a second during the earlier 60's, when retirement is increasing rapidly; and a third after about 65, when retirement

Chart 3.—Trends in the number of annual hospital admissions

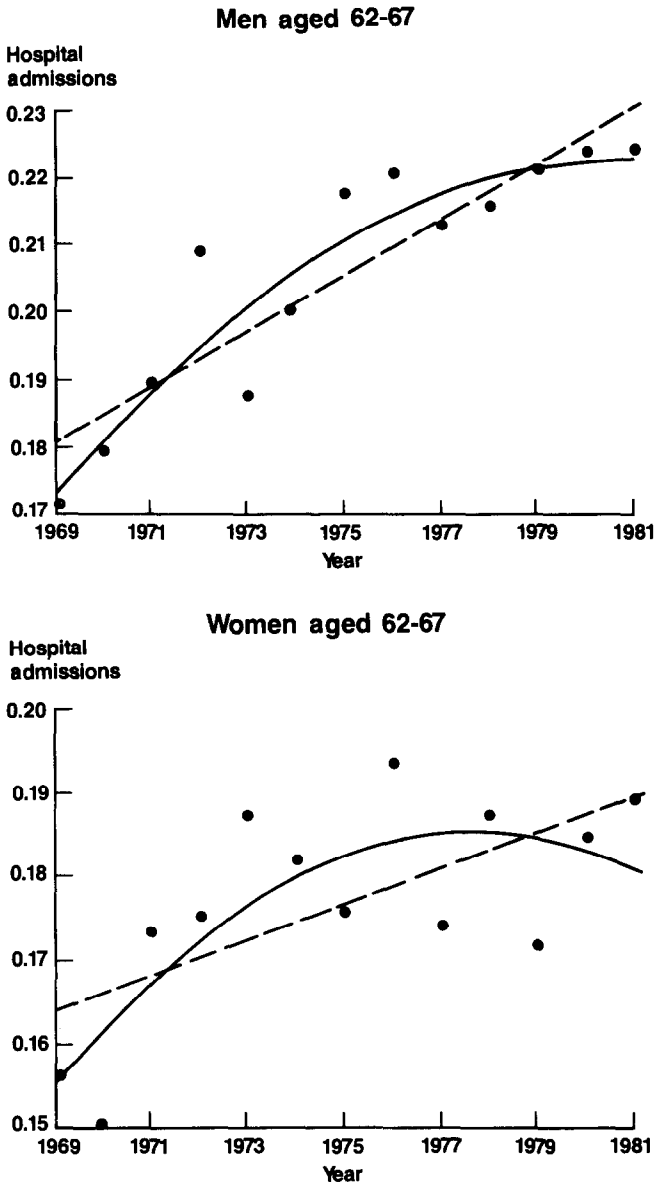
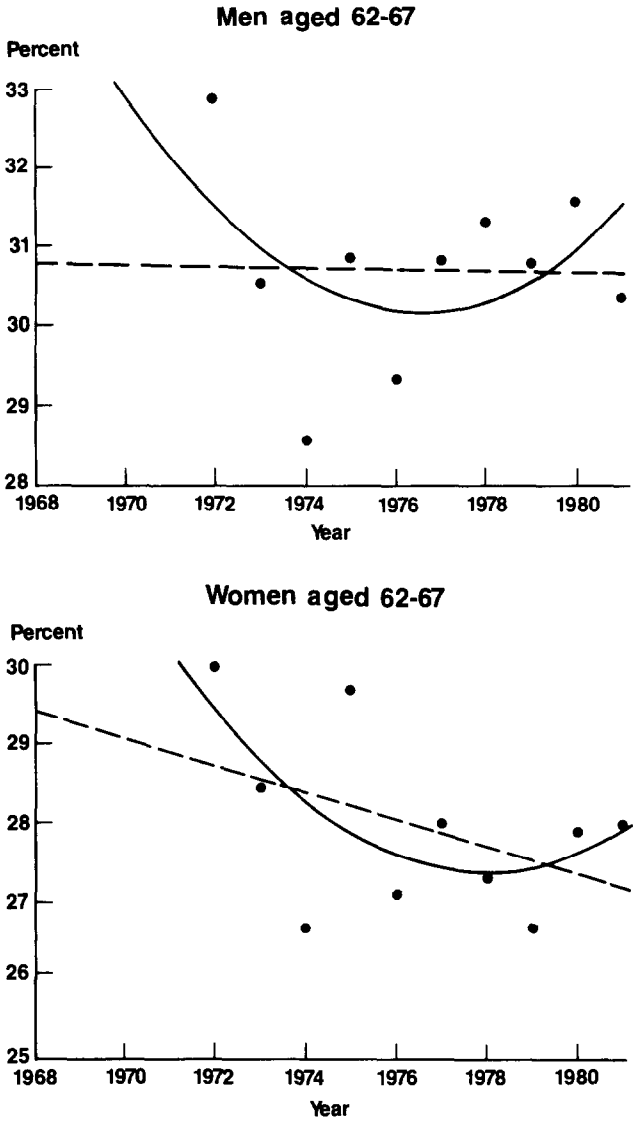


Chart 4.—Trends in the percent of population in excellent health



is nearly complete in the population. This was represented by a cubic term. The age trend model was therefore

$$H_{ij} = \alpha_2 + \beta_3 A_j + \beta_4 A^2_j + \beta_5 A^2_j$$

where A is the age variable.

Finally, the two two models were combined with the addition of an interaction term

$$H_{ij} = \alpha_3 + \beta_6 Y_i + \beta_7 Y^2_i + \beta_8 A_j + \beta_9 A^2_j + \beta_{10} A^3_j + \beta_{11} Y_i A_j$$

4.2.b Outcome and findings. The results summarized in table M are somewhat complex but vary in a fairly systematic manner. At the aggregate level of analysis, all measures are very significantly predicted by the combined model and for the most part a considerable amount of the variance is explained. Estimates are nearly as good from the age trend model, which contains only a subset of the combined predictors—only the number of limiting conditions reported by persons with limitations is not very well predicted. The period trend model does not do quite as well, but the F ratios are highly significant for the majority of equations. A considerable part of the variance is explained for the two limiting conditions measures, and an appreciable amount for restricted activity days, hospital admissions, and (for women) activity limitation.

At the weighted-case level, the two significance measures suggest strikingly different interpretations. With only a few exceptions, the predictor equations are highly significant in the formal sense. The probability of their F

ratios resulting from random fluctuations in the data is less than 1 in 10,000 for nearly every variable examined using the age and combined models. It is not this high for a minority of variables when the period trend model is used, but meets at least the minimal $p > .10$ standard in all but a few cases.

Using the more pragmatic criterion of explained variance, practically nothing was predicted significantly at the person level. The only possible exception was the best prediction (excellent perceived health for men, using the complete model) which explained less than 8 percent of the variance. No other variable had even 2 percent of its variance explained, and for the majority this fell to much less than 1 percent. The age and period effects are there, but they are swamped by other sources of variation in the health variables.

Trends over time were usually, though not always, significant. Table N summarizes some relevant statistics (from the cell-level analysis), comparing the importance of the linear and quadratic components.[15] Not every health variable shows signs of a statistically significant turnaround during the seventies, but it is there in many cases: restricted activity days (for women), bed days (for men), doctor visits (where there was no significant linear trend at all), hospital admissions, activity limitations, number of limiting chronic conditions (where it is a very powerful predictor, especially when nonlimited cases are excluded), and percentage of persons reporting excellent health. No significant evidence for a turnaround appears for hospital nights, mean health status, or percent of persons in poor health, but these are all very poorly predicted by the period trend model in any case.

Moreover, the sign of the estimated quadratic parameter is always in the expected direction (that is, the turn of the indicator is toward better health) when the estimate is significantly different from 0, and indeed in the expected direction even when not, in nearly every case.[16] To the extent that these measures are tapping a single underlying "health" dimension, it seems reasonable to say that there has been a real change in trend from worsening to improving health at some point roughly midway between 1969 and 1981 among persons aged 55–70.

Chapter Five: Conclusions and Implications

The main purpose of this paper has been to examine trends in health, on the assumption that rises and falls in health in general are reflecting rises and falls in the number of persons whose work may be affected by health problems.

Taken one by one, each of the variables that have been discussed here is open to criticism. As detailed in Chapter 3, they are subject to different biasing factors, and changes in what they measure need not be changes in what other indicators measure or in what might ordinarily be called "health." This is particularly a problem when interpreting changes and differences in variables that are affected by differences in labor-force status—variables like usual activity limitations, loss days, and restricted activity days.

Still, in this age range during these years, most of the measures have produced quite similar patterns by age and over time. Taken together they show a fairly consistent pattern that suggests that they are, by and large, tapping the same underlying variables. Moreover, they have displayed a pattern of change over time that is significant and somewhat unexpected. The trends over time are clearer for women than men, but both suggest increasing health problems into the mid or late seventies, with a leveling off and perhaps some turnaround in the most recent years.

Again, this is true across a range of measures. No one variable is badly out of line with the others and stands up to formal statistical analysis. Not all measures showed the quadratic trend definitely enough to meet formal tests of statistical significance, but even the "insignificant" indicators were almost always in the same direction, and there were no clearly significant exceptions.

Some of the implications of these findings are clear and some are not. What health will be like near retirement in the longer term remains quite uncertain. Obviously, if the late seventies marked the beginning of a persisting trend toward greater health near retirement, then the proportion of persons who can continue working will increase as the retirement age is raised. However, it is by no means clear that the trend will not level out of or reverse itself. Certainly high priority should be given to examining health measurements made in more recent years to provide a better idea of what is happening, even if we do not yet know why.

The model tested above can hardly be used to project health much beyond the period from which it was derived. It is essentially a curve-fitting system of equations which tests the patterns which appear within the health measures themselves; it does not derive their estimates from any underlying factors which cause good and bad health. The very significance of a change in trend found for many of the health variables means that the quadratic component tends to dominate the model's estimates for the out years. While health may indeed continue to improve in the near future, there is no reason beyond dead-reckoning extrapolation to assume that the trend will accelerate indefinitely.

Reliable forecasting requires a sound understanding of the determinants of health, and here these findings have clear and specific implications. None of the theoretical

[15]Note that the probability of each polynomial factor is assessed in terms of sequential rather than partial sums of squares; that is, here the period trend is assumed to be linear and the higher-order quadratic term is "credited" only with the additional variance it explains at the margin.

[16]The trend in number of work-loss days among men is a marginally significant exception; loss days among women and poor health in men are the insignificant exceptions. Otherwise the pattern is entirely uniform.

approaches to relating mortality and morbidity that were reviewed earlier have led to accurate predictions of the actual pattern of events that is now emerging. Any adequate model must explain how morbidity was first inversely related to mortality, then began to be independent or positively related to it. Certainly it is possible to make explanations after the fact from most or all of the present competing theoretical perspectives, and some of these revised explanations may prove to be quite correct. Until they lead to verifiably accurate predictions, however, it hardly seems wise to rely very strongly on them when setting policies for several decades in the future.

The decision to raise the social security retirement age was not driven by firm beliefs about what health will be in the years to come, but by much more firmly grounded projections of the age structure of the population and the ratio of workers to nonworkers. Its primary rationale is not cast into doubt by any of the issues and findings discussed here. The distribution of health among persons affected by these changes will nonetheless play an important part in determining their impact. This study was intended to shed some light on what that distribution might be. Its main finding is therefore not the unexpected pattern of the recent past, interesting as that may be, but how cautiously the conventional wisdom on morbidity and mortality should be accepted when the retirement age is at issue.

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