Working Health Time Reconsidered:

Evidence on Workers' Health across the Past Century

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"A Century of Evidence on Workers' Health"

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ABSTRACT

Researchers have recently questioned the view that mortality declines necessarily imply improvements in health. Some have concluded that mortality declines have led to increased rather than decreased morbidity. The study of long term health trends among adults has been hampered by a lack of a consistent historical morbidity time series. I present a time series of morbidity in the United States military which addresses the major weaknesses of civilian morbidity series and shows a decline in the days of sickness during the century following the Civil War. I conclude that the American workforce has not suffered from an overall deterioration in health.

I. Introduction

The impressive decline in mortality rates and increase in life expectancy since the latter decades of the nineteenth century in the United States and other industrialized nations has led to the general impression that the overall health of these countries' populations improved during that period.

But recently, researchers have begun to look more carefully at the assumption that improvements in mortality go hand in hand with improvements in morbidity. Some have concluded that the relationship is negative rather than positive: as mortality rates fall, the population's average health declines and, hence, morbidity rates rise.[1] For example, in "Working Health Time," James Riley examines health data from four sources: records of a group of Scottish friendly societies from 1750 to 1821; records of the Independent Order of Odd Fellows Manchester Unity from 1866 to 1870; another set of Odd Fellows records from 1893 to 1897; and the General Household Survey of noninstitutionalized civilians in Great Britain from the early 1980s (Riley, 1991). All four sources provide sick days data for adult males. Riley shows that the annual number of work days lost due to illness per person and by age increased over time from the eighteenth century to the 1980s.[2] Thus, he concludes that the historical decrease in age-specific mortality has not been accompanied by a commensurate increase in working health time.

An important question is whether the increase in time lost to illness is due to a real deterioration of health of the working population, or alternatively, to a greater tendency over time for people to take days off from work for a given level of health. This latter effect may be a behavioral response which could be as strongly affected by economic factors, such as increased income or sick-leave provisions, as by objective medical factors. For example, several recent studies have shown that disability and duration rates move with the size of disability and compensation benefits.[3] Although Riley concedes that the data he uses could support either an economic or a medical explanation for the increase in sick days, he concludes that there has been an objective increase in poor health.

A resolution of this controversy has been impeded by the paucity of historical data on health and illness, as well as by the lack of consensus on the definition of ill health. In this paper, I present historical morbidity series compiled by the United States Army and Navy that has, for the most part, been overlooked. These data show a clear downward trend in morbidity during the century following the Civil War for a working population that is relatively stable in its composition.

In the following section, I describe Riley's attempt to show that there has been a real increase in sickness rates over time. In section three, I describe the military time series and discuss the probable relation between the health of military personnel and that of civilian workers. I conclude that the American workforce has not suffered from an overall deterioration in health.

II. Riley's Position

In "Working Health Time," Riley concludes that despite higher life expectancy, an increase in sick time has meant that Britons' "working health time," the joint probability of survival and good health, has not increased commensurately over the past two centuries. He argues that the very success of medicine may be at fault: improvements in medical treatment have meant that more people are surviving episodes of illness and injury which in the past would have been fatal. While this lowers the case fatality rate, it increases the number of weakened people surviving in the population. These people may be more susceptible to further bouts of illness than those who have not suffered a serious illness. In addition, when people with more accumulated health insults do become ill again, they are more likely to remain ill for a prolonged period.[4]

For the population as a whole, the greater rate of survival of sickness means that there is a demographic shift toward people with a higher prevalence of health problems. The decrease in mortality does not only increase the numbers of older people and other high-morbidity groups, but also increases the chance that the surviving members of such groups are, on average, less robust. This is particularly evident when one looks at the increasing importance of degenerative diseases over the past century: as the proportion of older people has increased in the population, so too has the relative incidence of heart disease, arthritis, and other diseases associated with old age (Verbrugge, 1984; Bound and Waidmann, 1990). Such observations lead Riley to state, "Members of the modern labor force are more often incapacitated than their preindustrial or industrial predecessors ..."(Riley, 1991, p. 169).

Riley's arguments are compelling, but a closer look at his evidence shows that he has not actually established that average sickness increased over time. The data sets he uses in "Working Health Time" are sufficiently different from one another to make a straightforward comparison, especially between the historical data and the twentieth century data, difficult to interpret (Riley, 1991).[5]

First, the populations included in the two types of surveys are different. The eighteenth and nineteenth-century benefit societies restricted membership to workers within certain occupations who often had to pass a medical examination before being accepted. Thus, the historical sample is a select population of people who very likely had a lower risk of sickness than did the general population. The twentieth century household survey, on the other hand, is of the adult male noninstitutionalized population, regardless of occupation or health status. This means that while the benefit society records provide information on a relatively healthy portion of the population, the General Household Survey (GHS) provides information on both the healthy population and on those who have withdrawn from the workforce due to poor health.

Second, the conditions under which the health data were collected are not the same. Workers in benefit societies could only receive benefits after having been ill or injured for half a week or more, and then only after their conditions were verified by a physician or an official of the benefit society. Thus, the sick days reported by the benefit societies exclude short-term illnesses (whether they ended quickly in recovery or in death) and any illnesses deemed too minor to disable. In contrast, the twentieth century survey provides self-reported health data and includes all illnesses that, in the opinion of the respondent, restricted activity for a day or more during the fourteen days preceding the interview. The historical data therefore understate the prevalence of short-term illnesses, whereas the twentieth century data understate the duration of long-term illnesses.

Finally, the type of health data collected are not the same. Benefit society data measure the number of days lost from work by sick or injured members, the great majority of whom were active workers. The GHS, on the other hand, reports the number of days during the 14 days before the interview on which people had to restrict their ordinary activity because of sickness or injury (Table 1 in Riley, 1991).[6] Those interviewed include nonworkers as well as those who are employed at the time of the survey. But, judging by modern U.S. health data, restricted-activity days are not the same as work-loss days.

In the United States, the National Health Interview Survey (NHIS) reports both restricted-activity days and work-loss days.[7] Here, the number of work-loss days is substantially lower than the number of restricted-activity days. In 1980, work-loss days per male 17 years of age and over were 4.9, while restricted-activity days for males of all ages were 19.1 (16.6 for males and females under 65 years of age) (Table 208 in U.S. Department of Commerce, 1996, p. 138).[8] Again, work-loss days measure days spent incapacitated by illness or injury among people who are sufficiently healthy to work. Restricted-activity days capture incapacity among the people not participating in the labor force, often due to frailty or old age, as well as among the relatively healthy working population. What Riley does, then, is to compare records of healthy segments of the historical populations to the total noninstitutionalized population, whether healthy or frail, of the 1980s.

In the absence of a long, consistent morbidity time series, one way to tackle the incomparability of historical morbidity information to modern information would be to constrain the modern data to reflect the same population as the historical data (i.e. a select, noninstitutionalized, working male population). Such an adjustment would, however, be insufficient. The fundamental differences in the methods used to gather health data (e.g. verified versus self-reported) in the two time periods would still limit their comparability. Moreover, the fact that benefit society series, both British and American, do not report short-term illnesses is especially problematic since work-place records show that such short-term illnesses make up the bulk of time lost from work.[9]

Other nineteenth century surveys, such as the Bureau of Labor Statistics surveys, did ask workers to list all absences from work. But, since these surveys required respondents to recall absences during the twelve months prior to the survey date, it is likely that many short-term illnesses were uncounted. The household surveys of the twentieth century, in contrast, only ask respondents about illnesses during the fortnight before the interview and therefore capture almost all such episodes.

From such scattered data, we cannot tell whether the increase in sickness rates Riley finds in his British data, and which he claims also applies to the United States (Riley, 1989, p. 197), is due to a decline in the average health of the frail, an increase in the proportion of frail people in the total population, or some combination of these. To determine which of these possible trends reflects the true evolution of health and morbidity over time, we would need information on the average health of the healthy and of the frail in both historical and modern populations. We would also need to determine the proportions of the populations which were healthy or frail. It would be ideal to have a continuous time series of such data so that trends over time would be evident.

There are many possible health measures including life tables, birth weight, terminal height, and body mass index (BMI). But such measures often do not reflect short-term health movements among a reasonably well-fed population, nor long-term health movements among a population at full stature. Moreover, since my interest is in understanding the time trend of health among workers, data measuring absences from work are more to the point than general health data.

The difficulty with work absence data is that, since such factors as sick-leave provisions, popular perceptions of the efficacy of medical care, and public income-maintenance programs have all increased over time, we cannot assume that the relationship between absences and morbidity has been constant over time. This makes comparisons of work absence data from different time periods and different industries or companies troublesome. There is, however, a time series that shows the historical trend in the morbidity of a working population under policy conditions that remained relatively stable over time, namely, the records of the United States Army and Navy.

Such data do not exist for the United States before the start of the NHIS in 1957. There is, however, a time series which shows the historical trend in the morbidity of a healthy working population, namely, the records of the United States Army and Navy.

III. United States Military Data

How has workers' health, rather than absences from work, changed since the nineteenth century? To answer this question, we need a time series which measures average annual days of sickness per worker. Ideally, the time series should meet three criteria: the time period covered should be long, the method of determining whether a worker is sick should not vary over the course of the time series, and the characteristics of workers in the data set should likewise remain constant.

A. Advantages of Using the Military Data

United States military data meet these three criteria fairly well. Starting in 1819, there are continuous time series of the annual number of admissions to sick report, deaths, and medical discharges in the Army.[10] Data on sick days per person are available starting in 1867. From the data, reported each year in the Annual Report of the Surgeon General, it is possible to calculate the average annual sick days per person in an almost unbroken series. The data are presented in such a way that it is possible to separate deaths and disability due to illness and nonbattle injuries from disabilities resulting from injuries sustained during military action. Thus, the first criterion of a useful data set is met.

The second criterion is consistency in the standards used to determine whether someone is sick or disabled. Such consistency is important if any conclusions are to be drawn about changes in health over time. If the definition of ill health and the norms regarding the acceptability of absence from work have changed in civilian society, we might expect to see the same changes in the military.

A major problem in tracking trends in civilian health over time has been the difficulty of disentangling the effects of changes in health insurance and workers' compensation coverage on workers' absenteeism decisions.[11] This difficulty does not arise in the military series. Men (and later, women) in the U.S. military have, in effect, always been insured against ailments and injuries incurred while on active duty. Even when incapacitated by illness, soldiers and sailors were assured of receiving the same housing and food they had received while healthy. This was a degree of stability not available to the average unskilled civilian worker of the nineteenth century. Soldiers were therefore not under the same economic pressure to work while ill to assure themselves a subsistence wage. On the contrary, soldiers and sailors were actively discouraged from working while sick: the military was well aware of the danger of contagion.

Another reason to expect greater consistency over time in the military's sickness figures is that, unlike in most modern civilian surveys, sick days were verified by someone other than the patient. A soldier or sailor could not go on sick report without first being examined by a medical officer. This does not mean that the data do not include some ailments feigned (and even some injuries self-inflicted) by men attempting to avoid work.[12] However, this should be less of a problem in these data than in the many civilian surveys which gathered only self-reported health information. Thus, not only do the military data provide a long time series of sick days data, these sick days have been verified as reflecting actual illness and injury.

It is more difficult to argue that the military data meet the third test of an ideal data set, that the characteristics of those surveyed remain constant over time. This difficulty stems from the lack of individual data or even, for most years, data broken down by age, sex, or rank. It would be unrealistic to expect that military personnel today are exactly like their nineteenth century counterparts. Nevertheless, it is probably safe to assume that twentieth century and nineteenth century personnel have many traits in common. In both centuries, the majority of personnel are young, able-bodied people who have passed some battery of tests for health and mental competence.[13]

Even if the characteristics of military personnel have changed over time, a study of the military time trend in morbidity can be instructive so long as the relationship between the health of military personnel and the health of civilians has not changed drastically during the past century. To establish this relationship, we can compare military and civilian mortality rates as Collins does in "Long-Time Trends in Illness and Medical Care." He compares Army and Navy annual death rates for all causes other than battle casualties to the civilian male death rate over the century following 1860. By the 1880s, the civilian death rate quite closely matches the military rates in both trends and levels. When he looks at death rates for disease deaths only, this coincidence of military and civilian rates begins in the 1870s. (Not surprisingly, military death rates for the 1860s are considerably higher than civilian rates.) Collins concludes, "These trends suggest that trends of sickness and nonbattle injury in the armed services are similar to trends of diseases and accidents in the civilian population of comparable ages" (Collins, 1957, pp. 34-37). Even if, as Riley argues, we cannot assume that morbidity rates move in tandem with mortality rates, so long as the relationship between morbidity and mortality at any given time is the same in the military and in the civilian workforce, Collins's argument is sound.

B. What the Military Data Reveal

The data used come from the Annual Reports of the Surgeon General for the Army and, separately, for the Navy and Marine Corps. The Annual Report for each year is a compilation of the sick reports submitted by all medical units in the service. Since information regarding the number of personnel sick or injured, the causes of disability, and the length of stay in hospital or confined to quarters comes from daily reports, there is no bias against short-duration disabilities.

Figure 1 shows the average annual days lost per person for the Army from 1867 to 1975. (The Navy and Marine Corps series for 1889-1962 is included for comparison and also to help bridge some gaps in the Army series.) I calculated this series from the "noneffective rate," which is given in the Surgeon General's Annual Reports. The "noneffective rate" is defined as, "the average daily number of Army active-duty personnel in an excused-from-duty status due to medical causes per 1,000 average strength," (U.S. Army, 1968, p. 7). To convert this rate to average annual days lost per man, I simply multiply by 365/1000.[14] The strength of the Army is the total number of troops, including those on sick report.

Figure 2 shows the yearly "noneffective rate" due to illness as compared with the total "noneffective rate" from all nonbattle causes. Nonbattle causes include all disability due to disease as well as injuries from accidents and assaults. Disabilities resulting from injuries sustained while fighting enemy action are excluded. Even in wartime, disease was the most important cause of disability.

Figure 3 shows that the "noneffective rate" is higher for enlisted men than for officers. This result reflects several basic differences between the two rank categories. In general, the officer-enlisted man distinction in the military mirrors the white collar-blue collar distinction in the civilian workforce. Civilian data show that white collar workers as a group have lower rates of disability than do skilled and unskilled labor.[15] This may be due to the greater physical demands of blue-collar work, or to the greater responsibility of many white-collar positions. The difference between officer noneffective rates and enlisted noneffective rates may also be due to the higher incomes of officers, or to the fact that the average age of officers is higher than that of enlisted men.[16]

Figure 4 and Figure 5 allow us to see what lies behind the downward trend in days lost per man in the Army. The rate of admissions to sick report is the yearly number of admissions divided by the number of Army personnel multiplied by 1000. Thus, this figure gives the number of separate incidences of illness or injury. Anyone suffering from illness or injury is examined by a medical officer who, if the condition warrants it, places the examinee on sick report. The examinee may then be admitted to hospital quarters or, if not seriously ill or contagious, be allowed to return to his own quarters for the remainder of the day.

The average days per admitted case, reported in Figure 5, is the ratio of all days on sick report (by everyone put on report during the year) to the number of admissions in that year. Therefore, the average days per admitted case gives the average number of disability days per incidence of disability. This is not the same as the average sick days per sick man since one man may be responsible for more than one case of disability during the year.

A comparison of Figures 4 and 5 shows that the rate of admissions to sick report falls consistently over time (ignoring war years), whereas the trend in average days per case first rises, then falls, and before leveling off. These series taken together seem to imply that it has been a decrease in the number of cases rather than a decrease in the duration of cases which has led to the drop in average sick days per person. This is consistent with the trend of increased duration of illnesses noted in civilian data by researchers such as Riley and Verbrugge (Riley, 1989; Verbrugge, 1984).

C. Comparisons of Army and Civilian Rates

As shown in Figure 1 and Table 1, the military data show a clear downward trend over time in average sick days per person. Furthermore, the military rates for the late nineteenth century are double or even triple the average sick days per person calculated from Bureau of Labor Statistics (BLS) surveys of civilian industrial workers. The BLS surveys I use are those which specify the number of work days lost to sickness, namely the Kansas, Maine, and California surveys from the 1880s and 1890s (Carter, Sutch, and Ransom, 1990a,b,c).[17] To facilitate comparisons with the military data, I calculate the average number of sick days per person for each age in the BLS surveys, and then weight those averages by the proportion of men in each age group in the Army. Thus, the BLS data have been adjusted to approximate the age structure of the military.

The BLS annual sick days per worker for the entire sample of workers surveyed are 8.7 in Kansas, 5.1 in Maine, and 7.9 in California. The samples include a number of workers with more than a month's worth of absences due to ill health. In the military, men who developed such extended illnesses were generally discharged, so that the military data undercount such cases relative to civilian data. To correct for this I recalculate average annual sick days per civilian worker excluding those with more than thirty sick days per year. The resulting numbers, reported in Table 1, are 3.3 for Kansas, 2.3 for Maine, and 2.7 for California. These are well below the Army figure of about fifteen sick days per person per year.

Not until the mid-twentieth century do the civilian and military rates converge, suggesting that nineteenth century sick days data severely under-represent the true extent of sickness among civilian workers: civilian workers must have frequently shown up to their jobs while ill. This suggests that workers' decisions to miss work when unwell are significantly influenced by non-medical variables such as income, sick-leave provisions, and disability benefits.

Judging from a comparison of Army and civilian data (as in Table 1), civilian workers in earlier periods often worked while ill. The Army figures are higher than the corresponding civilian figures by 11.8 to 13.3 days per year. Thus, in the late nineteenth century, the average civilian industrial worker probably worked while ill about one week out of the year. In the twentieth century, this tendency declined.

The excess of military over civilian disability rates did not escape the medical officers of the military. They cite a number of reasons for this difference chief among them the greater accessibility and affordability of health care in the military, both in terms of out-of-pocket expenses and loss of income while ill. Unlike their civilian counterparts, men in the Army received free medical care and suffered no loss in income while ill.[18] The need to isolate infectious cases from healthy men to avoid the spread of disease also increases military sick days relative to civilian sick days. Another cause is the greater emphasis on preventing medical complications by treating illness in its early stages. This was true of the military even at the turn of the century, long before such notions were prevalent among civilians.

V. Conclusion

There are two apparently contradictory trends for the health of Americans in the twentieth century. On the one hand, mortality rates have fallen and life expectancy has improved dramatically. On the other hand, absenteeism rates and disability claims have risen. Riley has argued that there is no contradiction between increasing morbidity and decreasing mortality: decreasing mortality has led to increased morbidity. Others have, to the contrary, explained the difference on the basis of economic reasons for increased absenteeism and disability rates: as we get richer, we can afford to be sick. Both sides of this discussion have been hampered by the lack of a consistent time series of civilian disability rates.

The military time series I describe in this paper overcomes many of the drawbacks of the civilian data used in the past. Furthermore, there is good reason to believe that the downward historical trend in the military series would be echoed in a similar civilian series. It seems reasonable to conclude that the decrease in morbidity in the military reflects a decrease in morbidity among civilian workers.

This suggests that the increasing rates of absenteeism and disability claims in the civilian worker data result from non-medical causes, such as increased economic incentives to reduce work time. This is not to say that the changes in economic incentives have been "bad." The large discrepancy between military and civilian sick days in the late nineteenth century implies that many workers were working through episodes of ill health and physical discomfort. During the twentieth century the availability of workers' compensation and other forms of medical insurance, as well as laws requiring the provision of paid sick leave, have made it possible for workers to have some of the medical benefits long enjoyed by military personnel. Workers today may spend less time at the work-place than they did a century ago, but they are probably healthier when they do go to work.

It seems, then, that the healthy, working segment of the American population has benefited from an improvement in health over time. Two questions remain: Has the frail segment of the population become less healthy? Has this segment grown as a proportion of the total population? The available nineteenth century data, whether from the military or from benefit societies and other worker groups, do not capture the behavior of nonworkers. Until we piece together evidence on the nonworking segment of the population regarding their numbers and their health status both in the nineteenth and the twentieth centuries, we will not be able to definitively determine whether the overall population is healthier now than during the high-mortality regimes of previous centuries.

[1] See, for example, Riley (1989, 1990, 1991), Alter and Riley (1989), and Verbrugge (1984).

[2] Riley (1991, p.175) presents a table comparing sickness rates by age in weeks per year for the four populations under study. For ages below 55, there is a steady increase in the weeks per year of sickness from the eighteenth century Scots population to the twentieth century British population. For example, for 30 year olds, the weeks per year of sickness is 0.6 in the eighteenth century and 1.9 in the twentieth century.

[3] Wolfe and Haveman (1990) find that reported disability rates between 1962 and 1984 moved with the generosity and accessibility of disability transfers. Krueger (1990) finds that the average duration of workplace injuries increased among workers whose compensation benefits increased, compared to workers whose benefits remained unchanged. See also Meyer, Viscusi, and Durbin (1990).

[4] Riley develops this argument in his 1989 book, Sickness, Recovery and Death: A History and Forecast of Ill Health. He pursues this thesis in several subsequent works. See Riley (1990 and 1991), and Alter and Riley (1989).

[5] In this article, Riley expands on the British data he used earlier in his 1989 book.

[6] When adjusted to annual figures, the number of restricted activity days range from 14 per year for 21 year olds to 35 per year for 70 year olds. According to Riley (1991, p.187), absenteeism from work or "certified incapacity," which is measured separately from the GHS, is much higher than the number of self-reported restricted activity days. He cites the Annual Abstract of Statistics, 1988 as his source of information on certified incapacity.

[7] The National Health Interview Survey has been conducted consistently since 1957 and has many features in common with Britain's GHS. In particular, the health and activity or work restriction information is self-reported. Information is gathered regarding any illnesses and injuries occurring in the household during the two weeks prior to the interview. The NHIS is limited to the civilian, noninstitutionalized population, and includes both workers and nonworkers.

[8] A "work-loss day" is a day when a person loses more than half a workday because of illness or injury. A "restricted-activity day" is a day when a person cuts down on ordinary activities for more than half a day because of illness or injury, and includes "bed-disability," "work-loss," and "school-loss days."

The great difference in the relation of work-loss days to restricted-activity days between Britain and the U.S. suggests that the British "certified incapacity" days are not equivalent to the work-loss days as defined by either the NHIS or the benefit societies.

[9] For example, Brundage found that for males, absences of fewer than seven days' duration made up 83% of workdays lost in a firm that paid wages during disability, and 57% of workdays lost in a firm that did not pay wages during disability (Table 1 in Brundage, 1927, p. 530).

[10] I was not able to find data which separate women from men. As the number of women in the military was quite small through most of the period studied here, their effect on the morbidity rates is negligible.

[11] An inter-plant comparison of payroll data and sick leave policies may be helpful for judging the importance of differences in such policies to the resulting number of absences per worker. A 1959 study of seventeen of the Kimberly-Clark Corporation's paper mills is described in a publication of the American Management Association (Gaudet, 1963, pp. 66-67). The corporation's medical director found that the mills with liberal benefit policies lost about seventy percent more time per male employee than mills with more restrictive policies. Furthermore, he found an inverse relationship between frequency and duration of absence.

Brundage, who compares absences at a firm which paid wages during disability to absences at a firm which did not, also shows that the provision of disability benefits significantly affected the tendency of workers to take time off when ill (Brundage, 1927).

[12] Several of the Annual Reports from the turn of the century include a discussion of the problem of malingering. In the Navy's 1909 report, for example, medical officers are exhorted to be on guard for "skulkers." Nevertheless, doctors are cautioned against being overly suspicious lest they refuse care to a man who truly needs it. There is a possibility of a downward bias in more recent times if improved diagnostic tools have made it more difficult to fool doctors. However the most common ways to feign

disability, such as by claiming various aches or ambiguous malaises, are probably no easier to disprove than they were a century ago.

[13] During the past century the military has gone from being composed almost entirely of white men to having a large proportion of women and racial minorities. According to civilian data, women have a higher rate of sickness, both incidence and duration, than men of the same age and income group. Similarly, members of several minority racial groups have higher sickness rates than whites of the same age, sex, and income groups. Wolfe and Haveman find that both female sex and nonwhite status are "... positively related to the probability of being classified as disabled" (Wolfe and Haveman, 1990, p. 63). This means that the increase over time in women, both in the military and in the civilian labor force, as well as the increase in minorities in the military create an upward bias in the trend of sick days over time. This change in the racial mix and sex ratio does not undermine my argument since it biases the military time trend upward rather than downward. And, as the modern military has a higher proportion of minority personnel relative to the civilian population, the upward bias is greater for the military series than for the civilian series. Since my Army series currently ends in 1975, the change in the sex ratio will have a smaller impact than it would if the series continued to the present.

[14] For many of the years in this series, it would be possible to use the number of days lost on account of sickness which is reported separately in the Annual Reports. However, because there are numerous gaps, I use the number of sick days derived from the noneffective rate, which is more consistently reported. A check of the years in which both figures are reported shows that the reported sick days and derived sick days are nearly identical.

[15] See, for example, Collins, "Economic Status and Health," (1927), Table 5, p.9.

[16] Civilian disability rates by age tend to be U-shaped, falling from the early twenties to the early thirties before rising again.

[17] BLS worker surveys were conducted on a state-by-state basis to collect wide-ranging information on workers' jobs, families, and homes, and on industry characteristics. Although the BLS surveys were not health surveys, several of them did gather information on workers' absences and the reasons for those

absences. However, many of the surveys lump together absences due to sickness with absences for non-health reasons and are therefore not useful for my purposes. And, several other surveys that do list sick days separately have a large percentage of non-responders (67% to 87% of the samples). The BLS surveys do not make clear the number of days during the year the worker was scheduled to work (the number of days per year at risk).

[18] The 1924 Annual Report of the Navy includes a fairly typical discussion of these issues:

> It is natural with the close medical supervision that obtains in the Navy that there should be apparently more cases of sickness among the men than among an equal number of males of working age in civil life who, depending more upon their own resources, are often not recorded as sick even when health is seriously jeopardized or impaired. (United States Navy, 1924, pp. 62-63.)

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Table 1: Comparisons of Army and Civilian

Average Annual Sick Days per Person

Year	Army	Civilian
1884-87	15.2[1]	3.3[2]
1890	15.6	2.3[3]
1892	14.5	2.7[4]
1935	7.9	4.4[5]
1959	3.5	6.4[6]
1960	3.3	5.5
1965	2.7	5.7
1967	3.4	5.3
1968	3.7	5.2
1970	3.8	5.0
1975	3.0	
1980		4.9

Sources: *Annual Report of the Surgeon General, U. S. Army* (1885-1975); Bureau of Labor Statistics surveys (1884-87, 1890, 1892); National Health Survey (1935); *Statistical Abstract of the United States* (1960, 1970, 1996).

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[1] Average of four years, 1884-1887. Figures for the individual years are as follows: 16.2, 14.9, 14.1 and 15.5.

[2] Kansas BLS, 1884-1887 combined. This survey includes some women.

Figure for entire series (including workers with more than 30 sick days in the year) is 8.7. All BLS figures have been adjusted to reflect the age structure of the Army, and to exclude workers with more than 30 sick days in the year.

[3] Maine BLS. Figure for entire series is 5.1.

[4] California BLS. Figure for entire series is 7.9.

[5] Disability days per person per year for employed white males, 25-44 years old, calculated assuming a 287 day work year (5.5 workdays per week). The figure for all males workers aged 25-44, employed and unemployed, is 5.5 days per person per year.

[6] 1959-1980 civilian figures are work-loss days for employed males 17 years of age and over. If both sexes are included, the numbers are 7.0, 5.7, 5.4, 5.4, 5.4, and 5.0.

FIGURES: LEGENDS AND SOURCES FOR FIGURES 1 - 5

Figure 1. Average annual days lost per person.

------- Army 1867-1975

-*-*-* Navy and Marine Corps 1889-1962

Sources: *Annual Report of the Surgeon General, U. S. Army* (1885-1975), and *Annual Report of the Surgeon General, U. S. Navy* (1889-1962).

Figure 2. U. S. Army, noneffective rate per 1000

-------- All nonbattle causes

-*-*-* Disease only

Source: *Annual Report of the Surgeon General, U. S. Army* (1885-1975).

Figure 3. U. S. Army, noneffective rate per 1000

------- Officers

-*-*-* Enlisted

Source: *Annual Report of the Surgeon General, U. S. Army* (1885-1975).

Figure 4. Admissions to sick report per 1000, U. S. Army, 1867-1973.

Source: *Annual Report of the Surgeon General, U. S. Army* (1885-1975).

Figure 5. Average days per admitted case, U. S. Army, 1867-1975.

Source: *Annual Report of the Surgeon General, U. S. Army* (1885-1975).

Figure 1

Average Annual Days Lost per Person

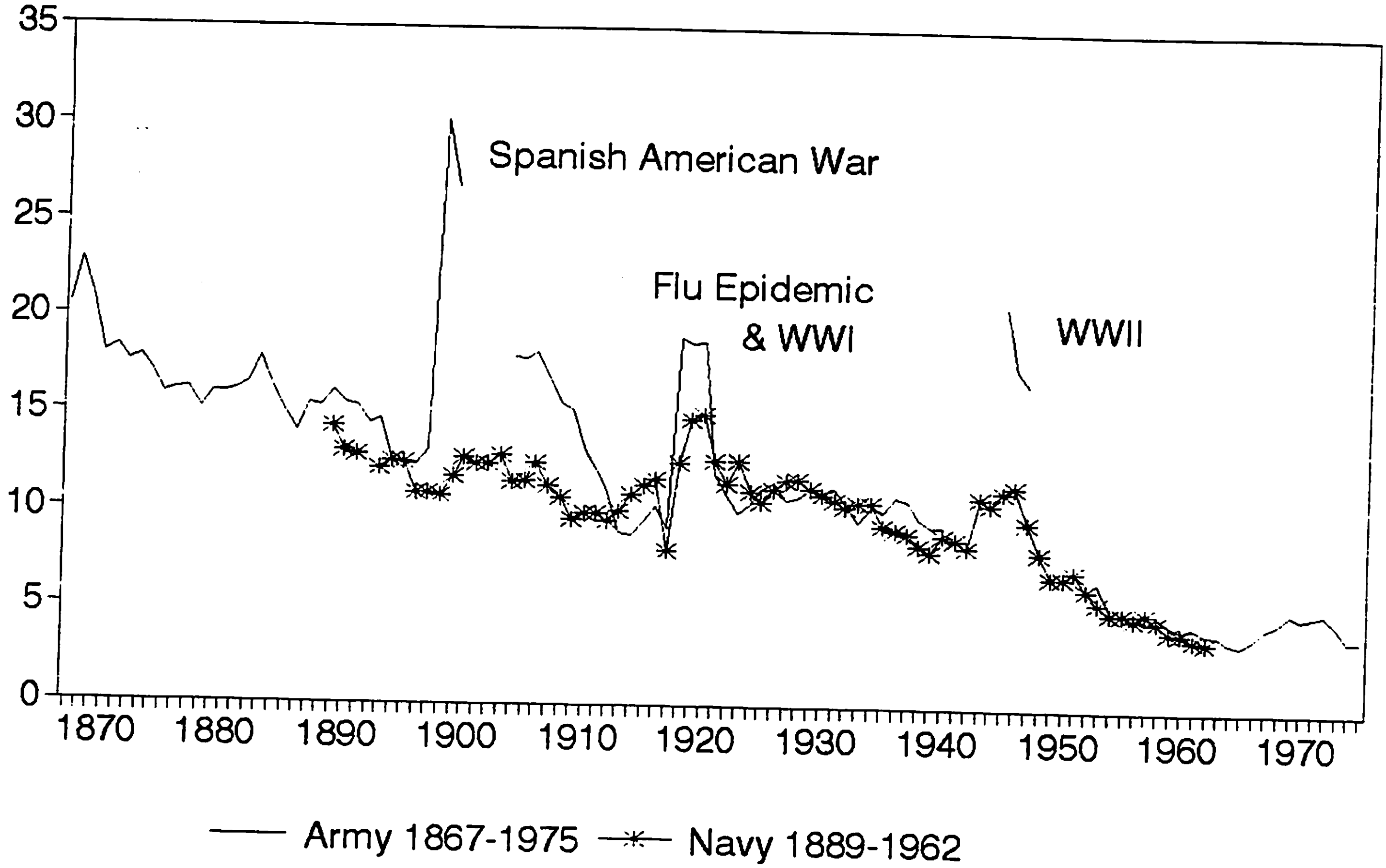

Figure 2

U.S. Army, Noneffective Rate per 1000

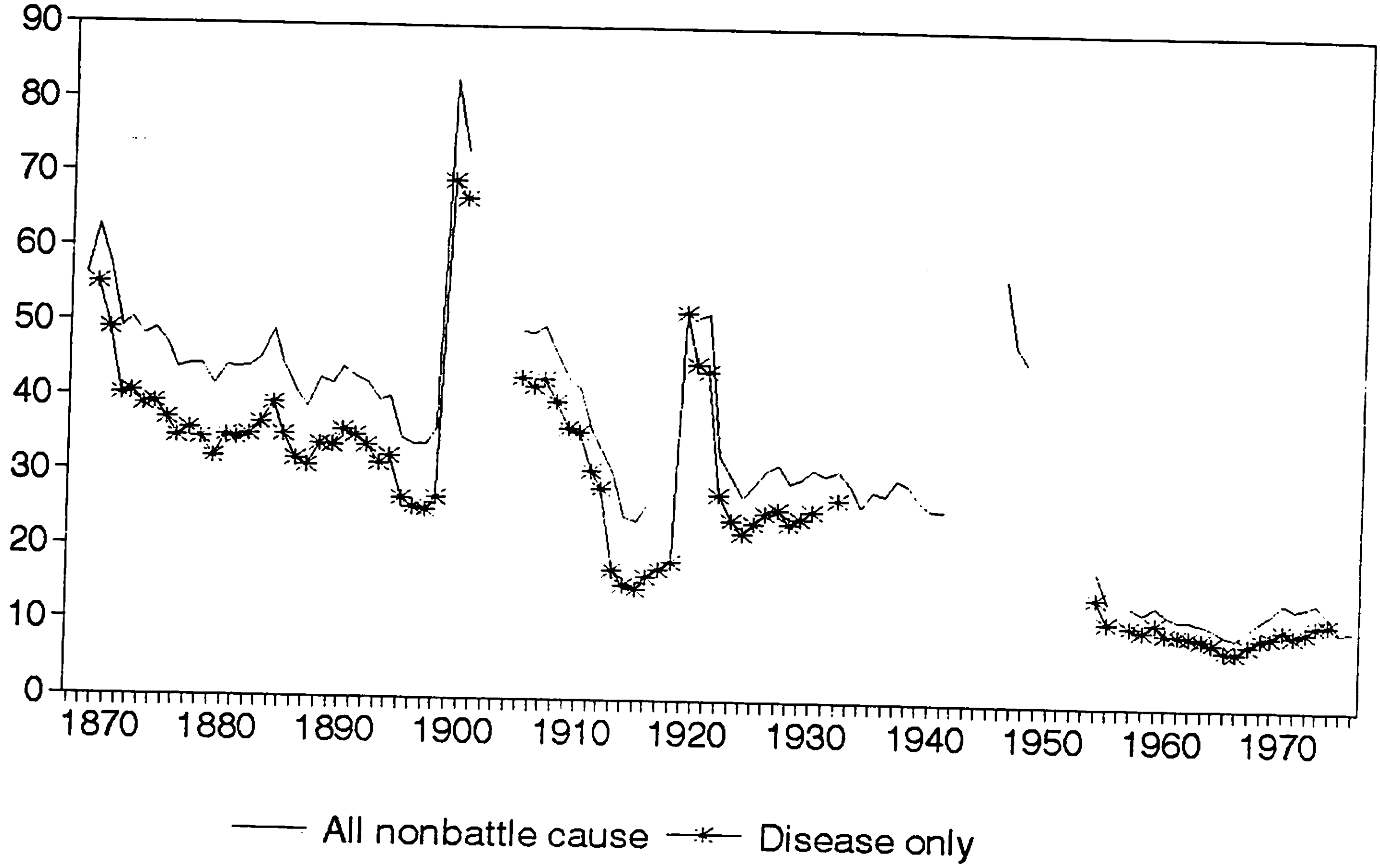

Figure 3
U.S. Army, Noneffective Rate per 1000

Figure 4
Admissions to Sick Report per 1000

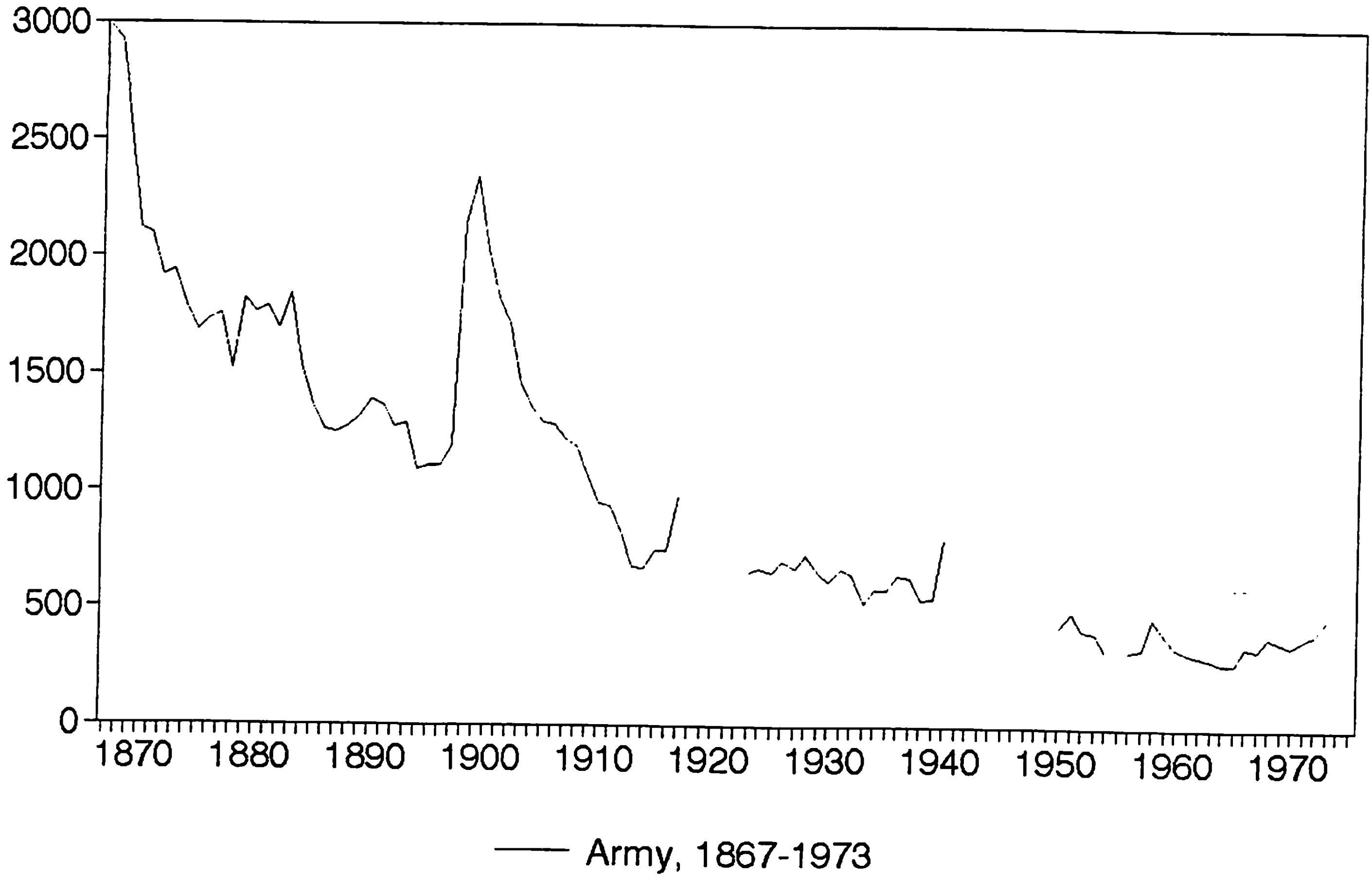

Figure 5
Average Days per Admitted Case