

# Mortality of Workers Insured Under OASDI, 1955

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THE OPERATIONS of the old-age, survivors, and disability insurance program yield, as a by-product, valuable data for social, economic, and demographic analyses. One important field is the study of the mortality of insured workers—both those with recent covered employment and those without such employment—in relation to the mortality for the Nation's total population. Many of the differences arising can readily be anticipated from *a priori* considerations, but nevertheless the specific numerical results are of interest.

This study of the mortality of insured workers in 1955 represents a preliminary investigation of the possibility of making such an analysis on a broad basis and covering an extended period. The year 1955 was selected since, for that period, detailed data are now available on insured workers and their recent employment experience. In addition, the great majority of the deaths that occurred in that year have now been reported. In this article a discussion of the general aspects of mortality analysis for workers covered by old-age, survivors, and disability insurance and an analysis of the derived data are followed by a technical note describing the basic data and the methodology used.

## ANALYSIS OF WORKERS' MORTALITY

Any mortality analysis, to produce meaningful results, must be based on data classified by age and sex because these elements produce such significant differentials in death rates.

### Age and Sex

Obviously, if one population is considerably older than a second one, it will very likely have a higher aggregate death rate, but this differ-

ence may not necessarily be any indication that it has higher mortality when the factor of age is considered. Data by age must be subdivided into at least decennial (and preferably quinquennial) age groups, especially for older persons. All persons over an advanced age—such as 70 or 75—may be grouped without loss of any significant results for some types of social and economic analysis but not for mortality analysis.

The age factor is also clearly significant in comparing the mortality of active and former workers. If such a comparison were made for men under retirement age, with the age factor otherwise disregarded, the aggregate mortality rate would be much lower for active workers than for former workers, most of whom would be disabled individuals. In a similar study of women, however, the effect would be less marked because many women normally leave the labor market in good health at the younger ages to run a home and raise a family.

### "Active" Workers Defined

Another complication in analyzing the mortality of active workers and former workers is related to the definition of these two terms. If by "active workers" were meant only those who had been employed immediately before death (or at least before the final acute illness), then there would be relatively few cases of deaths—only those arising from accidents and certain diseases. To define active workers as those who have had earnings in a recent period, such as the year of death, creates difficulties with respect to those who die at the beginning of a calendar year and thus have little opportunity to have had earnings in that year. A better procedure, if possible, would be to consider as active workers only those who had had earnings in a specified period preceding death.

It would be anticipated that active workers, particularly those who had been employed

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recently, would have lower mortality than the total population. In other words, by the very nature of the group, lower mortality should be inevitable. Many deaths are preceded by a period of final illness during which there are no earnings. As a hypothesis—and an extreme one—if this period were 1 year for everyone, then obviously the death rate for those workers insured at the end of 1955 with earnings in that year would have to be zero. Alternatively, if the final-illness period were 4 months for everyone, the death rates for insured workers with 1955 earnings would be expected to be only about two-thirds those for the total population.

### **Occupation**

Mortality studies of workers according to occupation are desirable but are difficult to make because, for many individuals, the occupation does not remain unchanged during an entire career. Often a person who is in poor health or whose health is deteriorating must, for this reason, shift his occupation. A worker who is in an occupation that causes respiratory difficulties might as a result contract some ailment of this type and be forced to shift to another kind of work. His death while engaged in the more recent occupation would not be indicative of its mortality risks.

### **Earnings**

Similarly, mortality investigation based on the earnings level is fraught with difficulties because of the interrelationship of health and earnings. Other problems also prevent, or make difficult, significant analysis in this field. If the earnings data of the old-age, survivors, and disability insurance program were used, for example, and if mortality were studied by level of earnings in the year of death, a bias would be introduced. Higher mortality would be shown among low-income workers, since persons who die during the year would be much less apt to have high earnings than those who live for the entire 12 months. For this group, the factor of final illness results in lowered earnings capacity, and the shorter period of time (6 months, on the

average) that the persons who die have earnings naturally means smaller total earned income.

### **Filing of Death Claims**

Another important factor involved in any mortality study is the completeness of the reporting of deaths and, especially, any variations in such completeness between different categories. In a program such as old-age, survivors, and disability insurance, it might be anticipated that virtually all deaths of insured workers would eventually result in claims. The only problem then would be to allow sufficient time after the end of the year, before the "closing date" for the data on deaths, for claims to be filed and adjudicated.

When an insured worker who has had recent earnings dies, it is extremely likely that a claim will be filed promptly if he had any near relatives. They would realize that he had been making contributions and that therefore some death benefits should be available. It is believed that failure to file a claim is relatively infrequent when the deceased worker has been recently employed.

The situation may be considerably different for insured persons who have not been employed recently. Payment of death benefits with respect to one group—deceased workers who were on the beneficiary rolls—is virtually automatic. A claim need not even be filed when a secondary beneficiary (wife or child) is on the rolls. Under other circumstances, the district offices communicate with persons who may be eligible for such a benefit.

Nonfiling of death claims happens mainly when the individual has not been on the beneficiary rolls and has not been employed for a number of years before death. Most of this group consists of women who had worked for sufficient years in the past to become insured but who have been out of the labor market for some time; in such cases, no one may remember to file a claim. Furthermore, in most instances of death among women, only a relatively small lump-sum payment is available so that there is less financial incentive to file. A woman who worked in covered employment for only 3 years—say, during World War II—would be fully insured if she

died in 1955, a decade after her employment ceased. Under such circumstances, the only benefit available would probably have been a lump-sum death payment of \$90.

## DESCRIPTION OF STUDY

The analysis that follows relates to the 1955 experience for workers insured under old-age, survivors, and disability insurance. The data are classified not only by age and sex but also by whether or not the individual had covered earnings in the year. No attempt is made to study occupational mortality or mortality by earnings level, for the reasons indicated earlier.

By "insured worker" is meant any individual on the basis of whose record survivor benefits (monthly or lump-sum) would have been payable if he had died in the year in question—in other words, those with either fully insured status or currently insured status. The definition includes also those insured workers who are on the beneficiary rolls, even though they have retired from gainful work.

The estimated average insured population during 1955, as defined in this analysis, numbered 71.6 million—44.2 million men and 27.4 million women. Of these individuals, 49.1 million (69 percent) had covered earnings in the year—33.9 million men (77 percent) and 15.2 million women (55 percent). The total insured population was naturally older, in general, than that portion of it that consists of persons who had earnings during 1955; 7.8 percent of the total group was aged 65 or over but only 4.7 percent of those with earnings.

Almost 572,000 deaths in 1955 (table 1) were represented in this study. About 225,000 of the deaths, or 39 percent, were of persons who had

TABLE 1.—Estimated exposures and deaths of workers insured under OASDI, 1955

Type of worker	Exposures	Deaths
Insured, total.....	71,560,000	571,900
With 1955 earnings.....	49,080,000	225,350
Without 1955 earnings.....	22,480,000	346,550
Male, as percent of total.....	62	84
With 1955 earnings.....	69	87
Without 1955 earnings.....	46	82
Aged 65 and over, as percent of total.....	8	48
With 1955 earnings.....	5	25
Without 1955 earnings.....	14	63

earnings in 1955—a category representing 69 percent of the total insured population. Deaths of men accounted for 84 percent of the total, in comparison with an exposure proportion for men of only 62 percent. Deaths among those aged 65 or over made up 48 percent of all deaths; the exposure for the aged was only 8 percent. The relationships between the proportion of deaths and the proportion of exposure are what might have been expected from the considerations discussed earlier.

## RESULTS OF STUDY

Table 2 sets forth the derived death rates for male insured workers and for the total population. The mortality rates for all insured men are slightly lower than those for the total male population. The relative differences are only 5–15 percent, with no significant variation by age. Far greater differences arise, however, when insured workers with 1955 earnings are considered. For this category the rates are only about one-half to two-thirds as large as those for the total male population (except for the youngest ages, where the rates are closer), and the difference tends to increase with age.

### Mortality of Insured Men

The mortality of insured male workers is, as would be expected, relatively close to that of the total population at the younger ages. Almost all men are in the labor force, and the great majority of male workers either are in covered employment or have had substantial coverage at some time in the past. Likewise, most men over age 65—and particularly those in the first few quinquennial age groups—possess fully insured status. In fact, it is only at the very oldest ages (80 and over) that as many as 25 percent of the men are not fully insured, generally because they had retired from gainful employment before their particular type of work was covered.

In the future, even more than today, the male insured population and the total population will consist of virtually the same persons and thus will have the same mortality experience. In fact, the experience under old-age, survivors, and dis-

ability insurance will provide a close check on the accuracy of mortality rates developed from census and vital statistics data for the total population. Any differences arising for men will probably occur at the youngest ages, since the total population will include men whose health never permitted them to engage in enough employment to acquire insured status.

Thus, substantially lower mortality for male insured workers with 1955 earnings is to be expected for two reasons. First, the criterion of having earnings in the calendar year of death necessarily means the exclusion of some persons who have suffered an extended illness but who had previously been actively employed, with the result that mortality rates are deflated. Second, active workers tend to have lower mortality rates than those not in the labor force. (It is not accurate to conclude that persons engaging in active employment have lower mortality rates because of such activity; rather they are engaging in gainful employment because they are in good health, which in turn means lower likelihood of death).

Death rates for male insured workers without 1955 earnings are, as would be expected, relatively high, for the reasons indicated previously. The ratio of their mortality rates to those of the total population runs well above 100 percent in most age groups (table 2). The ratio is generally between 175 percent and 200 percent for ages 25-64,

TABLE 2.—Comparison of 1955 death rates for male workers insured under OASDI and of total male population

Age	Death rate per 1,000				Death rate for insured male workers as percent of rate for total male population		
	Total male population	Insured male workers			Total	With 1955 earnings	Without 1955 earnings
		Total	With 1955 earnings	Without 1955 earnings			
All ages <sup>1</sup> .....	12.0	10.8	7.1	18.2	90	59	152
15-19 <sup>2</sup> .....	1.3	1.1	1.2	1.0	85	92	77
20-24.....	2.0	1.9	1.7	2.2	95	85	110
25-29.....	1.8	1.7	1.2	3.6	95	67	200
30-34.....	2.0	1.9	1.6	3.4	95	80	170
35-39.....	3.0	2.8	2.2	5.3	93	73	177
40-44.....	4.6	4.2	3.0	9.7	91	65	211
45-49.....	7.6	7.0	5.6	13.5	92	74	178
50-54.....	12.2	10.5	8.7	18.7	86	71	153
55-59.....	18.3	16.5	11.9	37.1	90	65	203
60-64.....	27.9	23.6	15.0	52.9	85	54	190
65-69.....	42.2	37.3	22.0	56.7	88	52	134
70-74.....	58.7	54.2	32.1	67.5	92	55	115
75 and over <sup>3</sup> .....	105.0	101.1	50.3	116.3	96	48	111

<sup>1</sup> Rate for all ages determined by weighting age-specific rates by total number of insured workers in each age group.

<sup>2</sup> For insured workers, all under age 20 are assumed to be aged 15-19.

<sup>3</sup> Rate for total population based on age distribution of total number of insured workers.

but it is lower for the youngest and oldest groups. This trend also would be anticipated because, for persons in the youngest groups to have been insured at all, they must have had some employment in recent years. Likewise, most of the persons in the oldest groups of the insured population are retired, and thus as a group they tend to have the same general characteristics as the total population.

### Mortality of Insured Women

An entirely different situation prevails for women in the mortality study. First, many women have never engaged in covered employment—or at least sufficiently to be insured. Second, many insured women are not currently in covered employment—frequently for reasons other than ill health or age retirement. Accordingly, the insured female population is by no means identical with the total female population. The difference, however, between the insured female population without 1955 earnings and all women can be expected to be considerably less than the difference between the insured male population and all men.

Table 3 shows an analysis of death rates for women. The differences in mortality between insured women and the total female population are much greater than the differences for men. For almost all age groups, the insured women have a death rate that is about one-third lower than that of the total population. This difference arises, no doubt, from the factor of selection. It is likely that the women who work or have worked in gainful employment are healthier than those who have never been employed, but virtually all men between the ages of 25 and 60 are in the labor force regardless of their health.

The analysis for women should be considered with some caution because it is likely that there is a substantial underfiling of death claims. The factor of nonfiling would be less important for insured women with 1955 earnings than for other insured women, since the survivors of such a woman would have been more likely to know that she had been in covered employment and that there might be benefits payable. Yet this category shows exceptionally low mortality when compared with the total female population. For most age groups, the ratio is about 40-50 percent, and it never rises much higher than 60 percent.

For insured women as for insured men, the

death rates for those without 1955 earnings are significantly higher than for those with such earnings. The ratios to the death rates for the total female population average about 100 percent but are less at the youngest and oldest ages. It is this group that is particularly apt to be affected by nonfiling of claims.

cently employed are in this status because of poor health, and this factor would tend to raise the relative mortality somewhat above that of the general population.

TABLE 3.—Comparison of 1955 death rates of female workers insured under OASDI and of total female population

Age	Death rate per 1,000				Death rate for insured female workers as percent of rate for total female population		
	Total female population	Insured female workers			Total	With 1955 earnings	With-out 1955 earnings
		Total	With 1955 earnings	With-out 1955 earnings			
All ages <sup>1</sup> .....	5.0	3.4	2.1	4.9	68	42	98
15-19 <sup>2</sup> .....	.6	.3	.2	.4	50	33	67
20-24.....	.8	.4	.4	.4	50	50	50
25-29.....	.9	.6	.5	.6	67	56	67
30-34.....	1.3	.8	.8	.8	62	62	62
35-39.....	1.9	1.3	1.1	1.5	68	58	79
40-44.....	2.9	2.0	1.1	3.1	69	38	107
45-49.....	4.3	3.1	2.0	4.9	72	47	114
50-54.....	6.6	4.4	2.9	7.4	67	44	112
55-59.....	9.7	6.4	3.7	11.9	66	38	123
60-64.....	15.2	10.3	6.7	16.7	68	44	110
65-69.....	25.5	17.6	11.7	22.7	69	46	89
70-74.....	37.9	26.3	10.7	33.2	69	28	88
75 and over <sup>3</sup> .....	78.1	59.5	22.2	70.6	76	28	90

<sup>1</sup> Rate for all ages determined by weighting age-specific rates by total number of insured workers in each age group.  
<sup>2</sup> For insured workers, all under age 20 are assumed to be aged 15-19.  
<sup>3</sup> Rate for total population based on age distribution of total number of insured workers.

In the future it is likely that the proportion of women who are fully insured will be increasing, although it will never approach as close to 100 percent as will the proportion of men. As a result, the ratios of the death rate for insured women to that for the total female population should rise from the present relatively low level of about 50-75 percent. How near the ratios will come to 100 percent only the future can tell.

Undoubtedly, the relatively low mortality rates for insured women with recent earnings will continue. The factors producing this result for women, like those for men, will always be present. On the other hand, the relative death rates for insured women workers who do not have recent earnings should approximate those of the general population. This should be the case not only at the older ages, as is expected for men, but also at the younger ages, since most of the women withdrawing from the labor market do so in good health. Nevertheless, some of the women at the younger ages who are insured but not re-

## TECHNICAL NOTE

All data used in this mortality analysis are contained in published sources, such as the *Annual Statistical Supplement of the Social Security Bulletin* and the *Handbook of Old-Age and Survivors Insurance Statistics*, or in regular tabulations of claims statistics that are readily available to the public, although not distributed in printed form.

The death rates derived are so-called central rates, obtained by dividing all deaths during the year in a particular age-sex group by the average population in that group during the year. Rates are developed separately by sex for each quinquennial age group. The group under 20 is considered as aged 15-19, and the oldest group includes all persons aged 75 and over, since some of the data were not available by quinquennial age grouping beyond age 75.

The insured population in each age-sex group at the beginning of both 1955 and 1956 was obtained on a preliminary basis from the 1-percent sample data contained in the 1953-54 and 1955 *Handbooks*. These data were then adjusted on the basis of the final estimated figures appearing, in decennial age groups only, in the 1958 *Statistical Supplement*.

The data for the beginning of 1956 were further adjusted to reflect the fact that the insured population is slightly lower at the beginning of a year than at the end of the preceding year. In 1956, under the law then in effect, the requirement for fully insured status increased on January 1 by 1 quarter of coverage. Thus, individuals who just met the quarters-of-coverage requirement on December 31, 1955, were not fully insured on January 1, 1956. The upward adjustment amounts to about 1½ percent for men and 3-4 percent for women.

The 1955 *Handbook* gives the number of insured workers at the beginning of 1956 who had covered earnings in 1955 and also the number of insured workers who died in 1955 and who had

covered earnings in that year. These data, after certain adjustments, were used to obtain the average exposure to death during 1955 for workers with earnings in that year.

Two adjustments were made in the data for workers insured at the beginning of 1956 and with earnings in 1955. The first adjustment was made to offset the effect of the loss of insured status by some workers on January 1, 1956.

Second, and more important, account was taken of the fact that not all insured workers with 1955 earnings were exposed to the risk of death during all of 1955, since the period of exposure began only with the first date in 1955 on which they had covered earnings. Although most of the insured workers with earnings in 1955 had earnings from the beginning of the year, many others did not obtain their first earnings until later in the year. A worker, for example, who had sufficient covered employment before 1955 would have been insured during the entire year, but if he had no 1955 earnings until December 1, he would be exposed to the risk of death as an insured worker with 1955 earnings for only 1 month.

Adjustments to take this exposure factor into account were based on data in the 1955 *Handbook* that show, for broad age groups by sex, both the total number of wage and salary workers and the number employed all 4 quarters of the year. Other data indicate that those who are not 4-quarter workers have their employment more or less evenly distributed throughout the year. By making certain statistical inferences and assumptions on the random distribution of entries into covered employment during the year (and assuming that all 4-quarter workers began employment at the beginning of the year), it is possible to determine the appropriate exposure factors for each age-sex group. For men aged 25-64, the factor applied to the insured population at the end of the year was 94 percent, and for women aged 35-64 it was about 90-91 percent. Smaller factors were used for the younger and older ages.

Once the average exposure for all insured workers and for insured workers with 1955 earnings had been determined for each age-sex group, the exposure for insured workers without 1955 earnings could be obtained by subtraction. Table 1 shows the estimated exposures and deaths for all insured workers, male workers, and aged workers.

## Deaths Among All Insured Workers

Data for deaths among all insured workers are available from a 10-percent sample of all benefits awarded each year, classified by the year of death. Deaths in 1955 for which benefits were awarded in that year numbered 430,000. Because of delays in filing claims and the necessary administrative processing time, awards in 1956 included an additional 129,000 based on deaths in 1955. Eleven thousand deaths in 1955 were represented in the 1957 awards, and 2,000 in the awards made in 1958. In all, about 571,900 deaths occurring during 1955 were represented in awards of 1955-58. Additional 1955 deaths that will subsequently be reported will, it is estimated, represent only  $\frac{1}{2}$  of 1 percent of those in the 1955-58 awards, and the death rates are accordingly understated by about this amount, which is really negligible.

## Deaths Among Workers With 1955 Earnings

Data on deaths in 1955 among insured workers who had 1955 earnings are available in the 1955 *Handbook*, on the basis of a 1-percent sample. The number of reported deaths in the sample was only 2,121 for this category (1,850 men and 271 women). Accordingly—because of the random sampling fluctuations that are possible—the inflated data, and the rates for various age-sex groups derived from these data, must be considered with more caution than those for deaths in the total insured population (based on a 10-percent sample). The same limitations, of course, apply to the data and analysis for insured workers without 1955 earnings (obtained by subtraction of the data for those with 1955 earnings from those for all insured persons).

These data on deaths among insured persons with 1955 earnings are obtained from awards made and processed by some time in April 1956. That closing date (only slightly more than 3 months after the end of the year), selected for the purpose of the *Handbook* sample, is considerably earlier than the one chosen in this study with respect to deaths of all insured workers (the end of 1958). Although claims are likely to be filed more promptly for insured workers with recent earnings than for other insured workers, a significant number of deaths that should have been included are nevertheless left out.

Some indication of the magnitude of the adjustment needed to take account of the early cut-off date in the data for deaths of insured workers with 1955 earnings can be obtained by studying the effect in the data for all insured workers. The 10-percent sample of all benefit awards shows that, for the 12-month period October 1954–September 1955, the deaths of 431,600 men and of 79,600 women were represented in awards through the end of 1955 (a cut-off date that was 3 months after the end of the period). Three years later, the number of deaths in this period that were represented in awards had reached totals of 466,300 for men and 90,400 for women—increases of 8.0 percent and 13.6 percent. When the data are considered by age at death, there is relatively little variation in these increases except that for men under age 35 the increase is about 15 percent, and for women under age 40 it is about 20 percent.

Because less of an adjustment seems necessary for the 1955 deaths of workers with earnings in 1955, it has arbitrarily been assumed that the increase factors used to obtain the final adjusted estimated deaths for this category should be only two-thirds as large as the factors for all insured-worker deaths in 1955. For each age-sex group, the number of deaths of insured workers who died in 1955 but did not have earnings in that

year were obtained by subtracting the number of adjusted deaths of those with 1955 earnings from the total number of deaths.

### Deaths Among Total Population

The death rates for the total population, with which the death rates for insured persons are compared, were obtained from *Vital Statistics of the United States* (Volume I, 1955).<sup>1</sup> For ages 75 and over, this source gave rates for three age groups (75–79, 80–84, and 85 and over). A combined rate for ages 75 and over was obtained by weighting these rates, separately for men and women, by the average numbers of all insured workers in 1955. Likewise, for purposes of comparability (since the age distributions of the total population and of the insured population are considerably different), the total population death rates by age were weighted by the insured population in each group to obtain a significant figure for all ages combined. A similar procedure was used to obtain the rate for all ages combined for men and women for the two subcategories—insured workers with 1955 earnings and insured workers without 1955 earnings.

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<sup>1</sup> Public Health Service, National Office of Vital Statistics.