

INTRODUCTION

This paper reports the results of a project whose major goal has been the determination of the extent to which deaths are reported to the Social Security Administration (SSA), the accuracy of these reports, and the way that such reporting varies across age, race, and sex categories. The determination of vital status for individuals who appear on Social Security record files is an important issue for the agency from both a research and an administrative standpoint. Because the financing of the Social Security system is dependent in part upon assumptions about the ratio of workers to beneficiaries, accurate estimation of mortality is an important ingredient in Social Security policy models which are used to predict the effects of proposed changes in the tax or benefit structure. Identifying the differential levels of mortality coverage for various demographic and socioeconomic groups should enhance SSA records as a valuable tool in mortality research.

DEVELOPMENT OF THE DATA BASE

This section provides background on the development of the 1975 Mortality Coverage Study. For documentation of the interagency planning efforts, the communications with State vital statistics offices, and the detailed specifications for data linkage, see [1].

The 1975 Mortality Coverage Study.—The sample selected for this project consisted of 22,881 known decedents age 35 or older from the year 1975. Three major sources of data were merged:

1. Death certificates were purchased directly from the vital statistics offices in each State. Items extracted from these records included name, sex, race, dates of birth and death, Social Security number, places of birth and death, usual occupation and industry.
2. The National Center for Health Statistics (NCHS) routinely maintains mortality data on all U.S. decedents. These data are kept strictly for statistical purposes and are not available for other uses. Linking to this file was necessary to acquire detailed, coded cause of death information. Other items extracted from the NCHS file included place of residence (as opposed to place of death) and various useful recodes of demographic items—sex, race and age at death.

3. Social Security's administrative record systems, both earnings and benefit files, were accessed between 1979 and 1982 for each decedent for whom a usable Social Security number was identified. The SER—Summary Earnings Record—contains demographic data such as sex, race and dates of birth and death, annual taxable earnings, and annual quarters of coverage information. The MBR—Master Beneficiary Record—contains demographic items and detailed information on the type and status of all benefit claims. A record of the beneficiary's date of entitlement to benefits, monthly benefit amount, and the number of other persons on the same claim are found on the MBR. Hospital and medical insurance enrollment data, disability investigation data, and even a cross reference to other record systems such as railroad retirement and black lung accounts, are also present on the MBR.

Record Matching Using the Social Security Number.—A Social Security number (SSN) for each decedent in the sample was necessary to locate their SSA earnings and benefit records. There were two ways to acquire the SSN. The first was to transcribe it directly from the death certificate. The SSN's identified in this way could then be sent through a computerized "machine" search of the SSA files, and the corresponding SER and MBR data extracted. However, not all death certificates had a valid SSN; some SSN's were inaccurate and others were simply missing. For a small sample of these problem cases, a "manual" search of SSA's National Employee Index microfilm file was conducted. This was an expensive and time-consuming task and therefore could not be done for all invalid or missing SSN's. The effect of the manual search on death reporting rates and its implications for future work of this sort is significant and will be discussed in a later section. For now, though, we can say that for 22,881 decedents in the sample, we found 20,152 Social Security numbers. This total includes 252 SSN's assigned during the manual search.

REVIEW OF DEATH CERTIFICATE-SUMMARY EARNINGS RECORD MATCH RESULTS

Much of the early work on the 1975 Mortality Coverage Study concentrated on matching issues and death reporting on SSA's longitudinal earnings file. This work is summarized and updated below. For more details on the early results, see [2].

Quality of the Match.—Everyone ever issued a Social Security number has a summary earnings record on file at SSA. Using the Social Security number as the match key, the SER was linked to the corresponding death certificate. This link permitted a test of the agreement of other identifying information found in both sources. The variables chosen for comparison were the decedent's last name, sex, race, and month and year of birth. As a result of these comparisons, the weighted estimate of the percent of decedents successfully matched to the summary earnings file was 77.9; the weighted estimate of the percent of decedents with questionable matches to the summary earnings file was 9.6; and, finally, the weighted estimate of the percent of decedents in 1975 who could not be matched to the summary earnings file, either because the Social Security numbers were invalid or unavailable, was 12.5 percent [3]. (See figure 1.) In other words, the estimate of the percent of 1975 decedents having a correct SSN either on the death certificate or found through the manual search was approximately

Figure 1.—Quality of Death Certificate-SER Match. (Numbers may not add to totals due to rounding.)

Description	Sample Counts	Weighted Estimates	Percent
Total.....	22,881	1,729,569*	100.0
Good matches..	18,430	1,347,856	77.9
Questionable matches.....	1,650	165,984	9.6
Not matched..	2,801	215,728	12.5

* The published death count for ages 35 and above in 1975 is 1,728,230.

78 percent. (If a manual search could have been conducted for all the remaining invalid, missing, or questionable SSN's in the sample, we would have had an even higher rate of good matches to the SER file.) The analysis below is limited to sample cases with good death certificate-SER matches.

Mortality Coverage on the SER.--There are two indications of death on the summary earnings record: a date of death and a report of a benefit terminated due to death. As figure 2 shows, the estimate of the percent of deaths reported on the SER was 90.9 percent of the successfully matched cases. This estimate can be partitioned into two components corresponding to the two indications of death on the SER--the estimate of the percent of successfully matched cases containing a date of death, 85.8 percent, and the estimate of the percent of cases containing a claim termination code, 5.1 percent.

Figure 2.--Death Reporting on the SER for Good Death Certificate-SER Matches

Description	Sample Counts	Weighted Estimates	Percent
Total good matches.....	18,430	1,347,856	100.0
Death reported on SER.....	16,629	1,225,417	90.9
No date on SER	1,420	68,360	5.1
Date of death correct*.....	15,070	1,147,298	85.1
Date of death incorrect*...	139	9,759	0.7
Death not reported on SER.	1,801	122,439	9.1

* Date of death was considered correct if it fell in the range 1974-1976.

The estimate of males with a good death certificate-SER match, but whose death was not recorded in any way on their SER, was 5.8 percent; the female estimate of unreported deaths was, on the other hand, 14.2 percent. Differential rates are also observable when race and age are considered. The estimate of whites with good matches having no reported death on the SER was 8.6 percent, whereas the estimate for other races was 14.0 percent. Death reporting is most complete for those 65 years and older; the estimate of the percent of decedents 65 years old or over with a successful death certificate-SER match, whose death was recorded on the SER, was 94.0 percent.

RESULTS OF DEATH CERTIFICATE-MBR MATCH

The most recent work on the 1975 Mortality Coverage Study has linked death certificate data to benefit records from the MBR for the sample decedents in order to determine the level of death reporting on this administrative file. As stated earlier, there were 20,152 decedents with Social Security numbers in the study sample. When a search of Social Security's record systems was made for administrative data for these decedents, substantially more earnings records were found than benefit records. This is attributable to the nature of the record systems. An earnings record is established for everyone who is issued a Social Security number; this is not true in the benefit record system. Until 1975 an MBR was created only when a person became entitled to receive retire-

ment, survivors, health or disability insurance benefits. Since 1976, MBR's have also been created for persons who apply for such benefits but are not necessarily entitled to receive them. So, while the record search produced earnings records on 20,080 decedents, benefit records were found for only 16,354 decedents.

Two Types of MBR Matches.--When benefit records were requested for decedents, more than 31,000 separate benefit records were returned. This occurred because for each SSN extracted from a death certificate, we received in return an MBR for everyone entitled to benefits on the same claim as the sample person (if any). This usually amounted to a group of records for members of a family. So the next step in developing the data base was to identify the one MBR from a claim that correctly matched the death certificate, and to set aside the "extra" MBR's. In some cases, the decedent did not have a benefit record of his or her own. For example, the decedent may never have been entitled to benefits while alive, but after death family members were eligible to receive survivor benefits because of the decedent's work record. In a case such as this, we selected at random one MBR from the decedent's claim (so that we would have some record of the status of that claim). For this reason, two different types of death certificate-MBR matches exist. The majority are referred to as "beneficiary" matches, meaning that the decedent in our sample was at some point entitled to benefits and has an MBR of his or her own. The others are called "primary" matches, indicating that the decedent's work record entitled others to receive benefits on his or her account, yet the decedent was never entitled to benefits. The benefit record in a "primary" match generally provides less data on the decedent than a "beneficiary" match.

Quality of the Match.--As with the analysis of the earnings records, the quality of the death certificate-MBR matches was assessed to decide whether the correct MBR had been chosen for each decedent. By determining the level of agreement for several confirmatory variables (last name, sex, race, and month and year of birth) from both the death certificate and benefit record, we found that 70.3 percent of the total decedent study population had a good match to the MBR. Broken down further, this amounted to 63.4 percent of the sample with good "beneficiary" matches (decedents entitled to benefits at some point in their life) and 7.0 percent with only "primary" matches (decedents whose work in covered employment entitled others to benefits).

Figure 3 provides estimates of the 1975 decedent population by demographic characteristics and MBR match characteristics. For example, the estimate of 1975 male decedents with good "beneficiary" matches was 67.9 percent; an additional 10.4 percent were good "primary" matches. These results may be contrasted with the 1975 female decedent estimates; the estimate of the percent of good "beneficiary" matches among females was 58.0 percent, and the estimate of the percent of good "primary" matches among females was 2.9 percent. In addition, the estimate of the percent of white decedents with good matches to the MBR was 71.7, while the estimate of the match rate for other races was much lower at 58.7 percent. The most

Figure 3.--Characteristics of Death Certificate Matches for "Beneficiaries" and "Primaries" on the MBR
(Numbers may not add to totals due to rounding.)

Description	Total		Good "Beneficiary" Matches		Good "Primary" Matches Only		Not Good Match	
	Weighted Estimates	Percent	Weighted Estimates	Percent	Weighted Estimates	Percent	Weighted Estimates	Percent
Total.....	1,729,569*	100.0	1,096,241	63.4	120,461	7.0	512,867	29.7
<u>Race-Sex:</u>								
Males.....	944,725	100.0	641,141	67.9	98,066	10.4	205,517	21.8
White.....	842,311	100.0	586,132	69.6	85,839	10.2	170,340	20.2
Other races.....	102,414	100.0	55,009	53.7	12,227	11.9	35,177	34.3
Females.....	784,804	100.0	455,101	58.0	22,395	2.9	307,310	39.2
White.....	704,180	100.0	417,980	59.4	19,258	2.7	266,943	37.9
Other races.....	80,624	100.0	37,121	46.0	3,137	3.9	40,367	50.1
<u>Age at Death:</u>								
35-61.....	400,471	100.0	107,453	26.8	99,630	24.9	193,390	48.3
62-64.....	108,813	100.0	66,952	61.5	9,346	8.6	32,515	29.9
65 and older.....	1,220,244	100.0	921,837	75.5	11,484	0.9	286,922	23.5

* One sample record, which had only NCHS data (no death certificate or SSA data), could not be classified by race, sex or age because it was garbled beyond interpretation. The weighted count for this record is 40.

Figure 4.--Death Reporting on the MBR for Good "Beneficiary" Matches*

(Numbers may not add to totals due to rounding.)

Description	Total		Death Reported		Death Not Reported	
	Weighted Estimates	Percent	Weighted Estimates	Percent	Weighted Estimates	Percent
Total "beneficiaries".....	1,096,242	100.0	1,082,681	98.8	13,561	1.2
<u>Race-Sex:</u>						
Males.....	641,142	100.0	636,940	99.3	4,201	0.7
White.....	586,132	100.0	582,641	99.4	3,491	0.6
Other races.....	55,009	100.0	54,299	98.7	710	1.3
Females.....	455,101	100.0	445,741	97.9	9,360	2.1
White.....	417,980	100.0	409,975	98.1	8,005	1.9
Other races.....	37,121	100.0	35,766	96.3	1,355	3.7
<u>Age at Death:</u>						
35-61.....	107,452	100.0	103,290	96.1	4,164	3.9
62-64.....	66,952	100.0	66,580	99.4	372	0.6
65 and older.....	921,838	100.0	912,812	99.0	9,026	1.0

* It is important to remember that good "beneficiary" matches are decedents who were SSA beneficiaries sometime during their life, not necessarily at time of death. This figure includes, therefore, not only old-age recipients, but also some people who received benefits only temporarily, for example, disabled individuals who could later return to work, young widowed mothers, and children of beneficiaries.

dramatic range in the estimates of match rates for the MBR, though, occurred when looking across different age groupings. This represents a significant difference from the earlier results with the SER, where match rates were fairly similar across a wide range of ages. Younger decedents are much less likely to have a good MBR match, particularly a "beneficiary" match. For example, the estimate of 1975 decedents under 62 who had good "beneficiary" matches was 26.8 percent, while 61.5 percent of those between 62 and 64, and 75.5 percent of those 65 or older were good "beneficiary" matches. This distribution is to be expected due to the greater likelihood of receipt of benefits upon reaching retirement. The younger decedents in our sample with good MBR matches, particularly those under 50, are generally what we have classified "primary" matches; they had never received benefits themselves, but are more likely to have left surviving spouses, parents and children when they died.

DEATH REPORTING ON THE MBR

Mortality coverage was expected to be higher on the benefit record than on the earnings record since the presence of a death report has immediate effects on the administration of the program—either causing termination of a decedent's benefits or causing new entitlement to survivor's benefits.

Several death indicators exist on the MBR file. The most obvious is a date of death. The second is a code which indicates the termination of a claim due to the beneficiary's death. The third is the presence of a lump sum death benefit paid following the death of a covered worker. In order to examine the completeness of death reports, the following analysis is limited to those decedent records with a good match between death certificate and MBR.

"Beneficiary" Matches.--Death reporting, as expected, proved to be significantly better on the benefit record file than on the earnings record file. Only 1.2 percent of 1975 decedents who had actually received benefits during their life had no death indication on the MBR. Coverage rates did not vary a great deal across age, race and sex categories. Large differences in coverage rates among demographic groups, apparent on the earnings record, were not observed on the benefit record file. The estimate of the proportion of death reports was only slightly higher for males than for females and for whites than for other races. Deaths were reported for 97.4 percent of the "beneficiary" decedents under 65 years, and for 99.0 percent of those 65 or older. (See figure 4.)

"Primary" Matches.--Of the 1975 decedents who had never received benefits, the estimate of the percent with no obvious death indicator was 8.6. Since a good "primary" match implies that the decedent left surviving beneficiaries, it seemed logical to expect all of these "primary" matches to have death indicators. Individual examination of these decedent records indicated that:

1. In almost one-third of the cases, the surviving beneficiary on the deceased's claim was a widow whose record showed that she became entitled to survivor benefits in the same month that her husband died. This was, in effect, an indication of her husband's death.

2. More than half of the cases in question were probably not good MBR matches after all. The deci-

sion rules in identifying good matches were most likely too lenient.

3. The remaining "primary" matches with no death indicator had miscellaneous errors which were either on the death certificate or were introduced into the record during the extraction or keypunching of the data. These errors, such as incorrect sex coding, resulted in faulty selection of a benefit record.

Comparison of Dates of Death from Death Certificates and MBR.--The estimate of the percent of successfully matched records (death certificate-MBR match) containing a date of death was 83.7; a comparison of the MBR date of death with the death certificate date of death indicated that this item, if present, is generally very accurate. The correct year of death (1975) was noted on 99.6 percent of the MBR records containing the year of death, and 98.1 percent had both the correct year and month of death.

The Manual Search for Social Security Numbers.
--As we have shown, death reporting was quite good on SSA's earnings files and even better on the benefit files, for decedents considered to be good matches. These are decedents for whom we believe we had accurate Social Security numbers. For this study, there were two methods of locating a decedent's SSN. One was to transcribe it directly from the death certificate, and send it through a computerized "machine" search of the earnings and benefit files in order to locate the decedent's administrative data. However, there was often no SSN on the death certificate or else the SSN was determined to be invalid or inaccurate. The estimate of the percent of 1975 decedents who did not have accurate SSN's on their death certificate was 23 percent. We could not follow up on all problem cases because of the expensive and time-consuming nature of the task, but we did investigate a subsample.

In the early days of the project, a 10 percent subsample of decedents (2,052 records) had been selected to be used as a pretest of matching and analysis techniques. In this subsample, 414 decedents with inaccurate or missing Social Security numbers were found. For these cases, a follow-up "manual" search of SSA's National Employee Index microfilm files was carried out in order to identify accurate SSN's. Of the 414 records sent for manual searching, 252 new SSN's were tentatively assigned on the basis of identifying information from the death certificate. Then the earnings and benefit records (if any) were retrieved for these newly identified account numbers. This manual searching had the effect of raising the number of good matches in the sample, but also slightly lowering the overall level of death coverage. Specifically, for the 10 percent subsample of decedent records, death coverage rates on the SER for identified good matches went from 91.2 percent prior to manual search, to 88.6 percent after manual search. Corresponding coverage on the MBR for the subsample good "beneficiary" matches went from 99.4 to 98.5 percent. (See figure 5.) Since women and blacks are more likely to have inaccurate or missing Social Security numbers on their death certificates, and since deaths are reported less often for these same groups, it is not surprising that the manual search resulted in lower death reporting on the administrative files. Therefore, we must keep in mind that if a manual

Figure 5.--Death Reporting to SER and MBR for a 10% Subsample Before and After Manual Search

Description	Before Manual Search		After Manual Search	
	Weighted Estimates	Percent	Weighted Estimates	Percent
Good matches to SER....	122,196	100.0	142,350	100.0
Death reported....	111,444	91.2	126,052	88.6
Death not reported..	10,752	8.8	16,298	11.4
Good beneficiary matches to MBR	95,595	100.0	113,394	100.0
Death reported....	95,059	99.4	111,705	98.5
Death not reported..	537	0.6	1,688	1.5

search of the National Employee Index for all missing or invalid Social Security numbers in the entire decedent sample were conducted, we could expect a reduction in the overall rate of death reporting in SSA record systems.

OTHER RELATED ISSUES

Posting Problems on the SER.--At the 1980 ASA meetings in Houston, Texas, a paper was presented on an historical examination of death reporting in several record systems within SSA [4]. That study, using the Continuous Work History Sample, examined all death reporting sources in SSA from 1950 through 1977; and the weighted counts of the combined sources were compared with the Vital Statistics deaths published annually by the National Center for Health Statistics. The two major questions the study was designed to answer were (1) to what extent does death reporting improve when the data from the various record systems are combined, and (2) does the growth of Social Security programs and proportion of covered population produce an accompanying improvement in death reporting. The study showed that death reporting improved dramatically by combining four different Social Security record systems--the Continuous Work History Sample, the Master Beneficiary Record, the Summary Earnings Record, and the Numident (a file which contains virtually all of the information from the application for a Social Security number, Form SS-5)--and that reporting had, indeed, improved significantly as programs and coverage grew. In 1950 only 20 percent of deaths were recorded. By 1968, over 80 percent of deaths were recorded, and by 1973 the percentage had risen to over 95 percent. A high was reached in 1976 with 99.7 percent, followed by a slight but puzzling drop in 1977 to 98.4 percent. In the meantime, other studies using SSA's decedent records revealed a dramatic decline in death rates beginning in late 1977. After some investigation and inquiries into the operations programs, it was discovered that SSA's operating component had stopped posting deaths to the SER at the end of November 1977, because the data were not necessary for the operation of the program. A request for reinstatement of posting all death information was immediately submitted. Even though the data had not been posted, SSA had continued to receive it, thus an attempt has been made to locate and save the data until it can be inserted into the SER. Unfortu-

nately, some of the data for 1978 through 1980 has been irretrievably lost. However, it is expected that by November 1982, all the death reports that could be identified will be added to the SER. This means that posting for 1978 through 1980 will be sporadic and these three years may best be ignored for research purposes if the study universe includes cases not likely to be Social Security beneficiaries. The posting of deaths from 1981 forward should be complete regardless of benefit status.

Recently, a tremendous amount of interest in death reporting at SSA was generated by two well-publicized activities, each of which will undoubtedly have a long-term effect on death information in the administrative files.

HCFA-MBR Match.--In September 1981, the Department of Health and Human Service's (HHS) Office of the Inspector General (OIG) matched the Health Care Financing Administration's (HCFA) file of death reports from the Medicare program to the MBR [5]. The HCFA files contain 20 million beneficiary deaths based on notifications received from health care providers over a 15-year period. The Medicare file used in the match was current as of March 1981. The match revealed 7,958 cases on the HCFA files where the MBR showed the beneficiary to be alive and receiving Social Security benefits. By April 1982, investigation of these cases had established beneficiary death in 4,738 cases (59.5 percent) and had found 2,105 (26.4 percent) to be alive and erroneously coded as deceased in the HCFA files. Investigation of the remaining 14.1 percent has not been completed at this writing. Two serious problems with data matches of this nature involve validity of the data from health care providers and multiple SSN's. Many individuals are miscoded as deceased in the HCFA files because health care providers often enter the date of release from the institution in the space for date of death. Another problem arises because multiple Social Security numbers may be assigned to the same individual [6]. There may be as many as nine million such numbers, which means that cross-checking is critical. In the very early stages of the Social Security program, a person who already had an SSN could acquire a new one simply by applying for it. Soon, applicants were asked if they already had an SSN. Finally, in 1978, requirements became even more strict and all persons applying for a number now have to submit satisfactory proof of age, identity, and citizenship or alien status.

The OIG matching operation described above has led to several activities to improve death reporting to SSA: (1) Since February 1982, an ongoing death-records matching procedure has been established between HCFA and SSA, (2) SSA and HCFA are working together to improve the reliability of health care providers' data, (3) SSA is working with other agencies (Veterans Administration, Office of Personnel Management, Railroad Retirement Board) to refine the current reporting mechanism so that data from these agencies will be usable in an ongoing death-records match, and (4) SSA is considering expanding the matching operations to include Department of Defense data which provide death information about all military retirees.

Partial Termination of the Lump-Sum Death Benefit.--The other well-publicized action that created interest in death reporting to SSA was

the Omnibus Budget Reconciliation Act of 1981, which partially eliminated the lump-sum death benefit. Prior to the Act, a payment of \$255 was made upon the death of an insured worker regardless of whether there was a surviving family member. About half of the payments were made to estates with no surviving spouse or surviving minor children and many of these went directly to funeral home operators. The costs of administering lump-sum death payments was five times as high as for administering other types of Social Security benefits. The Omnibus Budget Reconciliation Act of 1981 eliminated the payment where there is neither a spouse nor a child to receive survivor's benefits, leaving only widows and orphans to receive the benefit. Savings in 1982 were estimated at \$0.2 billion [7].

Concern for the effect of this Act on death reporting to SSA has spurred two Congressmen to introduce bills to remedy the potential problem. In November 1981, Representative Robert L. Livingston, stating "The problem is, under current law, the Social Security Administration has almost no access to State or local death records," introduced H.R. 5076, which would make it mandatory that States inform SSA of deaths [8]. In December 1981, Representative Willis Gradison stated that "As a result (of the eliminated lump-sum death benefit), it is likely that the number of deaths reported by (funeral) directors will decrease steadily since their incentive to report is gone. This could create a large void in the ability of SSA to stop payments to people once they have died" [9]. Consequently, Mr. Gradison introduced H.R. 5188, which would establish a program under which States would voluntarily contract with the Secretary of HHS to furnish information on deaths. Information furnished by the States would be exempted from the Freedom of Information Act, but would be shared with other Federal agencies providing benefits to the individual.

Related Plans.--Within SSA itself, much activity is underway to review the death reports process and to remedy any problems. One of the larger activities involves a pilot State death record matching project in which SSA's operating components are contracting with State bureaus of vital statistics to obtain copies of death rolls. These rolls, which encompass many years of data, will be matched to SSA's administrative files to identify and record any deaths not previously posted. Fifteen States, with a total of 4-5 million records, have tentatively agreed to participate in the pilot. If the pilot proves successful, the record match will likely be extended to other States. Perhaps this work will eventually help recover the 1978 to 1980 death information not posted to the SER, in addition to improving other years of data.

Concurrent with this death-records match, SSA's Office of Research and Statistics is conducting an in-depth study to determine the extent of prob-

lems in reporting of beneficiary deaths since the change in the lump sum death benefit. After the results of this study are available, SSA's operating component will decide what, if anything, needs to be done to improve the death reports process on a continuing basis. If all these activities are carried out successfully, SSA may eventually have complete death reporting in its administrative files.

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