

*To provide a more detailed assessment of the coverage of deaths of older adults in the Social Security Administration's Death Master File (DMF), this research note compares age-specific death counts from 1960 to 1997 in the DMF with official counts tabulated by the National Center for Health Statistics, the most authoritative source of death information for the U.S. population. Results suggest that for most years since 1973, 93 percent to 96 percent of deaths of individuals aged 65 or older were included in the DMF.*

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## ***The Social Security Administration's Death Master File: The Completeness of Death Reporting at Older Ages***

by Mark E. Hill and Ira Rosenwaike\*

### ***Summary***

We examine the completeness of death reporting in the Social Security Administration's Death Master File (DMF) through comparison with deaths by year and age group reported in official U.S. vital statistics. For most years since 1973, results suggest that the DMF includes 93 percent to 96 percent of deaths of individuals aged 65 or older. Although studies have shown that the National Center for Health Statistics' National Death Index provides superior coverage of deaths, for many researchers the DMF may be a desirable choice. Some advantages of the Death Master File are discussed.

### ***Introduction***

The Social Security Administration's Death Master File (DMF) is a publicly available database containing more than 60 million death notices for individuals enrolled in the U.S. Social Security program since 1936. The DMF is extracted on a quarterly basis from the Numident, SSA's master file containing identifying information about each individual to whom SSA has assigned a Social Security number. Introduced in 1988, the DMF supersedes earlier files used internally by Social Security person-

nel and contains information on deaths reported to SSA for beneficiaries and nonbeneficiaries. Relatives of deceased individuals, funeral directors, financial institutions, and postal authorities are the primary sources of death information recorded in the DMF. Additional deaths are identified from computer files provided to SSA from a variety of government agencies (Social Security Administration 2000b). Variables in the DMF include name, Social Security number, last known residence, dates of birth and death, and the state where the individual first enrolled for a Social Security card.<sup>1</sup>

The academic research community has principally used the DMF (and its predecessor files) to determine the vital status of subjects in longitudinal follow-up studies. In particular, the DMF serves as an important complement to the National Death Index (NDI), which does not include deaths that occurred before 1979 (Kraut, Chan, and Landrigan 1992; Loughlin and Dreyer 1997).<sup>2</sup> It has also proved an invaluable resource for evaluating the consistency of age reporting in other data sources (Elo and others 1996; Hill, Preston, and Rosenwaike 2000; Preston and others 1996). Other potential applications of the DMF include use as a sampling frame for long-lived individuals (for example, in

retrospective or record-linkage studies) and as a source for obtaining Social Security numbers or date of birth for deceased study participants.

Despite the utility of the DMF, studies have suggested that many deaths have gone unreported in the SSA files that predate the DMF (Boyle and Decoufle 1990; Curb and others 1985; Fisher and others 1995; Kraut, Chan, and Landrigan 1992; Wentworth, Neaton, and Rasmussen 1983). Moreover, a recent audit by SSA's Inspector General found that about 1.3 million deaths recorded in SSA's Master Beneficiary Record (the master payment file for the Old-Age, Survivors, and Disability Insurance program) have not been entered into the DMF's parent Numident file and therefore are not included in the DMF (Social Security Administration 2000b).

The only study to evaluate the coverage of the DMF by comparison with national death data found that the DMF contains 17.5 percent fewer deaths than were reported in the U.S. vital statistics system during the 1970-1991 period (Schnorr and Steenland 1997). However, that study did not assess completeness for age-specific groups. Because SSA has a greater financial incentive to collect death information for beneficiaries than for nonbeneficiaries, estimates based on the crude number of deaths may severely understate the completeness of the DMF at older ages. For example, Hill, Preston, and Rosenwaike (2000) successfully linked fully 93 percent of their sample of 12,980 known decedents aged 85 or older to the DMF. Furthermore, at least three studies exploring the completeness of death reporting in SSA files have shown that successful identification of known decedents improves substantially with age at death (Curb and others 1985; Reyes, Stebbings, and Voelz 1982; Wentworth, Neaton, and Rasmussen 1983). To provide a more detailed assessment of the coverage of deaths of older adults in the DMF, this research note compares age-specific death counts from 1960 to 1997 in the DMF with official counts tabulated by the National Center for Health Statistics (NCHS), the most authoritative source of death information for the U.S. population.<sup>3</sup>

## Method

We estimate the percentage completeness of the DMF for age group  $i$  in year  $t$ ,  $C_{it}$ , using the following equation:

$$C_{it} = 100(D_{it}/O_{it})$$

where  $D_{it}$  represents the number of deaths reported in the DMF in age group  $i$  occurring in year  $t$  and  $O_{it}$  represents the official number of deaths of U.S. residents reported by NCHS in age group  $i$  during year  $t$ .<sup>4</sup> Hence, this comparison is not based on individual-level record linkage, which could understate estimates of completeness because some decedents included in both data

sources would be unmatchable as the result of inconsistencies in the reporting of identifying information such as name, Social Security number, and date of birth (Preston and others 1996; Social Security Administration 2000b:6).

Slight differences in the NCHS and DMF data systems cause their target populations to be less than fully comparable. Both include deaths of residents who died in the United States (including resident aliens). However, the DMF also includes thousands of deaths of persons enrolled with SSA who died abroad. To adjust for that difference, we exclude all decedents whose DMF records indicate they resided outside the United States at the time of death. The version of the DMF used here was published in March 1998. Appendix Table 1, presents the number of deaths of U.S. residents in the DMF by year and age group for the period 1960 to 1997. NCHS tabulations by age were taken from annual volumes of the *Vital Statistics of the United States* (National Center for Health Statistics 1963-1996), except for 1993-1997, which are from the NCHS Compressed Mortality File (National Center for Health Statistics 2000).<sup>5</sup> The official death counts are shown in Appendix Table 2.

## Results

As expected, results show that death reporting in the DMF is substantially more complete at older ages than at younger ages (see Table 1). That pattern can be seen clearly in Chart 1, which plots the estimated percentage completeness for five broad age groups over the 1960-1997 period. Deaths of persons aged 0 to 24 are poorly reported over the entire period; in no year are more than 43 percent of deaths in that group reported in the DMF. By contrast, estimates of completeness at age 65 or older are well over 90 percent for all years from 1973 to 1986 and from 1992 to 1997, the last year in the series.

Fluctuations in coverage over time apparently reflect changes in recordkeeping procedures within SSA as well as changing patterns in the reporting of deaths to SSA. DMF completeness is extremely poor for all age groups as late as the mid-1960s, at which point results show dramatic improvements. Although the U.S. Social Security program initially covered only nonagricultural workers in commerce and industry, it expanded to include the vast majority of workers by the mid-1950s.<sup>6</sup> Hence, improvements in DMF coverage beginning in the 1960s for all but the youngest decedents are almost certainly explained by enhanced recordkeeping efforts on the part of SSA.

In 1981, a steady decrease in completeness begins for decedents younger than 65. That decline apparently corresponds with the Omnibus Budget Reconciliation Act of 1981, which greatly tightened eligibility requirements for SSA's lump-sum death benefit. According to Aziz and

**Table 1.**  
**Estimated percentage of U.S. deaths included in the**  
**SSA Death Master File, 1960-1997, by age group**

Year	Total	0-24	25-54	55-64	65-74	75-84	85 or older
1960	5.3	0.4	17.5	9.0	1.9	0.4	0.1
1961	5.8	0.4	18.4	10.8	2.4	0.5	0.2
1962	17.0	0.4	19.1	14.9	22.7	19.3	9.6
1963	36.0	0.5	20.0	20.4	55.3	51.7	27.2
1964	37.3	0.5	24.9	29.4	52.8	50.9	28.0
1965	40.4	1.1	31.6	37.9	52.7	52.7	30.8
1966	55.5	2.9	41.3	46.3	70.3	69.1	61.6
1967	60.4	3.9	43.1	48.2	73.8	75.0	76.4
1968	62.6	5.7	48.2	51.2	74.8	75.7	77.8
1969	64.1	6.6	55.3	54.5	75.4	75.4	76.9
1970	65.0	6.6	57.9	57.3	76.2	75.2	76.1
1971	66.5	7.9	60.9	60.9	77.4	75.1	75.5
1972	78.8	17.6	77.0	76.1	87.2	86.5	85.0
1973	83.3	19.0	76.6	76.6	92.1	94.2	92.2
1974	85.0	20.7	79.1	79.6	92.8	95.4	93.6
1975	85.7	22.1	80.2	80.7	93.4	95.5	94.1
1976	87.7	24.5	84.5	84.7	94.6	95.4	94.8
1977	90.8	31.7	91.3	91.2	95.7	96.4	96.5
1978	91.5	33.6	92.4	92.4	96.1	96.3	96.7
1979	91.7	34.2	92.2	92.9	96.3	96.2	97.0
1980	91.9	34.4	92.0	93.4	96.5	96.2	97.1
1981	90.8	28.7	87.4	91.0	96.2	96.1	96.8
1982	88.5	17.2	78.4	86.4	95.9	95.7	96.7
1983	88.7	16.8	77.6	86.2	95.8	95.9	96.6
1984	88.9	16.7	76.8	86.1	96.0	96.1	96.7
1985	89.1	17.0	76.4	86.1	96.2	96.3	96.5
1986	88.9	17.1	75.0	85.6	96.4	96.8	96.0
1987	69.2	13.7	56.6	65.1	74.9	75.3	76.0
1988	77.9	14.5	52.7	61.7	88.6	89.8	87.2
1989	78.2	14.7	51.4	59.9	88.9	90.9	89.0
1990	75.3	15.5	50.0	57.7	85.0	87.1	85.7
1991	74.8	19.6	52.4	58.7	83.1	85.3	84.7
1992	83.6	31.2	63.3	69.9	91.1	92.8	92.2
1993	86.4	37.8	69.5	76.3	92.9	94.0	92.8
1994	86.9	42.3	71.1	77.7	93.1	94.0	92.4
1995	87.5	42.6	71.4	78.3	93.5	94.2	93.4
1996	89.1	42.1	73.6	80.4	94.9	95.2	94.9
1997	89.7	42.4	74.2	81.3	95.4	95.4	95.3

Buckler (1992), that legislative change eliminated prior incentives for funeral directors to report deaths to SSA in cases in which the decedent did not leave either a surviving spouse or a child. However, results suggest that the act had little effect on death coverage for decedents aged 65 or older, perhaps because SSA more

carefully monitors the vital status of beneficiaries receiving regular payments to prevent fraud, waste, and abuse.

In 1987, results show a sharp drop in DMF completeness for all age groups, followed by a recovery in the mid-1990s. Although the decline remains unexplained, communication with SSA staff suggests that it may be caused by an error in the computer program used to extract the DMF from its parent Numident database. Therefore, it might be possible to correct the problem in future versions of the DMF. Concerned about dramatic declines in voluntary death reporting by funeral directors during the 1980s, SSA conducted a campaign in 1991 that included a direct mailing to 22,000 funeral directors (Aziz and Buckler 1992). Perhaps as a result of that campaign, coverage improved throughout the 1990s. By 1997, the last year in the series, DMF completeness for persons aged 65 or older exceeded 95 deaths for each 100 in the NCHS data.

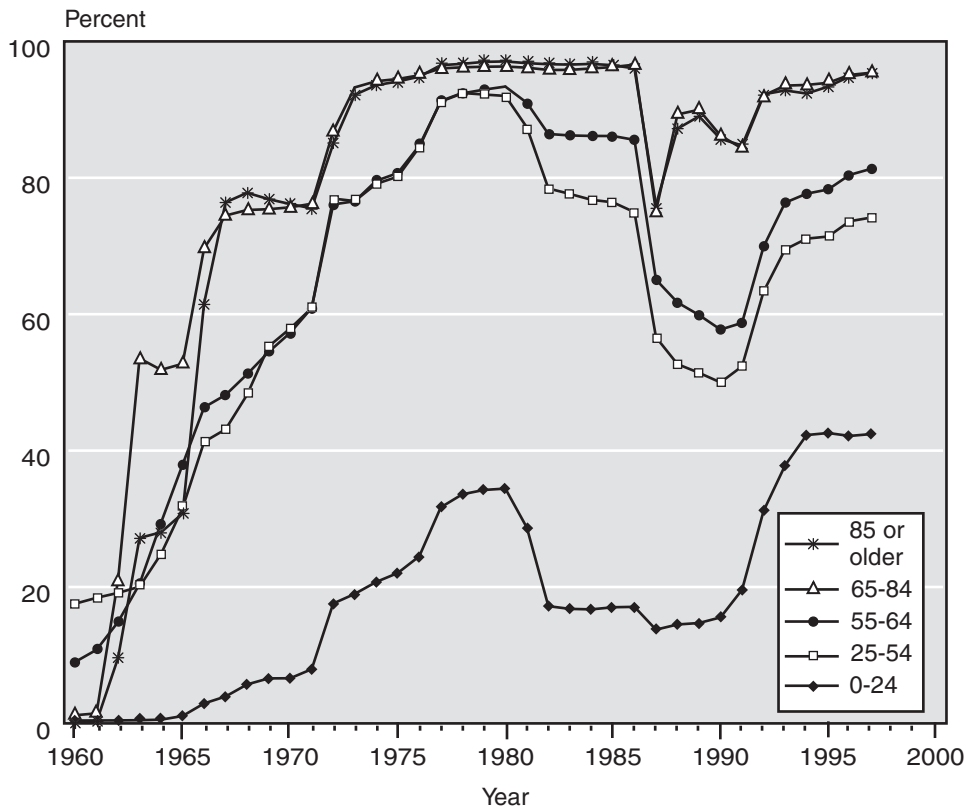
### Discussion

A recent study that did not distinguish deaths by age concluded that the DMF was inadequate for determining vital status (Schnorr and Steenland 1997). We agree that for many studies, the DMF alone would be inadequate. However, our results demonstrate that the age profile of the study sample must be considered. For most years from 1973 to 1997, more than 93 percent of deaths among persons aged 65 or older were included in the DMF. In the 5 years when completeness dipped below 90 percent, it ranged between 84 percent and 89 percent (except for 1987, the only year it fell below 80 percent).

Although results suggest that mortality ascertainment will not be as complete in the DMF as in the NDI, there are a number of reasons why investigators may wish to use the DMF, perhaps as a supplement to the NDI.

- **The DMF fills an important gap left by the NDI by including deaths occurring before 1979 (the earliest year covered by the NDI).** Our results show that the DMF includes well over 90 percent of the deaths of persons aged 65 or older from 1973 to 1978, making it an excellent source for that period.
- **Numerous researchers have noted the low cost and ease of use of the DMF relative to the NDI** (Kraut, Chan, and Landrigan 1992; Page, Wagan, and Kang 1996; Schall, Marsh, and Henderson 1997). Indeed, several organizations now maintain fully updated copies of the DMF on the Web that can be searched at *no cost* to the researcher (see, for example, [www.ancestry.com](http://www.ancestry.com)). The low cost and ease of use makes the DMF of great utility for linkage to other data files.

**Chart 1.**  
**Estimated percentage of U.S. deaths included in the SSA Death Master File, 1960-1997, by age group**



searchers relying solely on the NDI for mortality ascertainment will almost certainly fail to identify some proportion of deaths because of inconsistencies in the reporting of identifying information (see, for example, Patterson and Bilgrad 1985; Williams, Demitrack, and Fries 1992). Hence, use of SSA death data in concert with the NDI has been shown to substantially improve the completeness of mortality ascertainment in longitudinal studies (see, for example, Kraut, Chan, and Landrigan 1992).

This research note should make researchers aware of some potential advantages (and limitations) of the DMF. Fortunately, studies need not be limited to one agency's data. When funding levels permit, both the DMF and the NDI can be employed in ways that enhance the advantages of each.

- Whereas the NDI is limited to deaths occurring in the United States, Puerto Rico, and the Virgin Islands, the DMF includes decedents enrolled with SSA who die in foreign countries (for example, Americans dying abroad or immigrants who have returned to their country of origin).<sup>7</sup> Smith (1997) reports that by using SSA death data, the Alameda County Study has been able to identify deceased study subjects in Spain, Norway, and the Philippines.
- The DMF is less affected by misreporting of age and Social Security number (and perhaps first and last name) than the NDI, which is based on death certificate information collected from proxy informants (Curb and others 1985; James and others 1997; Preston and others 1996). Therefore, the DMF has served as an excellent source for independent verification of age in mortality studies (Elo and others 1996; Hill, Preston, and Rosenwaike 2000).
- Although the NDI is believed to contain death certificate information on virtually all resident deaths occurring in the United States, re-

### Notes

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<sup>1</sup> Before 1988, most DMF records include only the month and year for the date of death; however, deaths occurring after this period typically also include the day of death. About one-fifth of the DMF records do not include information on the decedent's last residence.

<sup>2</sup> The NDI is a central computerized index based on death certificate data files submitted to the National Center for Health Statistics (NCHS) by the various state vital statistics offices. Because the state death certificate files also serve as the source for the official death statistics produced annually by NCHS, deaths tabulated from the NDI should correspond with official death statistics.

<sup>3</sup> NCHS believes that it registers more than 99 percent of the deaths occurring in the United States (National Center for Health Statistics 1996).

<sup>4</sup> Because our results are for the full universe of deaths in a given period and age group, no statistical tests are conducted.

<sup>5</sup> We use death counts from the NCHS Compressed Mortality File for recent years because the NCHS *Vital Statistics of the United States* volumes had not been released for 1993-1997 at the time this analysis was performed. Data in the Compressed Mortality File for those years are “Final Deaths” reported in the monthly *National Vital Statistics Reports*.

<sup>6</sup> A key exception is civilian employees of the federal government hired before 1984, for whom enrollment is voluntary. For a brief history of the expansion of the Social Security program, see Social Security Administration (1997).

<sup>7</sup> As of December 1999, SSA reported the number of beneficiaries living in foreign countries (not including U.S. territories) to be 385,492 (Social Security Administration 2000a). That number does not include the many nonbeneficiaries enrolled with SSA who are also living abroad.

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**Appendix Table 1.****Number of deaths of U.S. residents reported in the SSA Death Master File, 1960-1997, by age group**

Year	Total	0-24	25-54	55-64	65-74	75-84	85 or older	Age not reported
1960	90,240	725	45,686	24,312	8,112	1,755	241	9,409
1961	98,935	709	47,150	28,649	9,874	2,235	367	9,951
1962	299,479	723	50,148	40,553	96,980	82,435	19,270	9,370
1963	653,523	775	53,624	57,825	243,689	230,491	57,259	9,860
1964	670,084	897	66,891	83,307	227,667	225,431	58,066	7,825
1965	738,888	1,716	85,592	109,072	229,640	241,624	66,838	4,406
1966	1,033,924	4,513	113,466	135,956	311,874	325,386	138,835	3,894
1967	1,118,383	5,807	118,101	141,685	323,339	352,486	174,186	2,779
1968	1,208,020	8,460	136,624	157,848	339,432	373,239	189,078	3,339
1969	1,231,741	9,850	155,915	166,399	336,718	370,898	189,095	2,866
1970	1,247,871	9,813	162,901	176,605	339,290	368,504	188,055	2,703
1971	1,281,932	11,367	168,924	186,809	341,775	373,328	197,285	2,444
1972	1,547,358	23,872	214,649	237,058	396,737	442,597	229,872	2,573
1973	1,642,875	25,037	212,160	237,777	418,943	484,616	261,863	2,479
1974	1,645,181	25,936	211,705	240,438	417,935	477,273	269,819	2,075
1975	1,622,371	26,598	207,695	238,635	413,375	467,192	268,319	557
1976	1,674,864	28,386	212,834	250,794	420,028	473,854	288,728	240
1977	1,724,938	36,702	226,505	266,855	426,273	472,855	295,493	255
1978	1,763,187	38,598	226,829	270,530	434,525	478,955	313,617	133
1979	1,754,571	38,895	222,165	266,659	432,825	475,051	318,857	119
1980	1,829,587	39,053	222,483	272,830	450,109	497,560	347,457	95
1981	1,796,011	30,585	208,897	263,909	447,094	494,472	350,934	120
1982	1,747,552	17,517	180,959	248,067	446,800	499,632	354,466	111
1983	1,791,759	16,228	177,024	249,090	454,337	518,842	376,114	124
1984	1,812,846	15,858	176,359	247,525	457,460	529,253	386,286	105
1985	1,858,313	16,049	179,014	246,739	464,176	547,819	404,427	89
1986	1,871,551	16,251	181,474	238,746	467,951	556,535	410,517	77
1987	1,468,578	12,735	139,913	177,861	363,984	440,104	333,890	91
1988	1,688,481	13,549	133,830	166,482	433,069	540,610	400,900	41
1989	1,682,097	13,593	133,504	155,727	427,740	544,409	407,105	19
1990	1,618,344	14,060	131,121	145,924	406,409	523,870	396,950	10
1991	1,623,833	17,419	140,523	145,698	397,540	518,110	404,535	8
1992	1,819,818	26,208	173,994	168,451	435,544	565,996	449,621	4
1993	1,959,569	32,031	199,793	184,442	452,970	599,886	490,445	2
1994	1,979,452	34,761	210,868	184,179	450,275	601,847	497,519	3
1995	2,022,569	33,559	216,319	184,381	449,717	614,563	524,027	3
1996	2,062,579	31,700	214,636	187,983	449,755	631,565	546,938	2
1997	2,076,251	31,033	207,559	188,650	442,769	639,882	566,355	3

SOURCE: Authors' tabulations of data from the Social Security Administration, Death Master File, March 1998.

**Appendix Table 2.****Number of deaths of U.S. residents reported by the National Center for Health Statistics, 1960-1997, by age group**

Year	Total	0-24	25-54	55-64	65-74	75-84	85 or older	Age not reported
1960	1,711,982	170,625	260,393	270,197	420,312	405,209	184,526	720
1961	1,701,522	166,337	256,066	265,470	415,906	407,864	189,275	604
1962	1,756,720	165,488	262,072	272,873	428,038	426,467	201,203	579
1963	1,813,549	165,806	267,585	282,960	440,362	445,667	210,541	628
1964	1,798,051	163,986	269,172	283,049	430,893	443,128	207,212	611
1965	1,828,136	158,030	271,250	287,465	435,392	458,302	217,147	550
1966	1,863,149	154,064	274,845	293,362	443,835	471,022	225,388	633
1967	1,851,323	147,133	273,866	294,162	437,919	469,669	227,987	587
1968	1,930,082	147,983	283,441	308,276	453,546	493,130	243,021	685
1969	1,921,990	149,216	282,058	305,504	446,864	491,681	246,001	666
1970	1,921,031	148,323	281,327	308,373	445,531	489,803	246,955	719
1971	1,927,542	142,988	277,354	306,669	441,773	496,778	261,222	758
1972	1,963,944	135,818	278,922	311,522	455,010	511,620	270,514	538
1973	1,973,003	131,863	277,020	310,577	454,661	514,236	284,100	546
1974	1,934,388	125,046	267,600	302,197	450,461	500,239	288,332	513
1975	1,892,879	120,609	259,074	295,724	442,496	489,458	285,077	441
1976	1,909,440	115,853	251,934	296,060	443,927	496,719	304,472	475
1977	1,899,597	115,847	248,165	292,672	445,595	490,598	306,151	569
1978	1,927,788	114,904	245,386	292,851	452,259	497,326	324,297	765
1979	1,913,841	113,638	240,929	286,966	449,255	493,676	328,725	652
1980	1,989,841	113,429	241,815	292,181	466,621	517,257	357,970	568
1981	1,977,981	106,538	239,024	290,009	464,648	514,649	362,499	614
1982	1,974,797	101,907	230,704	287,014	465,820	521,959	366,727	666
1983	2,019,201	96,653	228,024	288,940	474,380	541,218	389,363	623
1984	2,039,369	94,845	229,697	287,355	476,570	550,912	399,466	524
1985	2,086,440	94,237	234,301	286,480	482,646	568,848	419,051	877
1986	2,105,361	95,088	242,084	279,029	485,539	575,149	427,473	999
1987	2,123,323	92,647	247,084	273,324	486,103	584,335	439,248	582
1988	2,167,999	93,431	254,063	269,749	488,545	601,914	459,710	587
1989	2,150,466	92,349	259,709	260,058	481,224	599,206	457,358	562
1990	2,148,463	90,451	262,261	252,696	477,949	601,439	463,105	562
1991	2,169,518	88,911	268,426	248,078	478,636	607,490	477,401	576
1992	2,175,613	84,133	274,801	240,991	477,916	609,852	487,446	474
1993	2,268,553	84,673	287,498	241,581	487,819	638,038	528,437	507
1994	2,278,994	82,215	296,673	237,119	483,669	640,214	538,690	414
1995	2,312,132	78,816	303,015	235,512	480,890	652,177	561,259	463
1996	2,314,690	75,208	291,509	233,725	473,894	663,290	576,541	523
1997	2,314,245	73,151	279,828	231,993	464,274	670,530	594,068	401

SOURCE: Authors' tabulations of data from the National Center for Health Statistics, *Vital Statistics of the United States* (for 1960-1993) and Compressed Mortality File (for 1993-1997).