

**Medicaid Analytic Extract (MAX)
Date of Death Auxiliary File,
1999-2008**

Final Report

January 31, 2012

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MATHEMATICA
Policy Research

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ACRONYMS

BIRLS	Beneficiary Identification Records Locator Subsystem
CER	Comparative effectiveness research
CHIP	Children's Health Insurance Program
CMS	Centers for Medicare & Medicaid Services
DMF	Death Master File
DOB	Date of birth
DOD files	Date of death files
EDB	Medicare Enrollment Database
ID	Identification number
IRS	Internal Revenue Service
MAX	Medicaid Analytic eXtract
MSIS	Medicaid Statistical Information System
NCHS	National Center for Health Statistics
NDI	National Death Index
PS	Person-Summary file
SSA	Social Security Administration
SSN	Social Security number
VA	Veterans Affairs

I. INTRODUCTION

A. Background

Beginning in 1999, all states and the District of Columbia were required to report Medicaid enrollee eligibility and claims data in a standard format into the Medicaid Statistical Information System (MSIS). Mathematica Policy Research, on behalf of the Centers for Medicare & Medicaid Services (CMS), has produced research files derived from these data for each state by calendar year. These files are known as the Medicaid Analytic eXtract (MAX) files. As the quality of the Medicaid data submitted by the states has improved over the years, they have come to be regarded as among the most important research tools for measuring Medicaid enrollment and understanding patterns of Medicaid service use and expenditures across states and over time.

Heightened interest in and expanded funding for comparative effectiveness research (CER) on the Medicaid population has increased the use of MAX data recently. CER researchers often use death as an outcome measure, typically measuring duration until death or including an indicator of death in a time period. To support these analyses, the MAX person-summary (PS) file contains three dates of death: (1) the MSIS date of death, which is reported by the state in the MSIS file; (2) the Medicare Enrollment Database (EDB) date of death, which is linked to the MAX PS file during MAX production (and is available only for people who are dually enrolled in Medicare and Medicaid); and (3) the date of death extracted from the Social Security Administration's (SSA) Death Master File (DMF), which is linked to the MAX PS file during MAX production. All three date of death (DOD) files are right-censored, meaning they contain dates of death that occurred prior to or during the MAX file year (no one in the MAX 2007 PS file, for example, has a date of death after 2007).

To support CER, it is beneficial to have the most up-to-date information on the date of death, including deaths that occurred after the MAX file year. Consequently, Mathematica

created a single 2008 DOD auxiliary file containing records for each MAX year from 1999 to 2008. The file contains DMF DODs as of October 2011 and the linkage variables necessary to link the DMF DOD to the MAX PS files. The 2008 DOD auxiliary file uses a later update of the DMF (October 2011) than was used in the creation of the MAX PS files from 1999 to 2008. Therefore, the 2008 DOD auxiliary file contains a more complete reporting of dates of death than the MAX PS files:

- Dates of death that occurred prior to or during the MAX file year, previously included in the MAX PS file
- Corrections to dates of death included in the MAX PS file
- Additional dates of death for the MAX file year, not included in the MAX PS file
- Dates of death that occurred after the MAX file year, not included in the MAX PS file

B. What Is the Death Master File, and Why Is It Used?

There are several large databases of mortality information that could have been used for the construction of the 2008 DOD auxiliary file. The National Death Index (NDI), produced by the National Center for Health Statistics (NCHS), is a central repository of death records collected by the states' vital statistics offices (NCHS 2010). The Beneficiary Identification Records Locator Subsystem (BIRLS) Death File, an extract of Veterans Affairs (VA) beneficiary death records, is collected from family members, VA hospitals, and VA cemeteries (VA 2010). The Internal Revenue Service (IRS) collects date of death via tax returns and estate tax returns (IRS 2010). The DMF is an SSA data file compiled from SSA payment records as well as information collected from relatives of the deceased individual, funeral directors, financial institutions, postal authorities, and other government agencies (Social Security Administration 2010).

Each of these data sources has strengths and weaknesses. The NDI includes the date of death, the death certificate number, and multiple causes of death. The NDI, however, is costly to

use (\$350 plus 15 cents per record) and has almost a two-year lag between the date of death and reporting of the death in the NDI. Records in the BIRLS death file include the date of death and broad categories for the cause of death (for example, combat, natural, unknown, and other). BIRLS records are updated monthly, but because only veterans are included in the database, they represent a small subset of Medicaid deaths and would not be sufficient for this project. While the IRS records would include a much broader segment of the population, IRS data are restricted and therefore could not be used for this project. The DMF records include the date of death but not the cause of death. As noted on the SSA website, the DMF does not, by design, include a death record for all decedents and SSA does not guarantee the veracity of the file. However, the DMF is updated monthly, made publicly available through a subscription fee, and considered a fairly complete source of mortality data (Hill and Rosenwaike 2001; Schisterman and Whitcomb 2004; Boyle and Decoufle 1990). Consequently, researchers rely on the NDI or the DMF for information about deaths. The NDI is regarded as the “best” source of death information in terms of accurately matching death records of those known to be deceased (Boyle and Decoufle 1990; Curb et al. 1985; Kraut et al. 1992). Research indicates that when compared to known deaths, the NDI identifies 93 to 98 percent, whereas the DMF identifies 78 to 96 percent (Boyle and Decoufle 1990; Curb et al. 1985; Kraut et al. 1992; Wentworth et al. 1983; Hermansen et al. 2009). These findings are mirrored in other studies that report that the DMF identifies 90 to 98 percent of records found in the NDI (Curb et al. 1985; Buchanich et al. 2005; Sohn et al. 2006).

Despite the slightly lower match rate, the DMF has several benefits. As previously mentioned, compared to the NDI, the DMF is less costly, takes less time to access, and has a shorter time lag in information availability. The DMF is also less affected by misreporting of Social Security Numbers (SSN), and it includes deaths abroad (Hill and Rosenwaike 2001; Sesso et al. 2000; Hill 2001). The DMF reliability levels are higher for some cohorts—particularly

those over age 65 (Hill and Rosenwaike 2001; Schisterman and Whitcomb 2004; Curb et al. 1985; Wentworth et al. 1983). Accuracy is also higher for men than for women (Curb et al. 1985; Sesso et al. 2000; Hill 2001), for whites than for African Americans (Schisterman and Whitcomb 2004; Curb et al. 1985), for married than for unmarried individuals (Curb et al. 1985; Wentworth et al. 1983), and for American-born than for foreign-born individuals (Schisterman and Whitcomb 2004).

Upon comparing the aforementioned benefits and limitations of the NDI and DMF, CMS chose the DMF as the data source for the 2008 DOD auxiliary file. To support this project and others at CMS, the agency purchased the DMF directly from SSA. Every month CMS obtains an update file from SSA and uses it to add new deaths and update existing records in the database. The version of the DMF which we used for this work is the version as of October 29, 2011. Unlike the public-use version, which can be readily purchased on the SSA website, this one is a federal agency version, which is a more complete, unrestricted source of DOD information.

C. MAX Person-Summary Files

The MAX PS file contains one record for each person who is enrolled in either Medicaid or the Children's Health Insurance Program (CHIP) in the MAX calendar year in that state. It contains information about eligibility, demographics, summary expenditures, and service use. There are 51 files (one for each state and the District of Columbia, hereafter referred to as the "51 states") for each year from 1999 to 2008. Each file uniquely identifies a person by the MSIS identification number (MSIS ID). States may choose to use their own state-assigned identifier, unique to and within that state, or the SSN as their MSIS ID. MSIS instructions to states indicate that an enrolled person should be assigned one and only one MSIS ID over time, but states do sometimes change MSIS IDs for federal reporting in MSIS.

D. 2008 DOD Auxiliary File

For calendar year 2008, the DOD auxiliary file is a single file that contains a record for each person in the MAX PS files 1999–2008 for all 51 states that linked to SSA DMF and had a non-missing date of death. To merge the DOD auxiliary records with MAX PS records, the researcher will simply merge the files by state and MSIS ID. The 2008 DOD auxiliary file is sorted in the appropriate order to facilitate this linkage.

E. Organization of Report

In the rest of this report, we further describe the 2008 DOD auxiliary file. In Chapter II, we describe the creation of the file and the contents of the file, and in Chapter III we summarize the linkage results. In Appendix A, we provide a data flow diagram describing how the file was created, in Appendix B we include the file layout and data dictionary, and in Appendix C we provide the linkage results by year.

II. CREATION OF DOD AUXILIARY FILE

A. Methodology

The creation of the 2008 DOD auxiliary file involved seven steps. The first five steps were conducted for each state and for each of the 10 years of MAX data that were linked (1999–2008). See program DODAUX01 in Appendix A for details. The output was a set of 510 files. In the first step, we extracted identification information from the MAX PS file. In the second step, we extracted identification and death information from the DMF. In the third step, we merged DMF with each MAX state/year file. In the fourth step, we tabulated the number of linked records to ensure the linkage was working properly. In the fifth step, we saved the individual state/year file with only the requisite linkage and DOD variables. For 2008, two steps were added to merge the set of 510 files into a single 2008 DOD auxiliary file. In the sixth step, we concatenated all of the year files together for each of the 51 states, sorted by state, MSIS ID, and year; kept the latest (most recent) record for each MSIS ID—in the event that SSN or DOB had changed over time; and retained only the records that linked to the DMF and had a non-missing date of death. See program DODAUX02 in Appendix A for details. In the seventh and final step, we merged the separate 51 state files into the 2008 DOD auxiliary file but did not unduplicate records across states. See program DODAUX03 in Appendix A, for details. In Appendix A we provide a complete data flow diagram describing how the files were created.

Specifically, for each state for each year, we extracted the following information from the MAX PS file:

- MSIS ID
- State
- Year
- SSN
- Date of birth (DOB)

- MSIS DOD
- EDB DOD
- Medicare/Medicaid dual enrollment

We extracted the following information from the DMF:

- SSN
- DOB
- SSA DOD

We merged the MAX PS record to the DMF record via the SSN and DOB.

To assess the quality of the linkage, we tabulated the linked records by state and year. We discuss these tabulations in the next chapter.

B. Contents of the 2008 DOD File

We wanted the DOD auxiliary file to be as small as possible so researchers could quickly and easily link it to the MAX PS file or to their specific research file. Consequently, we kept only a limited number of variables on the DOD auxiliary file:

- State
- MSIS ID
- SSA DOD

For 2008, the DOD auxiliary file contains records for all states and all years from 1999 to 2008 and is called MW00.@BF32955.US.PS.DOD.

III. RESULTS

In this chapter, we present the linkage statistics by state for the link between MAX 1999-2008 to the SSA DMF. We recommend that researchers use these tables for quality control purposes (linkage statistics should match these statistics). It is important to remember that the DMF DOD in the DOD auxiliary file includes dates of death before, during, *and after* the MAX file year. Because the DOD auxiliary file is right-censored as of October 2011 (meaning there are no available dates of death after October 2011) instead of the end of the MAX year, the number of deceased individuals in this file will, by design, be much higher than the number of deceased individuals based on the existing DOD variables in the MAX PS files. Also, the number of deceased individuals evident in the linkage statistics is highest in the first year of MAX PS records (1999) and generally decreases with each succeeding year of MAX PS records to the last year (2008). This is because the probability of dying for any individual increases as the number of years between the year of the MAX PS record(s) and the date of the DMF used for the linkage (in this case October 29, 2011) increases. There are instances of reporting changes or corrections that may occur for individual states that cause small increases from one year to the next.

A. Limitations

The number of MAX PS records that linked to the DMF is a function of the accuracy of both the DMF and the SSN and DOB in the MAX PS file. The SSN in the PS file has not been verified, so there could be false positives and false negatives in these linkage results. The extent of the inaccuracy, which varies by state, is unknown at this time. The percent of records with missing SSN and DOB varies by state as well. If the SSN or DOB is missing on the MAX PS file (for example, for undocumented aliens, certain restricted benefit enrollees, presumptively eligible enrollees, or other enrollees), it is impossible to link to the DMF and obtain a date of

death. Researchers may want to classify these records differently because it is not known whether the person is deceased.

B. Linkage Across States

Table III.1 shows the number of records in the 2008 DOD auxiliary file by state. The number of records varies considerably by state. In general, the number is related to the number of Medicaid enrollees in the state: for example, Wyoming has the fewest number of linkages, California has the highest. Table III.2 contains the number of MAX PS records with DMF DOD for each year from 1999 to 2008; and Table III.3 contains the percentage of MAX PS records with DMF DOD for each year from 1999 to 2008. Appendix C (Tables C.1 to C.10) contains comparable linkage results of the MAX PS to the DMF for each year from 1999 to 2008.

C. Linkage Over Time

As shown in Table III.3, the percentage of MAX PS records that linked to the DMF is highest in 1999 and gradually reduces with each subsequent year. This downward trend is expected because the DMF DOD is the date of death for that person as of October 2011. With the passage of time, the number of deaths increases accordingly. In other words, Medicaid enrollees in 1999 have a greater likelihood of dying by October 2011 than do Medicaid enrollees in 2008, all other things being equal.

D. Summary

Despite the previously identified limitations, the 2008 DOD auxiliary file provides MAX data users with two enhancements regarding deaths to Medicaid enrollees:

- All dates of death reported in the DMF through October 2011 including corrections to previously reported dates of death from earlier DMF files. Dates of death for persons enrolled in the year of the MAX file even if those deaths occurred after the year of the MAX file and were reported by October 2011

Table III.1. Linkage of MAX PS Records to SSA Death Master File, 1999-2008 MAX

State	Number of Records in the MAX DOD File
Alabama	195,291
Alaska	13,715
Arizona	166,487
Arkansas	127,065
California	1,004,650
Colorado	96,548
Connecticut	112,982
Delaware	25,330
District of Columbia	35,753
Florida	912,244
Georgia	300,314
Hawaii	36,437
Idaho	33,839
Illinois	479,073
Indiana	205,515
Iowa	96,035
Kansas	84,271
Kentucky	186,904
Louisiana	195,428
Maine	81,147
Maryland	152,544
Massachusetts	249,788
Michigan	303,715
Minnesota	221,008
Mississippi	152,516
Missouri	226,491
Montana	29,211
Nebraska	52,808
Nevada	49,782
New Hampshire	32,976
New Jersey	225,742
New Mexico	57,952
New York	722,372
North Carolina	344,058
North Dakota	24,262
Ohio	396,690
Oklahoma	177,194
Oregon	116,694
Pennsylvania	439,791
Rhode Island	42,897
South Carolina	175,180
South Dakota	26,322
Tennessee	317,924
Texas	648,437
Utah	37,561
Vermont	31,985
Virginia	194,162
Washington	178,986
West Virginia	81,968
Wisconsin	217,221
Wyoming	13,992
United States	10,331,257

Source: MAX PS Records Linked to SSA Death Master File, Version 10/29/2011

Table III.2. Number of PS Records with SSA DOD, 1999-2008 MAX

State	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008
Alabama	105,396	105,806	102,112	103,585	95,958	89,323	82,160	73,813	62,283	51,683
Alaska	7,056	7,027	6,840	6,681	6,345	5,915	5,628	5,008	4,326	3,518
Arizona	48,871	48,627	61,031	74,671	75,477	72,930	67,715	51,019	48,593	42,450
Arkansas	68,297	64,999	61,998	61,259	57,192	51,953	48,453	44,119	39,526	33,436
California	608,294	574,290	556,661	530,420	503,301	465,368	418,790	363,442	308,038	254,464
Colorado	46,117	45,645	44,397	42,763	39,637	37,875	35,033	31,961	27,897	23,672
Connecticut	56,638	54,839	54,729	53,230	50,782	46,818	42,233	38,093	33,248	28,085
Delaware	11,413	11,521	11,685	12,023	11,596	11,000	10,380	9,428	8,156	6,732
District of Columbia	16,331	16,106	15,188	13,747	12,963	12,418	11,369	10,063	8,596	7,041
Florida	279,621	289,495	284,065	286,926	265,906	254,028	236,996	210,456	174,256	153,652
Georgia	142,631	137,997	133,157	147,074	138,555	130,604	115,410	101,476	85,896	73,001
Hawaii	19,908	16,820	16,533	17,405	16,755	15,719	14,379	12,651	10,725	9,018
Idaho	13,543	13,849	14,198	14,071	13,564	12,824	12,791	11,708	10,288	8,805
Illinois	166,604	160,001	152,348	241,723	241,759	231,029	218,095	138,242	110,409	90,293
Indiana	93,559	92,652	91,268	89,505	84,304	79,681	73,939	66,249	58,326	50,951
Iowa	47,253	45,622	43,278	42,324	39,918	36,932	35,580	32,746	29,055	24,782
Kansas	38,928	37,671	36,641	35,689	33,239	31,565	30,252	27,479	24,585	21,261
Kentucky	105,182	101,929	97,148	94,045	85,005	77,871	70,903	63,644	55,309	45,638
Louisiana	100,910	102,119	98,911	98,375	91,605	87,112	80,226	69,903	59,209	49,561
Maine	32,778	31,805	53,795	54,208	30,513	28,220	26,625	24,757	25,893	21,689
Maryland	74,260	70,598	67,415	70,448	68,724	64,925	59,307	50,170	41,765	34,885
Massachusetts	141,598	137,319	131,259	124,298	112,805	98,989	91,131	82,733	71,471	61,910
Michigan	152,696	148,169	143,012	138,135	129,122	127,748	118,088	105,456	89,634	76,935
Minnesota	71,157	74,686	85,288	83,292	78,153	73,286	68,745	63,026	55,730	47,960
Mississippi	86,283	86,696	88,014	83,472	79,488	71,574	64,707	56,533	48,111	38,232
Missouri	113,810	111,319	110,184	111,480	105,533	100,571	88,691	74,677	63,855	53,656
Montana	13,427	13,181	12,755	12,253	11,368	10,664	9,924	8,662	7,449	6,352
Nebraska	26,119	25,314	24,552	23,747	22,275	20,661	19,330	17,544	15,297	12,805
Nevada	18,755	19,894	19,091	20,436	19,932	19,517	17,059	15,018	13,217	11,165
New Hampshire	14,339	14,143	13,639	13,843	13,331	12,651	11,792	10,735	9,568	8,178
New Jersey	121,694	117,322	112,367	105,991	99,096	91,327	84,608	73,968	63,283	52,316
New Mexico	30,010	29,060	27,697	27,435	26,373	24,825	22,986	20,743	17,870	15,021
New York	406,729	390,056	370,720	363,257	345,291	317,119	295,151	259,275	221,030	185,146
North Carolina	184,129	180,291	175,815	165,958	156,955	146,011	135,994	120,921	104,970	87,833
North Dakota	10,694	10,316	10,310	9,964	9,468	8,623	7,943	7,244	6,102	5,116
Ohio	183,070	176,175	174,178	174,174	169,078	157,234	151,871	138,229	121,800	102,352
Oklahoma	69,683	67,977	65,900	67,257	60,277	55,991	52,206	47,033	41,007	34,870
Oregon	58,055	57,277	56,343	56,338	50,797	44,322	38,850	34,079	29,430	25,222
Pennsylvania	217,815	214,476	204,923	199,604	189,161	181,153	170,980	154,015	134,020	114,112
Rhode Island	21,660	21,465	20,922	20,467	19,311	17,859	16,442	14,476	12,458	10,304

Table III.2 (continued)

State	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008
South Carolina	82,161	80,839	79,275	78,564	97,329	91,731	83,518	55,116	46,461	38,552
South Dakota	13,023	12,720	12,224	12,002	11,364	10,562	9,749	8,887	7,664	6,461
Tennessee	205,728	189,250	183,142	176,606	159,127	150,911	132,213	104,829	85,658	70,962
Texas	330,176	326,521	317,988	310,259	295,192	276,934	256,849	229,742	199,565	168,194
Utah	15,786	15,279	14,976	15,356	15,535	14,716	13,788	12,137	10,366	8,594
Vermont	19,236	18,886	18,072	17,103	15,825	14,627	12,906	11,215	9,464	7,934
Virginia	98,560	94,955	90,383	87,062	81,594	77,003	71,220	63,784	55,937	47,589
Washington	83,119	82,698	81,782	79,185	74,283	70,204	65,351	56,449	49,396	41,312
West Virginia	43,304	41,328	39,313	38,460	35,760	33,294	30,442	29,323	25,910	21,950
Wisconsin	87,428	84,569	81,908	105,433	109,715	103,582	94,117	84,065	70,370	57,654
Wyoming	6,127	5,940	5,862	5,825	5,606	5,269	4,783	4,294	3,753	3,207
United States	5,009,961	4,877,539	4,775,292	4,817,428	4,562,242	4,273,068	3,937,698	3,400,635	2,917,225	2,456,511

Source: MAX PS Records linked to SSA Death Master File, Version 10/29/2011

Table III.3. Percentage of PS Records with SSA DOD, 1999-2008 MAX

State	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008
Alabama	15.9	14.3	12.8	11.9	10.6	9.6	8.5	7.6	6.8	5.6
Alaska	6.7	6.2	5.7	5.3	4.9	4.5	4.2	3.8	3.4	2.7
Arizona	7.4	6.8	6.8	6.5	5.6	5.1	4.5	3.3	3.1	2.5
Arkansas	13.8	12.2	10.5	9.5	8.3	7.2	6.4	5.7	5.0	4.3
California	7.9	6.7	6.1	5.3	4.7	4.1	3.8	3.3	2.8	2.3
Colorado	12.7	11.8	10.5	9.4	8.1	6.5	5.4	5.0	4.4	3.6
Connecticut	13.5	12.9	11.8	10.7	9.9	9.0	7.9	7.1	6.2	5.0
Delaware	9.7	9.0	8.4	6.5	7.2	6.5	5.7	5.1	4.3	3.4
District of Columbia	11.1	10.6	9.4	8.9	8.1	7.6	6.8	5.9	5.0	4.0
Florida	13.1	12.4	11.0	10.3	9.1	8.6	7.7	6.9	5.9	4.8
Georgia	10.7	9.1	7.7	8.1	7.3	6.5	5.5	4.8	4.3	3.6
Hawaii	9.8	8.5	8.2	8.2	7.5	6.8	6.0	5.3	4.5	3.6
Idaho	10.1	8.7	7.7	7.0	6.4	5.7	5.5	5.1	4.4	3.6
Illinois	9.6	9.0	8.1	11.3	10.8	9.5	8.3	5.3	4.1	3.3
Indiana	13.4	11.9	10.7	9.6	8.7	7.8	7.0	6.2	5.4	4.4
Iowa	15.0	14.3	12.8	11.6	10.4	9.2	8.3	7.0	6.0	5.0
Kansas	15.0	13.8	12.3	11.3	9.1	8.3	8.4	7.6	6.9	5.9
Kentucky	15.1	13.6	12.4	11.7	10.2	9.1	7.9	7.1	6.1	4.9
Louisiana	12.2	11.7	10.6	9.2	8.1	7.2	6.4	5.5	5.1	4.1
Maine	15.8	14.4	16.2	14.8	10.2	8.9	8.1	7.3	7.2	6.0
Maryland	10.7	10.3	9.3	8.9	8.2	7.6	6.8	5.8	4.9	3.9
Massachusetts	13.2	12.1	11.3	10.1	9.4	8.3	7.3	6.3	5.2	3.8
Michigan	11.2	10.6	9.7	8.3	7.8	6.9	6.3	5.4	4.5	3.8
Minnesota	11.9	11.9	12.6	11.5	10.2	9.4	8.7	7.8	6.8	5.7
Mississippi	15.6	14.2	12.6	11.5	10.3	8.9	8.2	7.3	6.4	5.2
Missouri	12.7	11.0	10.2	9.9	8.9	8.1	7.3	6.7	5.9	4.9
Montana	13.6	12.2	11.0	10.2	9.2	8.4	7.7	6.7	5.8	4.8
Nebraska	11.5	10.6	9.6	8.8	8.4	7.8	7.4	6.7	5.8	4.8
Nevada	12.2	11.8	10.0	8.8	7.8	7.4	6.3	5.8	5.1	4.0
New Hampshire	13.4	12.9	12.1	10.9	9.8	8.9	8.1	7.2	6.3	5.2
New Jersey	13.4	12.1	10.6	9.2	8.6	8.1	7.5	6.2	5.2	4.1
New Mexico	7.9	7.1	6.3	5.8	5.2	4.7	4.3	4.0	3.4	2.7
New York	11.9	11.4	9.8	8.0	7.3	6.4	5.8	5.1	4.4	3.6
North Carolina	14.7	13.6	11.9	11.0	9.9	8.8	7.9	6.8	5.8	4.6
North Dakota	16.2	15.5	14.4	12.7	11.5	10.6	9.9	9.0	7.6	6.4
Ohio	13.1	12.0	10.0	9.5	8.6	7.7	7.1	6.4	5.6	4.6
Oklahoma	13.0	11.5	10.4	9.1	9.0	8.1	7.1	6.2	5.2	4.3
Oregon	10.4	9.8	9.0	8.4	7.9	7.4	6.9	6.1	5.4	4.4

Table III.3 (continued)

State	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008
Pennsylvania	12.8	12.7	12.3	11.5	10.2	9.1	8.4	7.3	6.3	5.1
Rhode Island	12.7	11.4	10.4	9.7	8.9	8.0	7.3	6.4	5.6	4.7
South Carolina	10.8	10.0	8.8	8.4	9.4	9.1	8.2	5.8	5.1	4.2
South Dakota	13.6	12.4	11.0	10.1	9.2	8.3	7.4	6.7	5.7	4.7
Tennessee	12.8	11.8	10.8	10.2	9.9	9.2	8.2	7.0	5.7	4.6
Texas	12.0	11.7	10.8	9.2	7.9	6.9	6.2	5.5	4.6	3.7
Utah	6.7	6.2	5.7	5.1	4.7	4.2	3.8	3.6	3.2	2.4
Vermont	13.4	12.5	11.3	10.5	9.6	8.7	7.8	6.8	5.8	4.5
Virginia	13.8	12.8	11.8	10.9	9.9	8.8	7.7	6.7	5.8	4.7
Washington	9.1	8.3	7.7	6.4	6.2	5.5	5.1	4.5	4.0	3.3
West Virginia	11.9	11.5	10.9	10.1	9.2	8.4	7.7	7.4	6.5	5.4
Wisconsin	15.1	13.4	11.9	12.9	11.8	10.5	9.1	8.0	6.7	5.1
Wyoming	11.7	10.9	9.6	8.2	7.1	6.5	5.9	5.3	4.8	4.1
United States	11.5	10.5	9.5	8.7	7.9	7.1	6.4	5.5	4.7	3.8

Source: MAX PS Records linked to SSA Death Master File, Version 10/29/2011

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APPENDIX A
DATA-PROCESSING STEPS

INTRODUCTION

Summary of MAX DOD Auxiliary File Programs

We used three programs to create the MAX DOD Auxiliary File. The programs were written in SAS and were designed to maximize efficiency and re-usability.

1. DODAUX01 extracts identifiers and demographic data from the MAX PS file and merges it to the SSA DMF file using SSN and date of birth. The SSA date of death variable is appended to the output file. We executed the program for each state and the District of Columbia (hereafter referred to as “51 states”). (Steps 1-5)
2. DODAUX02 concatenates the files for all years for each state, sorts by state, MSIS ID and year, and keeps the latest record per MSIS ID to ensure one date of death per person.¹ In the last step, the program keeps only the records that linked to the DMF and have a non-missing date of death. (Step 6)
3. DODAUX03 concatenates files for all 51 states and retains the state code, the MSIS ID, and the SSA date of death. In the final step, it copies the file to tape cartridge to preserve it for a longer period of time. (Step 7)

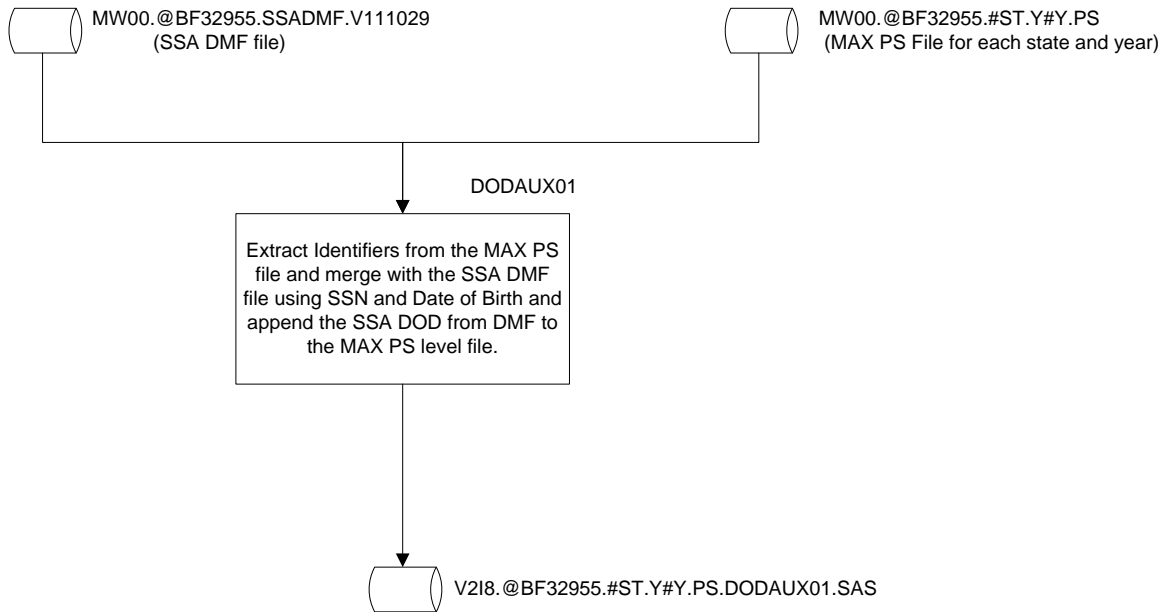
MAX DOD Auxiliary File

The MAX DOD Auxiliary File contains Medicaid enrollees (from the MAX PS files for 1999 through 2008) that linked to the SSA DMF and have a nonmissing date of death. The file includes the state code (STATE), Medicaid identification number (MSIS_ID), and the SSA DMF date of death (SSA_DOD).

¹ A state’s Medicaid agency may eventually learn that the SSN or date of birth for a Medicaid enrollee was incorrect. When this happens, the state changes the SSN and/or date of birth on the person’s enrollment record. Consequently, there are instances in the MAX PS files in which a Medicaid enrollee (as identified by STATE and MSIS_ID) has more than one SSN and/or date of birth over time. Therefore, we *could* encounter a situation in which more than one date of death was assigned to the same person, at different times. Our algorithm assumes that the latest (most recent) SSN is the most accurate and uses the corresponding date of death associated with that SSN and date of birth.

MAX DOD AUXILIARY FILE DATA-PROCESSING STEPS
DODAU01

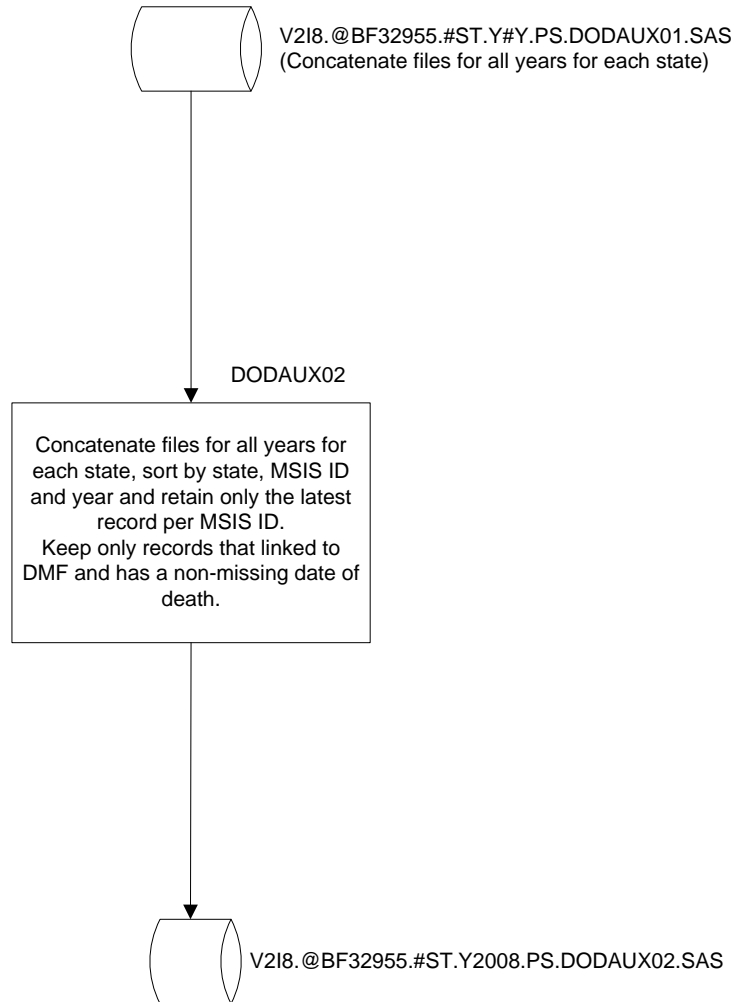
Extract identifiers and demographic data from MAX PS files and merge with SSA DMF file using SSN and Date of Birth
DODAU01 CLIST submits this program for each year (#Y) for each state (#ST)



MAX DOD AUXILIARY FILE DATA-PROCESSING STEPS
DODAU02

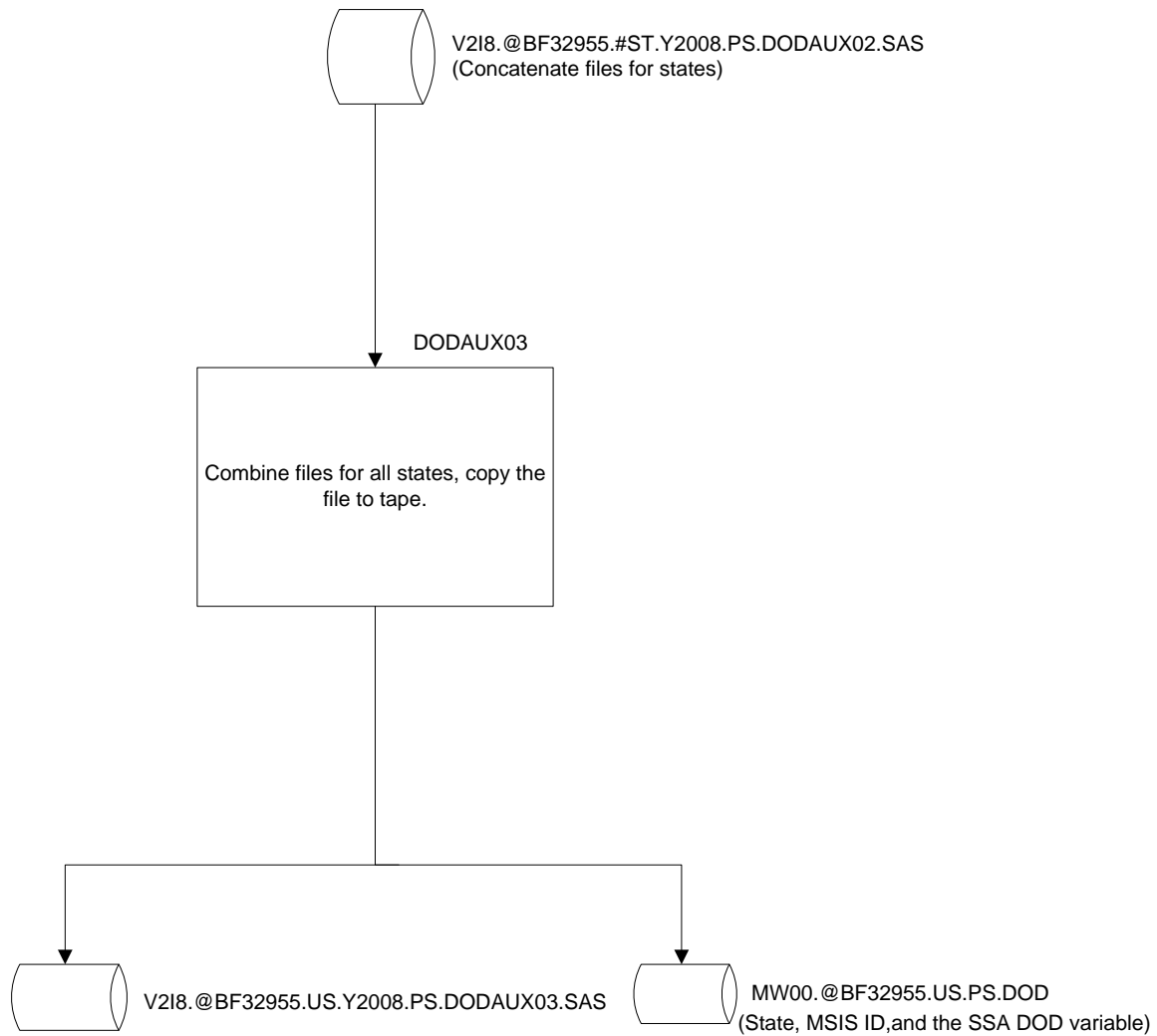
Concatenate output files from DODAU01 for years 1999 through 2008 for each state, sort by state, MSIS ID, and year, and retain only the latest record per MSIS ID. Keep only records that linked to DMF and have a non-missing date of death.

DODAU02 CLIST submits this program for each state (#ST)



MAX DOD AUXILIARY FILE DATA-PROCESSING STEPS
DODAU03

Concatenate output files from DODAU02 for all states, and copy file to tape.



APPENDIX B

FILE LAYOUT

**MAX DOD AUXILIARY FILE
FILE LAYOUT
1999–2008**

ELEMENT NUMBER:	ELEMENT NAME:	TYPE:	LENGTH:	BEG:	END:
****	MAX DOD Auxiliary File	REC	30	1	30
1	State	CHAR	2	1	2
2	MSIS ID	CHAR	20	3	22
3	Date of Death	NUM	8	23	30

APPENDIX C
LINKAGE TABLES BY YEAR

Table C.1. Linkage of MAX PS Records to SSA Death Master File, 1999

State	Number of PS Records	Number Matched to SSA DMF	Percent Matched to SSA DMF	Number with SSN and DOB	Percent Matched Among People with SSN and DOB
Alabama	660,824	105,396	15.9	654,069	16.1
Alaska	104,950	7,056	6.7	99,222	7.1
Arizona	661,459	48,871	7.4	648,013	7.5
Arkansas	493,696	68,297	13.8	449,945	15.2
California	7,731,625	608,294	7.9	5,665,234	10.7
Colorado	364,517	46,117	12.7	322,766	14.3
Connecticut	418,566	56,638	13.5	407,382	13.9
Delaware	117,229	11,413	9.7	111,081	10.3
District of Columbia	147,489	16,331	11.1	141,613	11.5
Florida	2,135,116	279,621	13.1	2,051,375	13.6
Georgia	1,330,992	142,631	10.7	1,130,814	12.6
Hawaii	203,594	19,908	9.8	199,352	10.0
Idaho	134,691	13,543	10.1	130,608	10.4
Illinois	1,729,208	166,604	9.6	1,663,331	10.0
Indiana	696,978	93,559	13.4	679,633	13.8
Iowa	315,004	47,253	15.0	310,260	15.2
Kansas	260,006	38,928	15.0	250,243	15.6
Kentucky	696,726	105,182	15.1	672,153	15.6
Louisiana	824,147	100,910	12.2	783,215	12.9
Maine	207,869	32,778	15.8	201,017	16.3
Maryland	691,506	74,260	10.7	654,902	11.3
Massachusetts	1,074,232	141,598	13.2	1,013,875	14.0
Michigan	1,368,133	152,696	11.2	1,256,329	12.2
Minnesota	596,416	71,157	11.9	574,230	12.4
Mississippi	553,018	86,283	15.6	526,457	16.4
Missouri	898,767	113,810	12.7	855,718	13.3
Montana	98,870	13,427	13.6	91,432	14.7
Nebraska	227,661	26,119	11.5	217,506	12.0
Nevada	153,519	18,755	12.2	135,782	13.8
New Hampshire	107,127	14,339	13.4	105,371	13.6
New Jersey	905,802	121,694	13.4	809,963	15.0
New Mexico	380,456	30,010	7.9	370,177	8.1
New York	3,403,888	406,729	11.9	3,047,077	13.3
North Carolina	1,253,691	184,129	14.7	1,221,709	15.1
North Dakota	65,865	10,694	16.2	62,203	17.2
Ohio	1,393,580	183,070	13.1	1,349,933	13.6
Oklahoma	534,663	69,683	13.0	508,838	13.7
Oregon	560,337	58,055	10.4	534,083	10.9
Pennsylvania	1,696,058	217,815	12.8	1,680,155	13.0
Rhode Island	170,934	21,660	12.7	169,491	12.8
South Carolina	758,480	82,161	10.8	719,217	11.4
South Dakota	95,531	13,023	13.6	92,295	14.1
Tennessee	1,613,135	205,728	12.8	1,541,222	13.3
Texas	2,741,035	330,176	12.0	2,539,227	13.0
Utah	236,759	15,786	6.7	206,401	7.6
Vermont	143,603	19,236	13.4	142,630	13.5
Virginia	713,629	98,560	13.8	672,595	14.7
Washington	918,272	83,119	9.1	852,920	9.7
West Virginia	364,904	43,304	11.9	340,291	12.7
Wisconsin	580,098	87,428	15.1	562,231	15.6
Wyoming	52,454	6,127	11.7	50,235	12.2
United States	43,587,109	5,009,961	11.5	39,475,821	12.7

Source: MAX PS Records linked to SSA Death Master File, Version 10/29/2011

Table C.2. Linkage of MAX PS Records to SSA Death Master File, 2000

State	Number of PS Records	Number Matched to SSA DMF	Percent Matched to SSA DMF	Number with SSN and DOB	Percent Matched Among People with SSN and DOB
Alabama	739,055	105,806	14.3	731,471	14.5
Alaska	114,251	7,027	6.2	108,089	6.5
Arizona	713,129	48,627	6.8	696,764	7.0
Arkansas	530,978	64,999	12.2	469,471	13.8
California	8,634,905	574,290	6.7	5,721,409	10.0
Colorado	388,242	45,645	11.8	339,171	13.5
Connecticut	424,855	54,839	12.9	410,184	13.4
Delaware	128,247	11,521	9.0	117,338	9.8
District of Columbia	151,713	16,106	10.6	145,386	11.1
Florida	2,334,173	289,495	12.4	2,230,302	13.0
Georgia	1,520,645	137,997	9.1	1,353,496	10.2
Hawaii	197,969	16,820	8.5	189,236	8.9
Idaho	158,350	13,849	8.7	152,806	9.1
Illinois	1,786,132	160,001	9.0	1,719,146	9.3
Indiana	776,435	92,652	11.9	753,482	12.3
Iowa	320,120	45,622	14.3	316,178	14.4
Kansas	273,392	37,671	13.8	262,288	14.4
Kentucky	749,007	101,929	13.6	723,188	14.1
Louisiana	869,535	102,119	11.7	830,386	12.3
Maine	221,552	31,805	14.4	210,638	15.1
Maryland	684,685	70,598	10.3	653,238	10.8
Massachusetts	1,131,670	137,319	12.1	1,062,390	12.9
Michigan	1,396,890	148,169	10.6	1,294,645	11.4
Minnesota	625,397	74,686	11.9	595,095	12.6
Mississippi	610,253	86,696	14.2	575,901	15.1
Missouri	1,008,624	111,319	11.0	945,197	11.8
Montana	108,259	13,181	12.2	100,506	13.1
Nebraska	239,639	25,314	10.6	228,061	11.1
Nevada	168,352	19,894	11.8	154,367	12.9
New Hampshire	109,680	14,143	12.9	107,440	13.2
New Jersey	969,670	117,322	12.1	865,791	13.6
New Mexico	411,661	29,060	7.1	397,803	7.3
New York	3,425,582	390,056	11.4	3,054,411	12.8
North Carolina	1,326,154	180,291	13.6	1,289,868	14.0
North Dakota	66,542	10,316	15.5	64,977	15.9
Ohio	1,472,784	176,175	12.0	1,410,893	12.5
Oklahoma	591,857	67,977	11.5	560,869	12.1
Oregon	583,989	57,277	9.8	550,857	10.4
Pennsylvania	1,683,650	214,476	12.7	1,666,669	12.9
Rhode Island	188,425	21,465	11.4	185,242	11.6
South Carolina	806,240	80,839	10.0	773,934	10.4
South Dakota	102,675	12,720	12.4	98,562	12.9
Tennessee	1,607,688	189,250	11.8	1,534,392	12.3
Texas	2,800,108	326,521	11.7	2,616,765	12.5
Utah	246,758	15,279	6.2	217,775	7.0
Vermont	151,532	18,886	12.5	149,347	12.6
Virginia	742,867	94,955	12.8	708,408	13.4
Washington	996,589	82,698	8.3	931,187	8.9
West Virginia	358,208	41,328	11.5	335,008	12.3
Wisconsin	631,041	84,569	13.4	614,676	13.8
Wyoming	54,328	5,940	10.9	50,590	11.7
United States	46,334,482	4,877,539	10.5	41,275,293	11.8

Source: MAX PS Records linked to SSA Death Master File, Version 10/29/2011

Table C.3. Linkage of MAX PS Records to SSA Death Master File, 2001

State	Number of PS Records	Number Matched to SSA DMF	Percent Matched to SSA DMF	Number with SSN and DOB	Percent Matched Among People with SSN and DOB
Alabama	797,224	102,112	12.8	784,625	13.0
Alaska	120,074	6,840	5.7	113,405	6.0
Arizona	898,060	61,031	6.8	893,261	6.8
Arkansas	587,684	61,998	10.5	516,536	12.0
California	9,153,196	556,661	6.1	5,795,164	9.6
Colorado	422,963	44,397	10.5	370,021	12.0
Connecticut	462,886	54,729	11.8	445,923	12.3
Delaware	139,907	11,685	8.4	124,830	9.4
District of Columbia	162,086	15,188	9.4	146,457	10.4
Florida	2,582,010	284,065	11.0	2,467,661	11.5
Georgia	1,722,114	133,157	7.7	1,552,068	8.6
Hawaii	202,429	16,533	8.2	192,697	8.6
Idaho	184,566	14,198	7.7	178,195	8.0
Illinois	1,882,237	152,348	8.1	1,812,087	8.4
Indiana	855,232	91,268	10.7	826,879	11.0
Iowa	338,145	43,278	12.8	331,288	13.1
Kansas	297,213	36,641	12.3	284,601	12.9
Kentucky	782,538	97,148	12.4	757,754	12.8
Louisiana	932,216	98,911	10.6	904,249	10.9
Maine	331,998	53,795	16.2	323,030	16.7
Maryland	722,068	67,415	9.3	690,654	9.8
Massachusetts	1,166,242	131,259	11.3	1,089,341	12.0
Michigan	1,481,790	143,012	9.7	1,353,816	10.6
Minnesota	677,329	85,288	12.6	650,693	13.1
Mississippi	695,868	88,014	12.6	657,939	13.4
Missouri	1,085,041	110,184	10.2	1,012,936	10.9
Montana	116,063	12,755	11.0	107,816	11.8
Nebraska	254,831	24,552	9.6	240,769	10.2
Nevada	190,951	19,091	10.0	164,159	11.6
New Hampshire	112,602	13,639	12.1	109,755	12.4
New Jersey	1,059,581	112,367	10.6	943,091	11.9
New Mexico	439,608	27,697	6.3	415,535	6.7
New York	3,774,727	370,720	9.8	3,126,873	11.9
North Carolina	1,473,871	175,815	11.9	1,433,424	12.3
North Dakota	71,762	10,310	14.4	70,120	14.7
Ohio	1,749,855	174,178	10.0	1,680,645	10.4
Oklahoma	635,258	65,900	10.4	604,318	10.9
Oregon	629,008	56,343	9.0	589,887	9.6
Pennsylvania	1,668,793	204,923	12.3	1,650,894	12.4
Rhode Island	200,703	20,922	10.4	196,476	10.6
South Carolina	904,335	79,275	8.8	870,596	9.1
South Dakota	111,130	12,224	11.0	106,508	11.5
Tennessee	1,693,143	183,142	10.8	1,628,195	11.2
Texas	2,952,397	317,988	10.8	2,764,723	11.5
Utah	264,182	14,976	5.7	236,507	6.3
Vermont	159,555	18,072	11.3	154,735	11.7
Virginia	765,098	90,383	11.8	724,314	12.5
Washington	1,057,034	81,782	7.7	980,924	8.3
West Virginia	359,170	39,313	10.9	336,309	11.7
Wisconsin	690,762	81,908	11.9	671,273	12.2
Wyoming	60,781	5,862	9.6	56,439	10.4
United States	50,078,316	4,775,292	9.5	44,140,395	10.8

Source: MAX PS Records linked to SSA Death Master File, Version 10/29/2011

Table C.4. Linkage of MAX PS Records to SSA Death Master File, 2002

State	Number of PS Records	Number Matched to SSA DMF	Percent Matched to SSA DMF	Number with SSN and DOB	Percent Matched Among People with SSN and DOB
Alabama	867,197	103,585	11.9	855,400	12.1
Alaska	125,662	6,681	5.3	118,599	5.6
Arizona	1,143,522	74,671	6.5	1,136,165	6.6
Arkansas	648,072	61,259	9.5	585,553	10.5
California	10,082,104	530,420	5.3	6,206,979	8.5
Colorado	453,722	42,763	9.4	404,930	10.6
Connecticut	497,180	53,230	10.7	482,143	11.0
Delaware	185,121	12,023	6.5	140,871	8.5
District of Columbia	154,771	13,747	8.9	148,540	9.3
Florida	2,799,154	286,926	10.3	2,707,347	10.6
Georgia	1,812,987	147,074	8.1	1,684,472	8.7
Hawaii	212,288	17,405	8.2	206,618	8.4
Idaho	199,892	14,071	7.0	195,421	7.2
Illinois	2,132,554	241,723	11.3	2,070,840	11.7
Indiana	931,109	89,505	9.6	901,869	9.9
Iowa	363,677	42,324	11.6	360,321	11.7
Kansas	314,827	35,689	11.3	305,575	11.7
Kentucky	806,549	94,045	11.7	786,323	12.0
Louisiana	1,065,810	98,375	9.2	1,045,214	9.4
Maine	366,299	54,208	14.8	356,258	15.2
Maryland	794,396	70,448	8.9	764,721	9.2
Massachusetts	1,228,684	124,298	10.1	1,134,651	11.0
Michigan	1,671,047	138,135	8.3	1,480,980	9.3
Minnesota	725,283	83,292	11.5	692,725	12.0
Mississippi	723,179	83,472	11.5	673,515	12.4
Missouri	1,130,756	111,480	9.9	1,097,765	10.2
Montana	120,433	12,253	10.2	112,679	10.9
Nebraska	268,953	23,747	8.8	253,723	9.4
Nevada	233,404	20,436	8.8	219,256	9.3
New Hampshire	126,754	13,843	10.9	124,843	11.1
New Jersey	1,153,998	105,991	9.2	999,315	10.6
New Mexico	471,366	27,435	5.8	456,610	6.0
New York	4,546,162	363,257	8.0	3,802,276	9.6
North Carolina	1,505,412	165,958	11.0	1,463,977	11.3
North Dakota	78,454	9,964	12.7	76,816	13.0
Ohio	1,839,178	174,174	9.5	1,811,772	9.6
Oklahoma	740,089	67,257	9.1	699,380	9.6
Oregon	670,388	56,338	8.4	630,230	8.9
Pennsylvania	1,738,198	199,604	11.5	1,721,248	11.6
Rhode Island	211,750	20,467	9.7	206,799	9.9
South Carolina	933,817	78,564	8.4	898,348	8.7
South Dakota	118,781	12,002	10.1	113,888	10.5
Tennessee	1,730,087	176,606	10.2	1,660,084	10.6
Texas	3,376,384	310,259	9.2	3,195,273	9.7
Utah	300,166	15,356	5.1	272,809	5.6
Vermont	163,438	17,103	10.5	159,997	10.7
Virginia	799,254	87,062	10.9	763,266	11.4
Washington	1,232,363	79,185	6.4	1,068,500	7.4
West Virginia	381,079	38,460	10.1	362,146	10.6
Wisconsin	817,420	105,433	12.9	798,092	13.2
Wyoming	70,686	5,825	8.2	65,765	8.9
United States	55,063,856	4,817,428	8.7	48,480,887	9.9

Source: MAX PS Records linked to SSA Death Master File, Version 10/29/2011

Table C.5. Linkage of MAX PS Records to SSA Death Master File, 2003

State	Number of PS Records	Number Matched to SSA DMF	Percent Matched to SSA DMF	Number with SSN and DOB	Percent Matched Among People with SSN and DOB
Alabama	902,076	95,958	10.6	890,554	10.8
Alaska	129,876	6,345	4.9	122,590	5.2
Arizona	1,348,521	75,477	5.6	1,327,943	5.7
Arkansas	688,523	57,192	8.3	626,524	9.1
California	10,796,820	503,301	4.7	6,650,771	7.6
Colorado	490,189	39,637	8.1	431,698	9.2
Connecticut	512,033	50,782	9.9	496,013	10.2
Delaware	160,133	11,596	7.2	147,696	7.9
District of Columbia	159,222	12,963	8.1	153,022	8.5
Florida	2,920,400	265,906	9.1	2,823,081	9.4
Georgia	1,887,197	138,555	7.3	1,734,303	8.0
Hawaii	222,754	16,755	7.5	217,853	7.7
Idaho	211,920	13,564	6.4	205,905	6.6
Illinois	2,246,388	241,759	10.8	2,183,394	11.1
Indiana	967,366	84,304	8.7	933,540	9.0
Iowa	382,894	39,918	10.4	379,344	10.5
Kansas	367,051	33,239	9.1	324,644	10.2
Kentucky	829,891	85,005	10.2	796,049	10.7
Louisiana	1,130,663	91,605	8.1	1,057,413	8.7
Maine	300,579	30,513	10.2	291,374	10.5
Maryland	841,004	68,724	8.2	812,324	8.5
Massachusetts	1,197,415	112,805	9.4	1,102,867	10.2
Michigan	1,660,124	129,122	7.8	1,516,385	8.5
Minnesota	762,630	78,153	10.2	738,451	10.6
Mississippi	768,803	79,488	10.3	726,494	10.9
Missouri	1,186,348	105,533	8.9	1,151,654	9.2
Montana	123,500	11,368	9.2	115,999	9.8
Nebraska	265,606	22,275	8.4	250,793	8.9
Nevada	254,259	19,932	7.8	245,491	8.1
New Hampshire	136,134	13,331	9.8	133,613	10.0
New Jersey	1,150,025	99,096	8.6	1,038,261	9.5
New Mexico	502,532	26,373	5.2	487,024	5.4
New York	4,698,972	345,291	7.3	4,270,056	8.1
North Carolina	1,588,095	156,955	9.9	1,544,911	10.2
North Dakota	82,203	9,468	11.5	80,356	11.8
Ohio	1,961,986	169,078	8.6	1,931,668	8.8
Oklahoma	670,326	60,277	9.0	652,556	9.2
Oregon	641,656	50,797	7.9	600,651	8.5
Pennsylvania	1,848,912	189,161	10.2	1,791,574	10.6
Rhode Island	217,797	19,311	8.9	211,613	9.1
South Carolina	1,034,679	97,329	9.4	989,269	9.8
South Dakota	124,028	11,364	9.2	118,807	9.6
Tennessee	1,610,768	159,127	9.9	1,582,935	10.1
Texas	3,746,761	295,192	7.9	3,558,653	8.3
Utah	330,618	15,535	4.7	303,685	5.1
Vermont	165,479	15,825	9.6	162,820	9.7
Virginia	825,879	81,594	9.9	785,892	10.4
Washington	1,194,901	74,283	6.2	1,089,710	6.8
West Virginia	388,420	35,760	9.2	369,053	9.7
Wisconsin	926,043	109,715	11.8	905,836	12.1
Wyoming	78,490	5,606	7.1	75,725	7.4
United States	57,638,889	4,562,242	7.9	51,138,837	8.9

Source: MAX PS Records linked to SSA Death Master File, Version 10/29/2011

Table C.6. Linkage of MAX PS Records to SSA Death Master File, 2004

State	Number of PS Records	Number Matched to SSA DMF	Percent Matched to SSA DMF	Number with SSN and DOB	Percent Matched Among People with SSN and DOB
Alabama	932,893	89,323	9.6	920,391	9.7
Alaska	131,300	5,915	4.5	123,830	4.8
Arizona	1,440,255	72,930	5.1	1,416,804	5.1
Arkansas	725,408	51,953	7.2	652,634	8.0
California	11,218,039	465,368	4.1	6,821,398	6.8
Colorado	580,106	37,875	6.5	538,720	7.0
Connecticut	522,658	46,818	9.0	503,319	9.3
Delaware	169,933	11,000	6.5	156,518	7.0
District of Columbia	164,352	12,418	7.6	158,584	7.8
Florida	2,936,906	254,028	8.6	2,824,921	9.0
Georgia	2,016,379	130,604	6.5	1,874,737	7.0
Hawaii	230,608	15,719	6.8	225,271	7.0
Idaho	225,025	12,824	5.7	215,822	5.9
Illinois	2,440,929	231,029	9.5	2,373,072	9.7
Indiana	1,026,274	79,681	7.8	982,398	8.1
Iowa	401,458	36,932	9.2	389,340	9.5
Kansas	382,505	31,565	8.3	339,067	9.3
Kentucky	852,066	77,871	9.1	829,918	9.4
Louisiana	1,215,412	87,112	7.2	1,169,247	7.5
Maine	315,370	28,220	8.9	308,879	9.1
Maryland	854,343	64,925	7.6	827,912	7.8
Massachusetts	1,186,540	98,989	8.3	1,069,780	9.3
Michigan	1,838,747	127,748	6.9	1,683,812	7.6
Minnesota	776,857	73,286	9.4	756,573	9.7
Mississippi	801,071	71,574	8.9	745,091	9.6
Missouri	1,243,452	100,571	8.1	1,214,614	8.3
Montana	127,468	10,664	8.4	124,689	8.6
Nebraska	264,006	20,661	7.8	249,023	8.3
Nevada	262,256	19,517	7.4	261,084	7.5
New Hampshire	142,071	12,651	8.9	140,425	9.0
New Jersey	1,129,947	91,327	8.1	1,041,358	8.8
New Mexico	523,975	24,825	4.7	514,598	4.8
New York	4,967,110	317,119	6.4	4,596,686	6.9
North Carolina	1,663,192	146,011	8.8	1,621,542	9.0
North Dakota	81,240	8,623	10.6	78,369	11.0
Ohio	2,044,300	157,234	7.7	2,013,247	7.8
Oklahoma	692,147	55,991	8.1	673,646	8.3
Oregon	602,938	44,322	7.4	561,136	7.9
Pennsylvania	1,987,856	181,153	9.1	1,905,850	9.5
Rhode Island	222,673	17,859	8.0	216,662	8.2
South Carolina	1,008,133	91,731	9.1	959,734	9.6
South Dakota	127,888	10,562	8.3	123,295	8.6
Tennessee	1,633,614	150,911	9.2	1,624,486	9.3
Texas	3,992,874	276,934	6.9	3,797,244	7.3
Utah	347,448	14,716	4.2	320,837	4.6
Vermont	168,697	14,627	8.7	165,544	8.8
Virginia	876,388	77,003	8.8	843,585	9.1
Washington	1,281,970	70,204	5.5	1,112,447	6.3
West Virginia	396,039	33,294	8.4	380,634	8.7
Wisconsin	990,431	103,582	10.5	963,024	10.8
Wyoming	80,599	5,269	6.5	77,836	6.8
United States	60,244,146	4,273,068	7.1	53,489,633	8.0

Source: MAX PS Records linked to SSA Death Master File, Version 10/29/2011

Table C.7. Linkage of MAX PS Records to SSA Death Master File, 2005

State	Number of PS Records	Number Matched to SSA DMF	Percent Matched to SSA DMF	Number with SSN and DOB	Percent Matched Among People with SSN and DOB
Alabama	963,526	82,160	8.5	948,357	8.7
Alaska	133,699	5,628	4.2	129,081	4.4
Arizona	1,491,569	67,715	4.5	1,444,520	4.7
Arkansas	762,193	48,453	6.4	693,106	7.0
California	10,924,768	418,790	3.8	6,813,647	6.1
Colorado	645,965	35,033	5.4	566,275	6.2
Connecticut	531,515	42,233	7.9	509,240	8.3
Delaware	181,053	10,380	5.7	163,998	6.3
District of Columbia	167,845	11,369	6.8	162,061	7.0
Florida	3,059,524	236,996	7.7	2,952,428	8.0
Georgia	2,107,826	115,410	5.5	1,958,926	5.9
Hawaii	237,736	14,379	6.0	231,817	6.2
Idaho	233,765	12,791	5.5	226,832	5.6
Illinois	2,612,709	218,095	8.3	2,540,896	8.6
Indiana	1,060,392	73,939	7.0	1,015,463	7.3
Iowa	430,985	35,580	8.3	423,487	8.4
Kansas	361,325	30,252	8.4	351,363	8.6
Kentucky	894,282	70,903	7.9	864,899	8.2
Louisiana	1,244,886	80,226	6.4	1,136,745	7.1
Maine	327,491	26,625	8.1	324,759	8.2
Maryland	868,686	59,307	6.8	841,483	7.0
Massachusetts	1,255,313	91,131	7.3	1,122,136	8.1
Michigan	1,878,812	118,088	6.3	1,737,621	6.8
Minnesota	792,366	68,745	8.7	771,514	8.9
Mississippi	787,537	64,707	8.2	740,926	8.7
Missouri	1,219,756	88,691	7.3	1,201,436	7.4
Montana	129,052	9,924	7.7	126,982	7.8
Nebraska	261,841	19,330	7.4	246,670	7.8
Nevada	272,739	17,059	6.3	237,631	7.2
New Hampshire	145,834	11,792	8.1	144,534	8.2
New Jersey	1,134,761	84,608	7.5	1,063,290	8.0
New Mexico	530,733	22,986	4.3	519,320	4.4
New York	5,118,695	295,151	5.8	4,755,424	6.2
North Carolina	1,729,575	135,994	7.9	1,693,714	8.0
North Dakota	79,961	7,943	9.9	78,290	10.1
Ohio	2,127,176	151,871	7.1	2,097,288	7.2
Oklahoma	730,873	52,206	7.1	709,676	7.4
Oregon	565,361	38,850	6.9	526,082	7.4
Pennsylvania	2,038,176	170,980	8.4	2,014,937	8.5
Rhode Island	224,884	16,442	7.3	217,647	7.6
South Carolina	1,012,763	83,518	8.2	966,445	8.6
South Dakota	130,988	9,749	7.4	127,364	7.7
Tennessee	1,607,615	132,213	8.2	1,580,916	8.4
Texas	4,164,091	256,849	6.2	3,905,663	6.6
Utah	359,506	13,788	3.8	333,378	4.1
Vermont	165,860	12,906	7.8	162,608	7.9
Virginia	928,642	71,220	7.7	885,869	8.0
Washington	1,285,090	65,351	5.1	1,141,515	5.7
West Virginia	393,616	30,442	7.7	382,862	8.0
Wisconsin	1,034,583	94,117	9.1	996,154	9.4
Wyoming	81,599	4,783	5.9	77,638	6.2
United States	61,429,538	3,937,698	6.4	54,864,913	7.2

Source: MAX PS Records linked to SSA Death Master File, Version 10/29/2011

Table C.8. Linkage of MAX PS Records to SSA Death Master File, 2006

State	Number of PS Records	Number Matched to SSA DMF	Percent Matched to SSA DMF	Number with SSN and DOB	Percent Matched Among People with SSN and DOB
Alabama	976,361	73,813	7.6	959,750	7.7
Alaska	131,586	5,008	3.8	126,193	4.0
Arizona	1,533,874	51,019	3.3	1,362,949	3.7
Arkansas	771,587	44,119	5.7	678,438	6.5
California	10,946,644	363,442	3.3	6,772,068	5.4
Colorado	642,575	31,961	5.0	582,030	5.5
Connecticut	534,495	38,093	7.1	512,561	7.4
Delaware	185,602	9,428	5.1	166,375	5.7
District of Columbia	169,814	10,063	5.9	161,596	6.2
Florida	3,042,834	210,456	6.9	2,912,317	7.2
Georgia	2,101,713	101,476	4.8	1,929,911	5.3
Hawaii	238,226	12,651	5.3	226,168	5.6
Idaho	230,815	11,708	5.1	222,610	5.3
Illinois	2,602,268	138,242	5.3	2,527,054	5.5
Indiana	1,067,016	66,249	6.2	1,034,623	6.4
Iowa	468,572	32,746	7.0	461,164	7.1
Kansas	361,498	27,479	7.6	353,288	7.8
Kentucky	893,225	63,644	7.1	881,535	7.2
Louisiana	1,273,978	69,903	5.5	1,159,643	6.0
Maine	337,424	24,757	7.3	334,521	7.4
Maryland	867,649	50,170	5.8	837,345	6.0
Massachusetts	1,315,266	82,733	6.3	1,187,396	7.0
Michigan	1,958,996	105,456	5.4	1,817,166	5.8
Minnesota	809,009	63,026	7.8	780,111	8.1
Mississippi	777,471	56,533	7.3	733,037	7.7
Missouri	1,115,164	74,677	6.7	1,090,625	6.8
Montana	129,162	8,662	6.7	125,857	6.9
Nebraska	262,403	17,544	6.7	247,696	7.1
Nevada	256,955	15,018	5.8	232,032	6.5
New Hampshire	148,759	10,735	7.2	147,059	7.3
New Jersey	1,190,176	73,968	6.2	1,117,511	6.6
New Mexico	521,785	20,743	4.0	505,960	4.1
New York	5,123,013	259,275	5.1	4,725,196	5.5
North Carolina	1,782,760	120,921	6.8	1,738,793	7.0
North Dakota	80,920	7,244	9.0	79,430	9.1
Ohio	2,157,415	138,229	6.4	2,126,376	6.5
Oklahoma	763,254	47,033	6.2	736,693	6.4
Oregon	554,749	34,079	6.1	510,043	6.7
Pennsylvania	2,111,259	154,015	7.3	2,077,605	7.4
Rhode Island	225,873	14,476	6.4	218,515	6.6
South Carolina	949,921	55,116	5.8	902,224	6.1
South Dakota	132,647	8,887	6.7	129,140	6.9
Tennessee	1,499,759	104,829	7.0	1,463,298	7.2
Texas	4,184,402	229,742	5.5	3,938,368	5.8
Utah	339,648	12,137	3.6	327,699	3.7
Vermont	164,682	11,215	6.8	161,354	7.0
Virginia	956,145	63,784	6.7	901,167	7.1
Washington	1,245,992	56,449	4.5	1,147,388	4.9
West Virginia	393,607	29,323	7.4	392,745	7.5
Wisconsin	1,051,903	84,065	8.0	1,008,902	8.3
Wyoming	80,790	4,294	5.3	77,244	5.6
United States	61,661,641	3,400,635	5.5	54,848,769	6.2

Source: MAX PS Records linked to SSA Death Master File, Version 10/29/2011

Table C.9. Linkage of MAX PS Records to SSA Death Master File, 2007

State	Number of PS Records	Number Matched to SSA DMF	Percent Matched to SSA DMF	Number with SSN and DOB	Percent Matched Among People with SSN and DOB
Alabama	919,048	62,283	6.8	874,738	7.1
Alaska	126,886	4,326	3.4	122,276	3.5
Arizona	1,572,906	48,593	3.1	1,414,571	3.4
Arkansas	786,248	39,526	5.0	735,288	5.4
California	10,987,805	308,038	2.8	6,817,003	4.5
Colorado	640,071	27,897	4.4	583,898	4.8
Connecticut	539,182	33,248	6.2	521,744	6.4
Delaware	188,695	8,156	4.3	169,289	4.8
District of Columbia	171,417	8,596	5.0	162,268	5.3
Florida	2,935,675	174,256	5.9	2,731,448	6.4
Georgia	2,014,312	85,896	4.3	1,791,051	4.8
Hawaii	240,375	10,725	4.5	228,970	4.7
Idaho	236,261	10,288	4.4	224,529	4.6
Illinois	2,671,131	110,409	4.1	2,595,837	4.3
Indiana	1,085,057	58,326	5.4	1,054,500	5.5
Iowa	484,526	29,055	6.0	476,037	6.1
Kansas	356,752	24,585	6.9	346,752	7.1
Kentucky	901,094	55,309	6.1	885,849	6.2
Louisiana	1,161,542	59,209	5.1	1,113,899	5.3
Maine	361,555	25,893	7.2	358,369	7.2
Maryland	856,476	41,765	4.9	825,452	5.1
Massachusetts	1,363,950	71,471	5.2	1,224,445	5.8
Michigan	1,982,608	89,634	4.5	1,805,244	5.0
Minnesota	823,723	55,730	6.8	798,670	7.0
Mississippi	746,010	48,111	6.4	720,998	6.7
Missouri	1,078,266	63,855	5.9	1,046,617	6.1
Montana	128,821	7,449	5.8	125,446	5.9
Nebraska	262,022	15,297	5.8	249,541	6.1
Nevada	259,843	13,217	5.1	234,168	5.6
New Hampshire	151,043	9,568	6.3	149,398	6.4
New Jersey	1,227,083	63,283	5.2	1,151,139	5.5
New Mexico	532,636	17,870	3.4	517,305	3.5
New York	5,038,798	221,030	4.4	4,630,059	4.8
North Carolina	1,822,975	104,970	5.8	1,776,497	5.9
North Dakota	80,594	6,102	7.6	78,878	7.7
Ohio	2,173,685	121,800	5.6	2,137,433	5.7
Oklahoma	786,992	41,007	5.2	741,816	5.5
Oregon	545,787	29,430	5.4	498,314	5.9
Pennsylvania	2,134,737	134,020	6.3	2,071,843	6.5
Rhode Island	222,340	12,458	5.6	215,431	5.8
South Carolina	917,726	46,461	5.1	871,888	5.3
South Dakota	133,795	7,664	5.7	129,738	5.9
Tennessee	1,494,749	85,658	5.7	1,443,075	5.9
Texas	4,313,350	199,565	4.6	4,023,412	5.0
Utah	327,812	10,366	3.2	313,990	3.3
Vermont	164,339	9,464	5.8	161,195	5.9
Virginia	965,390	55,937	5.8	913,278	6.1
Washington	1,227,878	49,396	4.0	1,150,076	4.3
West Virginia	397,462	25,910	6.5	395,483	6.6
Wisconsin	1,053,300	70,370	6.7	1,004,805	7.0
Wyoming	78,360	3,753	4.8	74,903	5.0
United States	61,673,088	2,917,225	4.7	54,688,853	5.3

Source: MAX PS Records linked to SSA Death Master File, Version 10/29/2011

Table C.10. Linkage of MAX PS Records to SSA Death Master File, 2008

State	Number of PS Records	Number Matched to SSA DMF	Percent Matched to SSA DMF	Number with SSN and DOB	Percent Matched Among People with SSN and DOB
Alabama	928,272	51,683	5.6	878,103	5.9
Alaska	128,385	3,518	2.7	124,375	2.8
Arizona	1,681,279	42,450	2.5	1,510,333	2.8
Arkansas	783,320	33,436	4.3	755,510	4.4
California	11,183,571	254,464	2.3	7,024,554	3.6
Colorado	666,240	23,672	3.6	613,385	3.9
Connecticut	562,239	28,085	5.0	543,258	5.2
Delaware	199,084	6,732	3.4	182,707	3.7
District of Columbia	174,457	7,041	4.0	164,093	4.3
Florida	3,170,489	153,652	4.8	3,015,636	5.1
Georgia	2,017,823	73,001	3.6	1,851,269	3.9
Hawaii	252,266	9,018	3.6	239,382	3.8
Idaho	243,016	8,805	3.6	232,254	3.8
Illinois	2,774,091	90,293	3.3	2,701,067	3.3
Indiana	1,154,292	50,951	4.4	1,121,996	4.5
Iowa	499,396	24,782	5.0	486,330	5.1
Kansas	362,794	21,261	5.9	352,899	6.0
Kentucky	926,354	45,638	4.9	904,209	5.0
Louisiana	1,219,892	49,561	4.1	1,159,356	4.3
Maine	361,611	21,689	6.0	358,657	6.0
Maryland	900,240	34,885	3.9	863,358	4.0
Massachusetts	1,633,841	61,910	3.8	1,475,299	4.2
Michigan	2,034,731	76,935	3.8	1,935,802	4.0
Minnesota	846,213	47,960	5.7	827,410	5.8
Mississippi	740,415	38,232	5.2	718,389	5.3
Missouri	1,096,123	53,656	4.9	1,074,183	5.0
Montana	131,160	6,352	4.8	127,711	5.0
Nebraska	265,282	12,805	4.8	252,507	5.1
Nevada	279,492	11,165	4.0	255,621	4.4
New Hampshire	157,524	8,178	5.2	155,672	5.3
New Jersey	1,276,190	52,316	4.1	1,198,860	4.4
New Mexico	565,298	15,021	2.7	550,473	2.7
New York	5,112,507	185,146	3.6	4,720,396	3.9
North Carolina	1,902,108	87,833	4.6	1,859,933	4.7
North Dakota	79,323	5,116	6.4	77,470	6.6
Ohio	2,212,338	102,352	4.6	2,137,786	4.8
Oklahoma	811,952	34,870	4.3	768,489	4.5
Oregon	577,932	25,222	4.4	537,071	4.7
Pennsylvania	2,233,017	114,112	5.1	2,205,209	5.2
Rhode Island	218,104	10,304	4.7	211,301	4.9
South Carolina	919,466	38,552	4.2	880,278	4.4
South Dakota	136,061	6,461	4.7	131,966	4.9
Tennessee	1,542,353	70,962	4.6	1,486,879	4.8
Texas	4,488,332	168,194	3.7	4,142,682	4.1
Utah	350,893	8,594	2.4	326,957	2.6
Vermont	176,697	7,934	4.5	173,718	4.6
Virginia	1,006,083	47,589	4.7	956,744	5.0
Washington	1,243,536	41,312	3.3	1,175,535	3.5
West Virginia	404,206	21,950	5.4	401,163	5.5
Wisconsin	1,133,714	57,654	5.1	1,091,607	5.3
Wyoming	78,645	3,207	4.1	74,281	4.3
United States	63,842,647	2,456,511	3.8	57,014,123	4.3

Source: MAX PS Records linked to SSA Death Master File, Version 10/29/2011

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