



Chronic Condition Data Warehouse

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CCW White Paper

Master Beneficiary Summary File (MBSF): Impact of Enrollment Source Data Conversion from EDB to CME

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Table of Contents

Chapter 1: Introduction	1
Chapter 2: Methodology – Data and Analysis.....	3
Chapter 3: Results	4
Chapter 4: Summary	9
Appendix A: Acronym List	10
Appendix B: Detailed Tables	11

List of Tables

Table 1. Medicare Beneficiary Enrollment Counts: MBSF-EDG and MBSF-CME, 2006-2014	4
Table 2. Average Person Months of Coverage per Year: MBSF-EDB and MBSF-CME, 2006-2014	5
Table 3. Overall Agreement between the MBSF-EDB and MBSF-CME, 2014	6
Table 4. Agreement between the MBSF-EDB and MBSF-CME on Demographic, Geographic, and Coverage Variables, 2014.....	7
Table 5. Agreement between the MBSF-EDB and MBSF-CME on Person Months, 2014.....	7
Table B - 1. Medicare Beneficiary Enrollment Counts: MBSF-EDB and MBSF-CME, 2006-2014	11
Table B - 2. Person Months of Coverage per Year: MBSF-EDB and MBSF-CME, 2006-2014	11
Table B - 3. Average Person Months of Coverage per Year: MBSF-EDB and MBSF-CME, 2006-2014	12
Table B - 4. Agreement between the MBSF-EDB and MBSF-CME on Part B Months of Coverage, 2014..	12
Table B - 5. Agreement between the MBSF-EDB and MBSF-CME on Part D Months of Coverage, 2014 .	13

List of Figures

Figure 1. Person Months of Coverage per Year: MBSF-EDB and MBSF-CME, 2006-2014	5
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Chapter 1: Introduction

The Chronic Condition Data Warehouse (CCW) has complete (100 percent) Medicare enrollment data for the period 1999 to the most current year, obtained directly from the Centers for Medicare & Medicaid Services (CMS). To facilitate the use of this data by researchers, the CCW has developed research-friendly data files. Since 2010, the preferred enrollment file for researchers has been the Master Beneficiary Summary File (MBSF)¹, which includes enrollment, demographic, and other related information for all beneficiaries documented as being alive for some part of the calendar year and enrolled in the Medicare program for at least one month of the year.

Historically, the Enrollment Database (EDB) has been the source for enrollment and demographic information in the MBSF. However, as the Medicare benefit has become increasingly complex, the Medicare enrollment applications and data systems have evolved. CMS has designated the Common Medicare Environment (CME) database as the single, enterprise-wide authoritative source for Medicare beneficiary enrollment and demographic data. The CME database integrates and standardizes different types of beneficiary data from CMS legacy systems. The CME database receives information from the EDB and also contains additional information not available in the EDB.

To meet researchers' evolving data needs, the CCW is transitioning the source for enrollment and demographic information in the MBSF from the EDB to the CME database. Key advantages of using the CME database for the MBSF include:

1. Timelier (monthly) Medicare Advantage (Part C) and Medicare Prescription Drug (Part D) enrollment information;
2. Specific Medicare Advantage (Part C) plan information, including when plans were selected and information regarding premium payments and subsidies;
3. Start and end dates for each type of coverage (Parts A, B, C, and D);
4. A single combined MBSF_ABCD segment that provides users with easier access to enrollment information across Parts A, B, C, and D.

The objective of this document is to present findings from an examination of the impact on the MBSF from converting from the EDB to the CME. It presents a side-by-side comparison of the "original" MBSF (i.e. based on the EDB) and the "new" MBSF (i.e. based on the CME), noting changes to beneficiary enrollment status, Medicare coverage, or demographic characteristics. For the remainder of this document the "original" MBSF (pre-April 2017) will be referred to as the MBSF-EDB and the "new" MBSF will be referred to as the MBSF-CME.

¹ Legacy files include the CMS Denominator File, the CCW Beneficiary Summary File (BSF), and the Beneficiary Annual Summary File (BASf).

When comparing enrollment figures between the MBSF-EDB and the MBSF-CME, it is important to note a discrepancy that the CCW recently identified in the MBSF-EDB Part B beneficiary counts. We determined that changes to a beneficiary's enrollment record were not being reflected in the monthly EDB that is loaded into the CCW. As a result, Part B enrollment records in the CCW that should have been marked as no longer current were retained as a current record, resulting in a slight over count of Part B beneficiaries.

Chapter 2: Methodology – Data and Analysis

To compare the MBSF-EDB and the MBSF-CME on key questions related to beneficiary enrollment, their Medicare coverage, and demographic information, we used Medicare enrollment data (100%) from both sources (EDB and CME) for the years 2006-2014.

First, we examined overall agreement between the two sources of enrollment data for the years 2006-2014. We created MBSF versions based upon the CME for the years and compared the overall agreement between the MBSF-CME to the existing MBSF-EDB. We examined the total number of beneficiaries enrolled in Medicare as well as by enrollment in full fee-for-service (FFS)² and Part D. We also examined person months by coverage status (i.e. Part A, Part B, Medicare Advantage [Part C], and Part D), both in terms of total person months and average person months. Average person months of enrollment for each type of coverage is derived by dividing the total number of person months by the total number of beneficiaries with at least one month of the particular type of coverage (e.g., Part B or Part D months).

The second part of the analysis examined the concordance between beneficiaries represented in both the MBSF-EDB and the MBSF-CME for the data year 2014³. We merged the MBSF-EDB (N=56,867,603) and MBSF-CME (N=56,767,788) to identify the same beneficiaries that were represented in both files (N=56,742,511). For the beneficiaries that were not common to the two files, we extracted historical enrollment records from the CME and EDB to determine why there was discordance. For the beneficiaries represented in both files, we calculated the agreement for demographic (e.g., date of birth, date of death, race, sex) and coverage (e.g., coverage start date, original reason for entitlement, current reason for entitlement, end stage renal disease status, and state-reported dual Medicare-Medicaid status) variables. Next, we examined monthly coverage for Part A, Part B, Medicare Advantage (Part C), and Part D to further illustrate noteworthy differences in enrollment counts.

Finally, it is important to note that the existing MBSF-EDB data files do not reflect any updates or corrections to the EDB that were made after the MBSF was created for a given year. These are static files as of the date of their original creation. In contrast, the MBSF-CME files were created more recently. For example the 2014 MBSF-CME was created approximately 10 months after the MBSF-EDB. Timing of the creation of the files will account for some of the discrepancies described.

² For this analysis, full fee-for-service (FFS) Medicare beneficiaries are beneficiaries that had both Medicare Part A and Part B FFS coverage for the entire portion of the year that they were enrolled in Medicare, i.e. beneficiaries with any Medicare Advantage (e.g. HMO) enrollment are not included in full FFS counts.

³ 2014 was the most recent year of data available at the time of this analysis.

Chapter 3: Results

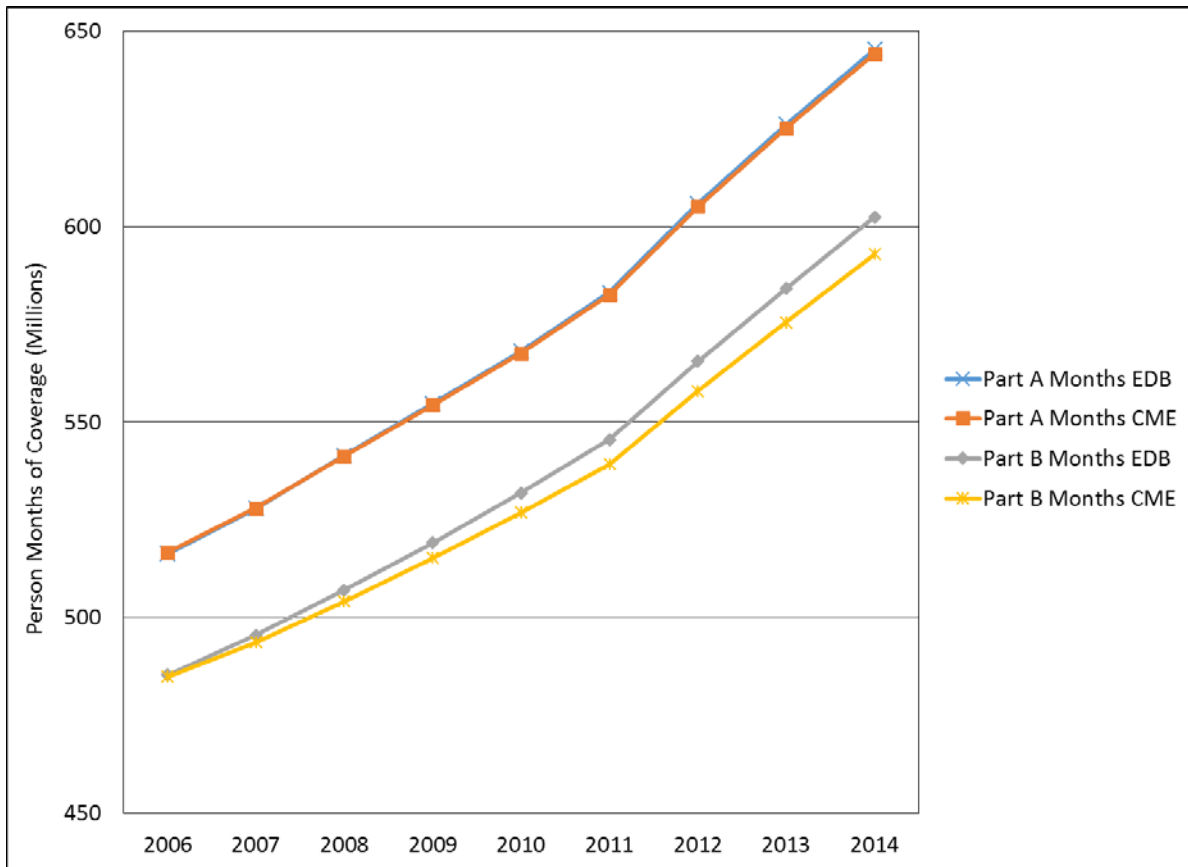
The overall agreement between the MBSF-EDB and the MBSF-CME for the years 2006-2014 is presented in Table 1 (data for all years can be found in Appendix B, [Table B - 1](#)). The total number of Medicare beneficiaries in the MBSF is comparable between the two enrollment sources, with differences being fewer than 100,000 beneficiaries. While MBSF enrollment counts based upon the CME were higher from 2006-2008, starting in 2009 the CME based enrollment counts have been lower than those based upon the EDB. When limiting to full FFS beneficiaries, differences between the MBSF-EDB and the MBSF-CME grow over time. In 2007, there are approximately 66,000 fewer full FFS beneficiaries in the MBSF-CME and in 2014 there are approximately 466,000 fewer beneficiaries in the MBSF-CME. Beneficiary enrollment in Part D is fairly comparable between with MBSF-EDB and MBSF-CME with the magnitude of the differences varying over time.

Table 1. Medicare Beneficiary Enrollment Counts: MBSF-EDG and MBSF-CME, 2006-2014

		2006	2008	2010	2012	2014
Beneficiary Count	EDB	45,618,323	47,850,425	50,088,947	53,597,183	56,867,603
	CME	45,685,188	47,868,545	50,052,744	53,540,264	56,767,788
Full FFS Count	EDB	31,774,994	30,923,846	31,313,344	32,004,019	32,166,757
	CME	31,819,587	30,808,870	31,068,528	31,594,107	31,700,502
Full FFS Percent	EDB	69.7%	64.6%	62.5%	59.7%	56.6%
	CME	69.7%	64.4%	62.1%	59.0%	55.8%
Part D Count	EDB	24,496,279	27,529,535	29,740,796	33,775,940	39,994,886
	CME	24,604,490	27,530,929	29,745,502	33,789,486	39,995,519
Part D Percent	EDB	53.7%	57.5%	59.4%	63.0%	70.3%
	CME	53.9%	57.5%	59.4%	63.1%	70.5%

Figure 1 presents the total person months, expressed in millions, for Part A and B coverage for the years 2006-2014 (underlying data for Figure 1 can be found in Appendix B, [Table B - 2](#)). Total person months for Part A shows very minor differences between the MBSF-EDB and the MBSF-CME. For example, in 2014 there are 645,291,530 person months of Part A coverage according to the MBSF-EDB and 644,097,623 in the MCBS-CME (0.185% difference). Differences for Part B enrollment increase over time. In 2006 there are 485,328,918 Part B person months in the MBSF-EDB and 484,945,445 in the MCBS-CME (0.079% difference), but in 2014 there are 602,391,924 p months of Part B according to the MBSF-EDB and 592,946,123 in the MBSF-CME (1.59% difference).

Figure 1. Person Months of Coverage per Year: MBSF-EDB and MBSF-CME, 2006-2014



The average person months for Part A, Part B, Full FFS, Medicare Advantage (Part C), and Part D are presented in Table 2 (data for all years can be found in the Appendix B, Table B - 3). Overall, the average person months between the MBSF-EDB and the MBSF-CME are comparable and the results for average Part A and Part B months mirror the totals in Figure 1 above. Average Part C and Part D months also were comparable.

Table 2. Average Person Months of Coverage per Year: MBSF-EDB and MBSF-CME, 2006-2014

Average Person Months	Source	2006	2008	2010	2012	2014
Part A Months	EDB	11.41	11.40	11.43	11.38	11.42
	CME	11.41	11.40	11.43	11.38	11.42
Part B Months	EDB	11.36	11.35	11.37	11.33	11.37
	CME	11.38	11.37	11.39	11.34	11.38
Full FFS Months	EDB	11.01	11.06	11.10	11.08	11.00
	CME	11.04	11.09	11.12	11.10	11.02
MA (Part C) Months	EDB	10.65	10.97	11.16	11.15	11.08
	CME	10.66	10.98	11.16	11.15	11.11
Part D Months	EDB	10.33	11.25	11.28	11.32	11.33
	CME	10.32	11.25	11.28	11.30	11.32

The next set of findings focus on the agreement between the MBSF-EDB and MBSF-CME for 2014 (Table 3). There are 56,742,511 beneficiaries that are common to both of the MBSF files, which represents an overall agreement of 99.7%. The MBSF-EDB includes 125,092 beneficiaries that are not identified in the MBSF-CME version (0.22% of beneficiaries in MBSF-EDB). Examination of detailed historical enrollment data reveals that nearly 42% (52,319) of these individuals have a date of birth prior to 1900. The remainder of the beneficiaries in the MBSF-EDB that are not in the MBSF-CME are due to differences in when the two files were constructed. As explained in the methods, the source CME enrollment data are continuously updated and we compare more recent CME data to our static MBSF-EDB files. The timing of file creation affects the information regarding whether enrollment information is current and for a smaller number of cases can result in a new beneficiary ID being assigned. The latter scenario of the same beneficiary with different IDs accounted for 13.5% of the MBSF-EDB non-matches to the MBSF-CME.

In addition, there are 25,277 beneficiaries in the MBSF-CME that are not included in the MBSF-EDB (0.04% of beneficiaries in the MBSF-CME version; refer to Table 3). Further examination reveals that, due to the timing of data file creation, some of these beneficiaries have an updated date of death within the CME indicating the beneficiary was alive and enrolled for some part of 2014. However, the MBSF-EDB had been created with a death date prior to 2014, before the information was updated and corrected in the EDB. The remaining beneficiaries in the MBSF-CME have current enrollment information that arrived after the MBSF-EDB was created.

Table 3. Overall Agreement between the MBSF-EDB and MBSF-CME, 2014

		MBSF-CME Data		
		Yes	No	Total
MBSF-EDB Data	Yes	56,742,511	125,092	56,867,603
	No	25,277		
	Total	56,767,788		56,892,880

The next set of findings focus on the 56,742,511 beneficiaries represented in both the MBSF-EDB and MBSF-CME for 2014. Table 4 presents the concordance for demographic, geographic and coverage variables. The MBSF-EDB and MBSF-CME have almost exact agreement for demographic, geographic, and coverage variables. The minor differences observed are due to differences in when the two data files were created.

Table 4. Agreement between the MBSF-EDB and MBSF-CME on Demographic, Geographic, and Coverage Variables, 2014

	Percent Agreement
Demographic Variables	
Date of birth (from Social Security Administration)	99.99
Date of death (from Social Security Administration)	99.99
Age at End of Reference Year	100.00
Sex	100.00
Beneficiary Race Code	99.87
Geographic Variables	
State Code	99.99
County Code	99.99
Coverage Variables	
Coverage start date	99.95
Original reason for entitlement	100.00
Current reason for entitlement	100.00
Medicare status code	99.98
End Stage Renal Disease indicator	99.97
Medicare-Medicaid enrollment (months of dual coverage)	99.50

Agreement for monthly coverage variables are presented in Table 5. For Part A months, Medicare Advantage months, and Part D months, both person months of coverage are nearly identical between MBSF-EDB and the MBSF-CME. However, similar to what is observed for Part B enrollment in Figure 1 and Table 2, even after limiting our analyses to the beneficiaries that were common to the two files, the determination regarding the months of Part B coverage is different.

Table 5. Agreement between the MBSF-EDB and MBSF-CME on Person Months of Coverage, 2014

Total Person Months	MBSF-EDB	MBSF-CME	Percent Agreement
Part A Months	643,932,112	643,929,917	99.98
Part B Months	601,815,850	592,864,514	98.51
Full FFS Months	401,118,483	394,465,743	98.08
MA (Part C) Months	196,991,163	194,669,218	99.56
Part D Months	453,292,614	452,643,176	98.88

Since the biggest difference between the MBSF-EDB and MBSF-CME is with Part B enrollment, where Part B enrollment is higher in the MBSF-EDB, we examined the concordance between the Part B member months. In 2014, there is exact agreement in the number of Part B covered months between the MBSF-EDB and the MBSF-CME for 98.5% of beneficiaries (the sum of numbers on the diagonal divided by the total number of beneficiaries; refer to Appendix B, Table B - 4). However, for 835,842 beneficiaries the MBSF-CME shows 0 months of Part B enrollment,

but the MBSF-EDB found one or more months of Part B coverage. Discrepancies in Part D enrollment also exist due to differences in the timing of the Part D data used in the MBSF-EDB and MBSF-CME. In most cases, the MBSF-EDB will show one additional month of Part D enrollment. For example, over 51,000 beneficiaries have one month of Part D enrollment in the MBSF-CME, but two months in the MBSF-EDB. Additional details regarding the count of Part B months and Part D months can be found in Appendix B, [Table B - 4](#) and [Table B - 5](#).

Chapter 4: Summary

Overall, there is very good agreement between the CCW MBSF using the EDB as the enrollment source compared to using the CME as the enrollment source. There are essentially no differences in terms of Part A coverage, demographic, geographic, or other coverage variables, e.g. dual Medicare-Medicaid enrollment status. However, there are differences between the MBSF-EDB and the MBSF-CME in Part B enrollment and Part B months of coverage.

The conversion from the EDB to the CME could affect some MBSF data users. For example, researchers studying centenarians will find changes in the number of these beneficiaries with the MBSF-CME. As shown with the 2014 data, there are over 50,000 beneficiaries with ages greater than 115 years who are not included in the MBSF-CME but are included in the MBSF-EDB. Also, there may be changes in Part B statistics due to the fact that the MBSF-CME corrects the discrepancy that the CCW recently identified in the MBSF-EDB Part B beneficiary counts. However, researchers who have identified a study population based on observed patterns of care or receipt of services should not be affected.

Using the CME rather than the EDB to create the MBSF offers a number of benefits to the researcher. The MBSF-CME will have enhanced information regarding managed care plan enrollment, including the exact plan identifiers and dates different plans were active for the beneficiary. Additionally, the CME contains the Part D enrollment data, resulting in a single combined MBSF_ABCD segment that will allow for more timely release of the MBSF file.

Appendix A: Acronym List

Acronym	Definition
CCW	Chronic Conditions Data Warehouse
CMS	Centers for Medicare & Medicaid Services
CME	Common Medicare Environment
EDB	Enrollment Database
FFS	Fee-For-Service
MA	Medicare Advantage
MBSF	Master Beneficiary Summary File

Appendix B: Detailed Tables

Table B - 1. Medicare Beneficiary Enrollment Counts: MBSF-EDB and MBSF-CME, 2006-2014

		2006	2007	2008	2009	2010	2011	2012	2013	2014
Beneficiary Count	EDB	45,618,323	46,694,639	47,850,425	48,922,869	50,088,947	51,717,260	53,597,183	55,277,442	56,867,603
	CME	45,685,188	46,735,669	47,868,545	48,916,748	50,052,744	51,667,138	53,540,264	55,206,238	56,767,788
Full FFS Count	EDB	31,774,994	31,310,588	30,923,846	30,866,963	31,313,344	31,706,631	32,004,019	32,304,957	32,166,757
	CME	31,819,587	31,244,451	30,808,870	30,673,777	31,068,528	31,382,075	31,594,107	31,829,308	31,700,502
Full FFS Percent	EDB	69.7%	67.1%	64.6%	63.0%	62.5%	61.3%	59.7%	58.4%	56.6%
	CME	69.7%	66.9%	64.4%	62.7%	62.1%	60.7%	59.0%	57.7%	55.8%
Part D Count	EDB	24,496,279	26,121,654	27,529,535	28,722,739	29,740,796	31,450,581	33,775,940	37,840,309	39,994,886
	CME	24,604,490	26,158,553	27,530,929	28,711,977	29,745,502	31,480,779	33,789,486	37,839,618	39,995,519
Part D Percent	EDB	53.7%	55.9%	57.5%	58.7%	59.4%	60.8%	63.0%	68.5%	70.3%
	CME	53.9%	56.0%	57.5%	58.7%	59.4%	60.9%	63.1%	68.5%	70.5%

Table B - 2. Person Months of Coverage per Year: MBSF-EDB and MBSF-CME, 2006-2014

Total Months		2006	2007	2008	2009	2010	2011	2012	2013	2014
Part A Months	EDB	516,315,401	527,907,645	541,452,275	554,767,974	568,151,379	583,149,824	605,876,454	626,003,394	645,291,530
	CME	516,725,864	527,987,724	541,289,022	554,395,009	567,612,405	582,486,391	605,139,652	625,045,446	644,097,623
Part B Months	EDB	485,328,918	495,465,666	507,024,808	519,113,496	531,894,450	545,512,858	565,522,031	584,117,008	602,391,924
	CME	484,945,445	493,658,116	504,219,357	515,241,920	526,839,277	539,241,952	557,920,672	575,513,328	592,946,123
Full FFS Months	EDB	393,336,151	386,860,784	382,108,978	380,966,097	386,380,879	391,765,907	397,315,598	400,652,957	401,519,556
	CME	393,229,497	385,437,600	379,997,741	378,063,120	382,610,688	386,925,227	391,437,628	393,982,605	394,514,986
MA (Part C) Months	EDB	87,635,827	104,375,577	120,798,844	134,134,437	141,371,044	149,729,227	164,427,784	179,697,138	197,081,234
	CME	87,152,381	103,743,732	119,821,452	132,934,556	140,005,584	148,239,309	162,661,104	177,750,761	194,671,977
Part D Months	EDB	252,924,785	292,740,973	309,661,787	323,570,860	335,478,304	354,858,615	382,371,071	428,855,049	453,328,887
	CME	254,003,271	293,144,362	309,780,720	323,630,339	335,477,456	354,676,112	381,695,901	428,157,096	452,650,075

Table B - 3. Average Person Months of Coverage per Year: MBSF-EDB and MBSF-CME, 2006-2014

Avg. Person Months	Source	2006	2007	2008	2009	2010	2011	2012	2013	2014
Part A Months	EDB	11.41	11.40	11.40	11.42	11.43	11.35	11.38	11.40	11.42
	CME	11.41	11.39	11.40	11.42	11.43	11.35	11.38	11.40	11.42
Part B Months	EDB	11.36	11.36	11.35	11.37	11.37	11.31	11.33	11.34	11.37
	CME	11.38	11.37	11.37	11.38	11.39	11.33	11.34	11.35	11.38
Full FFS Months	EDB	11.01	11.08	11.06	11.10	11.10	11.08	11.08	11.07	11.00
	CME	11.04	11.09	11.09	11.11	11.12	11.10	11.10	11.08	11.02
MA (Part C) Months	EDB	10.65	10.88	10.97	11.12	11.16	11.15	11.15	11.15	11.08
	CME	10.66	10.89	10.98	11.12	11.16	11.15	11.15	11.15	11.11
Part D Months	EDB	10.33	11.21	11.25	11.27	11.28	11.28	11.32	11.33	11.33
	CME	10.32	11.21	11.25	11.27	11.28	11.27	11.30	11.32	11.32

MA = Medicare Advantage (also known as Part C or HMO enrollment).

Table B - 4. Agreement between the MBSF-EDB and MBSF-CME on Part B Months of Coverage, 2014

		MBSF-CME												Total	
		0	1	2	3	4	5	6	7	8	9	10	11		12
MBSF-EDB	0	3,789,188	126	94	87	51	39	63	51	41	36	24	27	550	3,790,377
	1	17,466	500,112	23	7	4	2	3	3	1	0	2	1	104	517,728
	2	17,056	12	474,423	19	6	2	8	2	2	2	2	1	92	491,627
	3	14,211	8	23	501,747	36	9	12	2	2	8	3	3	93	516,157
	4	16,629	10	10	13	490,160	22	4	2	2	9	4	2	101	506,968
	5	16,390	5	5	4	13	481,019	28	4	8	8	2	4	110	497,600
	6	17,676	2	5	6	7	19	624,401	19	2	13	6	8	133	642,297
	7	14,932	1	5	2	8	6	17	462,712	15	4	7	4	118	477,831
	8	14,467	1	3	3	3	2	8	23	437,397	31	3	5	123	452,069
	9	13,822	0	2	3	3	3	10	8	18	440,235	17	3	175	454,299
	10	14,413	1	1	1	2	1	5	6	12	14	454,777	24	276	469,533
	11	13,207	5	3	1	1	0	4	2	6	8	15	442,102	5,593	460,947
	12	665,573	61	66	61	56	59	72	69	55	79	119	121	46,798,687	47,465,078
	Total	4,625,030	500,344	474,663	501,954	490,350	481,183	624,635	462,903	437,561	440,447	454,981	442,305	46,806,155	56,742,511

Table B - 5. Agreement between the MBSF-EDB and MBSF-CME on Part D Months of Coverage, 2014

	MBSF-CME														
	0	1	2	3	4	5	6	7	8	9	10	11	12	Total	
MBSF-EDB	0	16,578,983	628	466	402	269	244	243	143	124	166	173	97	1,939	16,583,877
	1	861	328,711	33	23	10	11	8	3	4	2	5	6	66	329,743
	2	123	51,357	334,994	36	17	17	13	7	4	6	3	2	83	386,662
	3	74	2,706	49,414	351,633	33	30	24	10	10	15	11	8	113	404,081
	4	44	911	2,267	59,530	360,297	37	40	27	20	17	8	13	187	423,398
	5	73	412	890	2,584	66,334	382,268	22	22	10	14	24	5	230	452,888
	6	52	180	280	652	2,085	52,156	395,405	24	17	19	12	19	304	451,205
	7	40	99	175	264	785	2,361	54,527	332,108	19	20	9	12	325	390,744
	8	31	57	93	127	306	808	2,134	50,071	354,965	16	13	7	286	408,914
	9	32	39	35	61	74	165	428	1,219	28,835	339,369	24	23	318	370,622
	10	33	34	52	69	113	194	360	764	2,725	63,627	393,790	16	318	462,095
	11	41	21	26	35	48	73	140	237	571	1,807	43,361	530,467	331	577,158
	12	2,591	172	203	185	258	337	463	595	849	1,600	4,617	63,877	35,257,606	35,333,353
	Total	16,582,978	385,327	388,928	415,601	430,629	438,701	453,807	385,230	388,153	406,678	442,050	594,552	35,262,106	56,574,740