MCBS
Medicare Current Beneficiary Survey

2018 | METHODOLOGY REPORT

Centers for Medicare & Medicaid Services (CMS)

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1. INTRODUCTION TO MCBS

1.1 Purpose and Goals

Medicare is the nation's health insurance program for persons 65 years and over and for persons younger than 65 years who have a qualifying disability. The Medicare Current Beneficiary Survey (MCBS) consists of a representative national sample of the Medicare population sponsored by the Centers for Medicare & Medicaid Services (CMS). The MCBS is designed to aid CMS in administering, monitoring, and evaluating Medicare programs. A leading source of information on Medicare and its impact on beneficiaries, the MCBS provides important information on beneficiaries that is not otherwise collected through operational or administrative data on the Medicare program and plays an essential role in monitoring and evaluating beneficiary health status and health care policy.

The MCBS is a continuous, in-person, multi-purpose longitudinal survey, representing the population of beneficiaries aged 65 and over and beneficiaries aged 64 and below with certain disabling conditions, residing in the United States. Fieldwork for the first round of data collection began in September 1991; since then, the MCBS has continued to collect and provide essential data on the costs, use, and health care status of Medicare beneficiaries. The MCBS has conducted continuous data collection for over 25 years, completing more than one million interviews provided by thousands of respondents.

The MCBS primarily focuses on economic and beneficiary topics including health care use and health care access barriers, health care expenditures, and factors that affect health care utilization. As a part of this focus, the MCBS collects a variety of information about the beneficiary, including demographic characteristics, health status and functioning, access to care, insurance coverage and out of pocket expenses, financial resources, and potential family support. The MCBS collects this information in three data collection periods, or rounds, per year. Over the years, data from the MCBS have been used to inform many advancements to the Medicare program, including the creation of new benefits such as Medicare's Part D prescription drug benefit.

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This *MCBS Methodology Report* provides an operational perspective on the collection of survey data for the 2018 MCBS data year. It complements other MCBS documentation (i.e., the Data User's Guides) with an overview of all activities carried out in support of the 2018 data files, including sampling, instrument design, interviewer training, data collection, data processing, and weighting. Please also see Section 11: Glossary for definitions of key terms used in this Report. Data users can access this *Methodology Report* along with other data documentation at https://www.cms.gov/Research-Statistics-Data-and-Systems/Research/MCBS/Codebooks.

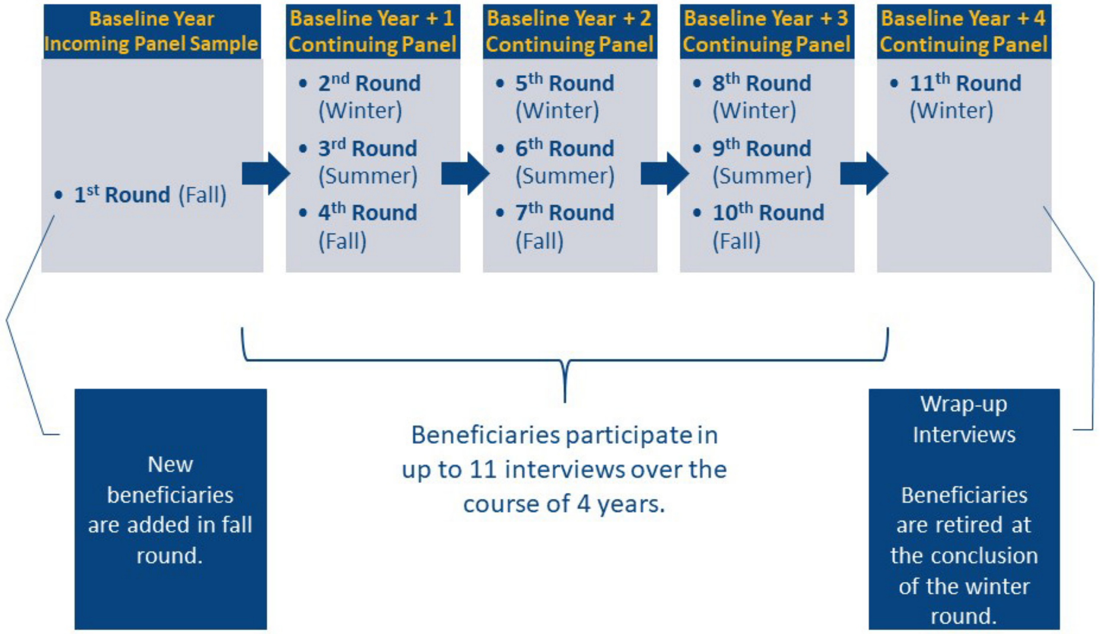
1.2 Survey Overview and History

In its initial design, the MCBS was to serve as a traditional longitudinal survey of the Medicare population, with no predetermined limit to the duration of participation. However, beginning in 1994, participation of beneficiaries in the MCBS was limited to no more than four years.

Initial interviews of newly-selected respondents take place once per year in the fall data collection period (i.e., round); these are referred to as the Incoming Panel. Often the fall round begins early (i.e., late July or early August) to allow more time to conduct outreach and collect information from the new survey respondents who are selected to participate in the MCBS. That is, the early start of the fall round overlaps with the final weeks of data collection for the summer round. These small overlap periods that occur as one round ends and another begins are acceptable design features of the survey. For example, the fall round can extend into early January to allow for the completion of interviews that may have been postponed due to the holiday period.

Subsequent rounds, which occur approximately every four months, involve re-interviewing of the same respondent (or appropriate proxy respondents) until they have completed four years of participation (up to 11 interviews in total); these are referred to as Continuing Panels. Interviews are conducted regardless of whether the respondent resides at home or in a long-term care facility, using a questionnaire version appropriate to the setting. Exhibit 1.2.1 depicts the timeline of participation for beneficiaries selected to be in the MCBS sample.

Exhibit 1.2.1: MCBS Participation Timeline



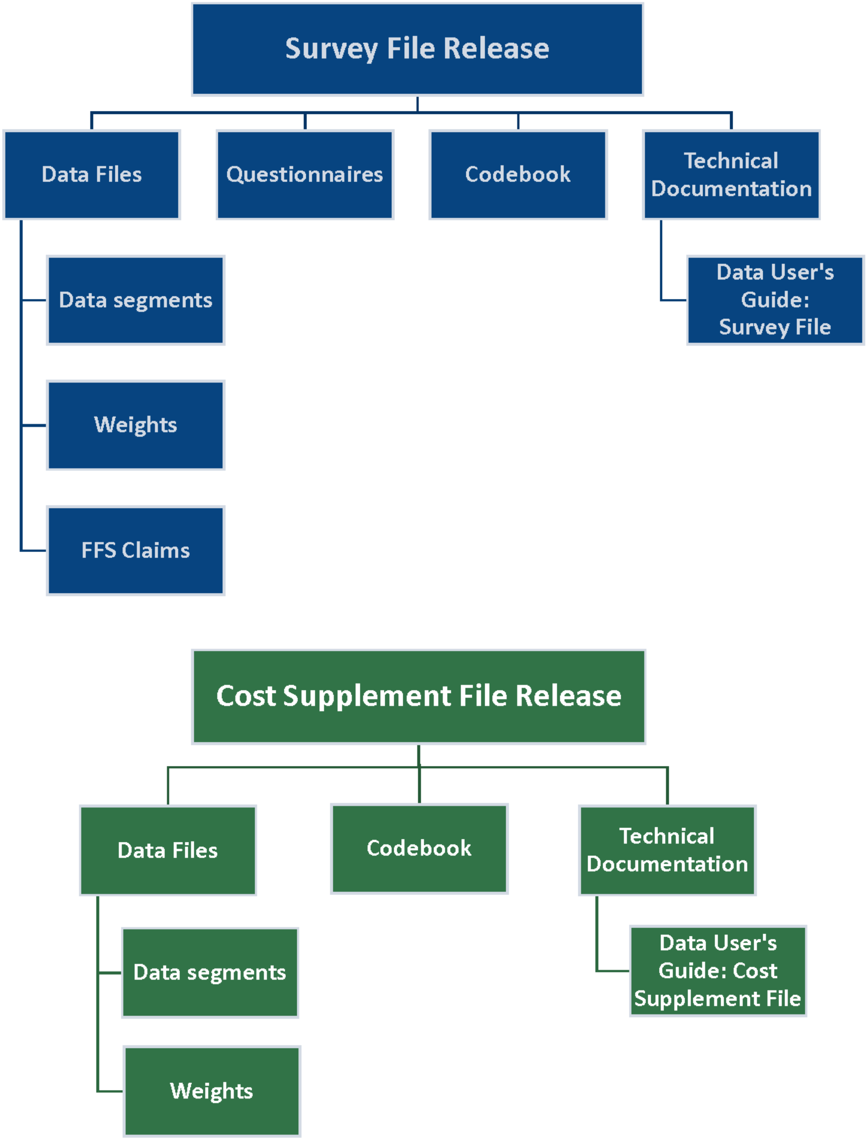
Detailed information on the sampling design can be found in Chapter 3 of this report. Chapter 6 describes the data collection fielding procedures, including eligibility for each round of the interview. Chapter 9 summarizes the results of data collection, including response rates. An updated nonresponse bias analysis report based on the 2018 data year is forthcoming and will be released as an appendix to this Report.

1.3 Key Data Products and Analyses

MCBS data are made available via releases of annual files. For 2018, two annual Limited Data Set (LDS) releases, the Survey File and the Cost Supplement File, and one Public Use File (PUF) (based on the Survey File data only) are released. The LDS releases each contain multiple files, called segments, which are easily linkable through a common beneficiary key ID. Detailed descriptions of each segment, including the core contents of each segment, key variable definitions, and special notes on new variables, recodes, and administrative sources for select variables can be found in the data release-specific chapters of the MCBS Data User's Guide (see *MCBS Data User's Guide: Survey File* and *MCBS Data User's Guide: Cost Supplement File*).

Exhibit 1.3.1 displays the components of each LDS release. Both the Survey File and Cost Supplement File contain data segments, codebooks, questionnaires, and technical documentation. The Survey File release contains the Fee-for-Service (FFS) claims data, which provide CMS administrative information on medical services and payments made by Medicare FFS claims; claims data for Medicare Advantage (MA) beneficiaries are not available, nor are Medicaid claims or Part D claims. However, the MCBS data includes survey-reported health care utilization and cost data for MA beneficiaries in the Cost Supplement. While users can conduct analyses with the Survey File alone, users interested in the Cost Supplement File data will need both LDS files in order to link cost and utilization variables with demographic or health insurance coverage variables.

Exhibit 1.3.1: 2018 Contents of Data Releases



Chapter 4 of this report provides information on the specific questionnaire sections associated with each data file. Chapter 7 describes the creation of these data files and Chapter 8 provides an overview of weighting and imputation procedures. Detailed descriptions of each file, including the contents of the files, file structure, information on new variables, key recodes, and administrative sources for select variables can be found in the data file-specific chapters of the MCBS Data User’s Guide (see *MCBS Data User’s Guide: Survey File* and *MCBS Data User’s Guide: Cost Supplement File*).

2. CHANGES UNIQUE TO 2018

Several key changes were made to the MCBS during 2018, affecting the areas of data collection, questionnaire design, and data processing, including weighting and imputation procedures. These changes are highlighted below and described later in this report.

2.1 Sampling

Sample eligibility: Beginning in 2018, data collection in Puerto Rico was officially halted.

Hispanic oversample: 2018 was the final year of the sampling of 75 *additional* continental U.S. Hispanics[1] to supplement the MCBS sample. However, Hispanics continue to be oversampled relative to non-Hispanics in the MCBS sample as in past years. A gradual increase in the Hispanic portion of the MCBS sample is planned over the next several years, with the goal of fully replacing the previously sampled Puerto Rican Hispanic beneficiaries.

Medicare Beneficiary ID: Beginning in 2018, Medicare began replacing the Health Insurance Claim Number (HICN) with a new Medicare Beneficiary ID (MBI) with full implementation to be completed in 2019. As a result, the new MBI, if available is being delivered as part of the sample frame's administrative data.

2.2 Questionnaires

Several Community Questionnaire updates were introduced in 2018 to enhance data quality, improve interviewer and respondent experience, and reduce respondent burden. These changes included several new items, including those on weight management counseling, depression screening, smoking cessation, and how beneficiaries with Limited English Proficiency (LEP) usually communicate with health care providers. Additional details about questionnaire content and changes made in 2018 can be found in Section 4.1.3-4.1.5.

There were several minor changes made to the Facility Instrument in 2018, including updates to question text, response options, programming logic, and text fills. These changes included updating out of date terminology, updating routing to maximize collection of facility billing rates, and better aligning the questionnaire with CMS administrative data sources. Additional details about Facility Instrument changes made in 2018 can be found in Section 4.2.5.

2.3 Data Collection

Rounds of Data Collection: Beginning in 2018, the MCBS design was modified to eliminate the 12th interview; the 11th interview, conducted each winter round, will be the final (exit) interview. Therefore, the final interview for the 2014 Panel was conducted in Winter 2018 (Round 80).

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[1] Heretofore referred to as U.S. Hispanics.

2.4 Documentation

The 2018 *Data User's Guides* and *Methodology Report* were enhanced with new charts, tables, and descriptions. The enhanced content describes in further detail differences in data collection and data processing for beneficiaries living in facilities and in the community, explains differences between the Survey File and Cost Supplement data sources and population, and expands information on imputation and guidance for conducting analyses with community and facility data.

2.5 Data Processing

MCBS data files undergo thorough editing and quality control checks prior to release. For more detailed information regarding data editing and imputation procedures conducted for the 2018 LDS releases, please consult the *2018 Data User's Guide: Cost Supplement File* and the *2018 Data User's Guide: Survey File* available on the CMS MCBS website.

Weighting: In 2018, the MCBS re-calibrated Continuing Panel weights and introduced the Medicare Advantage/Fee-for-Service status in the weighting process for Incoming and Continuing Panels in order to bring MCBS estimates of MA enrollment in line with administrative benchmarks.

There were two new seasonal Topical section weights added to reflect movement of Access to Care Questionnaire (ACQ) and Usual Source of Care Questionnaire (USQ) to the Winter round. Also, in previous years, supplied weights for the Topical data sections corresponded to two MCBS populations: the Survey File continuously enrolled population and the Cost Supplement ever enrolled population. This year, new Topical weights corresponding to the Survey File ever enrolled population are also available for all Topical data sections.

The 2018 Survey File LDS includes a two-year longitudinal weight for analyses using 2017 and 2018 data, a three-year longitudinal weight for analyses using 2016 and 2018 data, and a four-year longitudinal weight for analyses using 2015 and 2018 data. The four-year longitudinal weights are new, having been reintroduced for 2018.

Imputation: The 2018 Income and Assets imputation (IA) process was updated for 2018 to improve longitudinal consistency and make better use of existing data related to total annual income. This improved estimates of total annual income when a value was not provided by the beneficiary and will better align year-to-year comparisons of total income.

3. SAMPLE DESIGN FOR THE MCBS 2018 PANEL

3.1 Overview of MCBS Sample Design

The MCBS employs a three-stage cluster sample design. A set of 107 primary sampling units (PSUs) had been employed for sampling for the MCBS from 2001 through 2016. Efforts were initiated in 2015 to more closely align the MCBS Hispanic oversample to the Hispanic population in the continental U.S., as most MCBS Hispanic beneficiaries were selected within Puerto Rico. These efforts included the implementation of a Hispanic oversample within the continental U.S., with the intention of gradually reducing and ultimately eliminating the selected sample in Puerto Rico altogether. However, the devastating hurricanes in Puerto Rico in 2017, which caused many beneficiaries to relocate, accelerated the removal of Puerto Rico from the sample frame. In 2017, the three PSUs in Puerto Rico were dropped from the original set of 107 PSUs, reducing the total MCBS PSUs to 104. Thus, the final 2018 Panel was selected from the remaining 104 MCBS PSUs, all of which are in the continental United States. At the second stage, the MCBS continued the use of the census tract-based secondary sampling units (SSUs) that were selected in 2014.[2] At the third stage, Medicare beneficiaries, the ultimate sampling units (USUs), were selected from within the selected tract-based SSUs.[3] In 2015, the sample design underwent significant modernization, including the aforementioned oversampling of Hispanic beneficiaries and the inclusion of current-year enrollees in the sampling frame; these changes are carried forward into 2018.

In 2018, the MCBS continued to use the sample rotation pattern used historically. In particular, the newly selected 2018 Panel, and the panels selected in 2015, 2016, and 2017, continued into Fall 2018 and beyond according to their established rotation schedules.[4] The 2014 Panel (which was first fielded in Fall 2014) exited at the conclusion of the Winter 2018 round and was replaced with a new sample of beneficiaries in Fall 2018. Exhibit 3.1.1 displays the MCBS rotating panel design from 2014 to the present panel.

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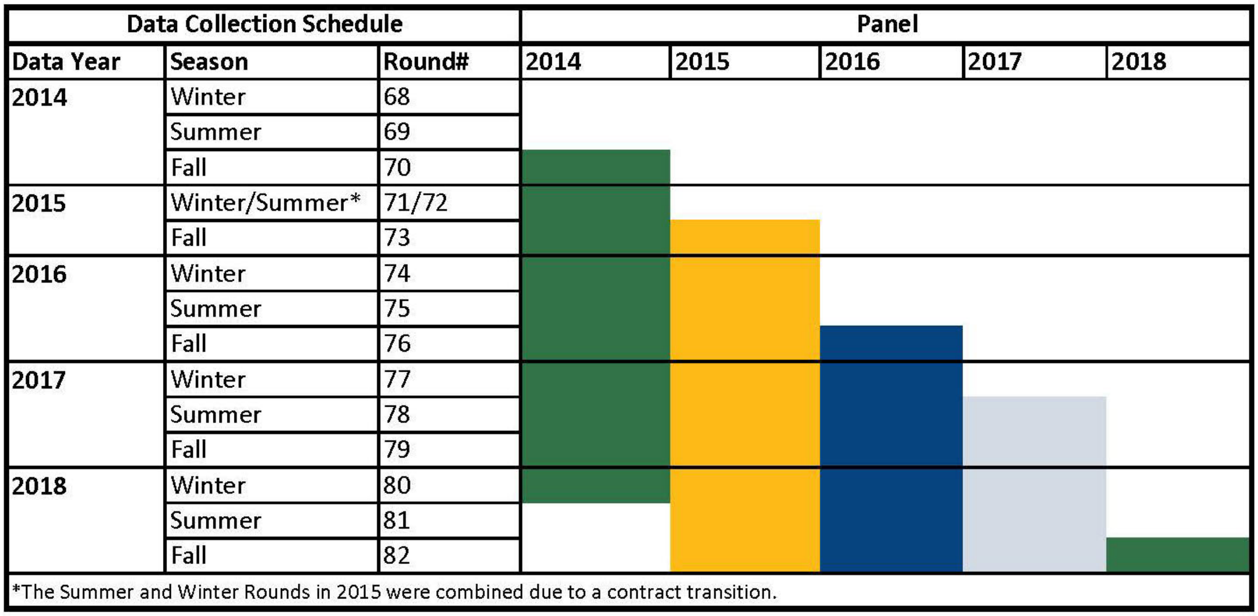
[2] These SSUs were sized to last 20 years; therefore, there is no current plan to reselect the SSUs.

[3] In late 2000, the current set of PSUs was selected. In 2014, SSUs were reconstructed using Census tracts and a new sample was drawn. While the MCBS PSUs and SSUs do not align directly with other surveys, they may overlap in some areas with PSUs and/or SSUs used for other surveys.

[4] A new panel is added each fall and retains the year of its entry as its sampling panel designation for projections and response rate analysis. Once a panel is selected, it remains in the MCBS for four years, participating in a total of 11 rounds.

Exhibit 3.1.1: 2014-2018 MCBS Rotating Panel Design



Data Collection Schedule			Panel				
Data Year	**Season**	**Round#**	**2014**	**2015**	**2016**	**2017**	**2018**
2014	Winter	68					
	Summer	69					
	Fall	70	🟩				
2015	Winter/Summer*	71/72	🟩				
	Fall	73	🟩	🟨			
2016	Winter	74	🟩	🟨			
	Summer	75	🟩	🟨			
	Fall	76	🟩	🟨	🟦		
2017	Winter	77	🟩	🟨	🟦		
	Summer	78	🟩	🟨	🟦	▨	
	Fall	79	🟩	🟨	🟦	▨	
2018	Winter	80	🟩	🟨	🟦	▨	
	Summer	81		🟨	🟦	▨	
	Fall	82		🟨	🟦	▨	🟩

*The Summer and Winter Rounds in 2015 were combined due to a contract transition.

This section documents the procedures used to select the new sample for Fall 2018 (i.e., the 2018 Panel). The 2018 Panel will be retained in the survey for the four years specified under the MCBS sample rotation scheme and is designed to: (a) replace approximately one-third[5] of the respondents in the existing MCBS sample; and (b) extend survey coverage to persons added to the Medicare rolls during the current year (see Section 3.4 for details).

3.1.1 Primary Sampling Units

As mentioned above, the three PSUs in Puerto Rico were removed from the original set of 107 PSUs in 2017. Thus, the final 2018 Panel was selected from the remaining 104 MCBS PSUs, all of which are in the continental United States, and include 28 certainty PSUs and 76 non-certainty PSUs.

3.1.2 Secondary Sampling Units

Prior to 2014, MCBS SSUs were made up of ZIP Codes and ZIP Code fragments. Beginning in 2014, the MCBS implemented the use of census tracts, or clusters of adjacent tracts, as SSUs. A total sample of 703 SSUs was selected within the 107 PSUs, consisting of a proportional allocation of 242 SSUs to the 29 certainty PSUs and an equal allocation of approximately six SSUs to each of the 78 non-certainty PSUs. These SSUs are sized to last for a full 20 years of use for MCBS

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[5] Due to the cumulative effects of attrition over time as well as cost-related sample cuts from past years, the number of MCBS respondents varies by panel, with fewer respondents in the older panels than in newer ones. Thus, while the newly-selected panel replaces one of four existing panels, the net effect has been to replace about one-third of the existing MCBS respondents. Furthermore, because attrition has been higher than expected in recent years, some of the newer panels may be required to replace more than one-third of the respondents.

sampling. (Note that with the removal of the three PSUs in Puerto Rico in 2017, the corresponding SSUs selected within those three PSUs were also removed from the sample. A total of 685 SSUs fall into the 104 U.S. PSUs used for sampling beginning in 2017.) 2018 is the fifth year in which the annual MCBS panel sample is selected from within the new SSUs. In 2018, all panels were selected from the census tract-based SSUs.

3.1.3 Ultimate Sampling Units

The third stage of sampling was the selection of Medicare beneficiaries from within each SSU. Previously, to be eligible for sample selection, beneficiaries had to be eligible for Medicare and enrolled by the first day of the sampling year. Beginning with the 2015 Panel, however, all current-year enrollees are also eligible to be sampled as part of a new sampling approach. As a result, all beneficiaries who are enrolled in Medicare before January 1, 2019 are eligible to be sampled as part of the 2018 Panel. Sampling of current-year enrollees is discussed in detail in Section 3.4.

Hispanic beneficiaries were first oversampled beginning in 2015 and continue to be oversampled in the 2018 Panel. An additional 75 completed interviews from Hispanic beneficiaries are targeted per year with the aim of producing 1,500 Hispanic beneficiaries in the 2020 Survey File.[6] Oversampling of Hispanic beneficiaries is discussed in detail in Section 3.4.

The sampling frame for the Medicare beneficiaries begins with Medicare administrative enrollment data. To avoid duplication in the various panels of MCBS beneficiaries, a unique and disjoint 5-percent sample of the enrollment data is specified annually by CMS for the MCBS. The most recent 5-percent file was used as a basis for selecting the sample for the 2018 MCBS Panel. A first extract of the enrollment data 5-percent file was provided in March 2018, and the bulk of the 2018 Panel sample was selected from that extract. Two additional extracts of the enrollment data 5-percent file, containing only new enrollees who were not included in the initial extract, were also needed to support sampling of current-year enrollees.[7] The combination of these extracts constitutes the full frame from which the 2018 Panel was selected. Details about the sampling frame construction can be found in Section 3.4.

The MCBS enrollment data 5-percent file extracts were subset based on eligibility and other criteria (described in detail later in this section) and then geocoded to the tract level. The set of all records that geocoded to the selected SSUs constituted the MCBS sampling frame of beneficiaries. A random sample of beneficiaries residing in the selected SSUs was then selected within defined age group and ethnicity (Hispanic/non-Hispanic) strata[8]. An ethnicity flag (see Section 3.4 for a full description) was used to classify beneficiaries into the Hispanic strata; a value of "yes"

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[6] Due to the removal of Puerto Rico from the sampling frame in 2017, this goal has been adjusted. Details are discussed in Section 3.4.

[7] Note that while all new enrollees added to the enrollment data since the previous extract(s) are received, only new *current-year* enrollees are sampled from these additional two extracts.

[8] Note that the MCBS surveys beneficiaries living in the community (e.g., households) and living in a facility (e.g., nursing home); however, residence status is not known at the time of sampling and is therefore not included among the MCBS sampling strata.

indicates that the beneficiary is expected to be Hispanic; a value of “no” indicates that the beneficiary is not expected to be Hispanic. (Actual, or self-reported, Hispanic origin status may differ from the ethnicity flag.) Thus, the sample was selected within the strata displayed in Exhibit 3.1.2.

Exhibit 3.1.2: 2018 MCBS Sampling Strata

Hispanic	Non-Hispanic
Under 45 Hispanic	Under 45 non-Hispanic
45 - 64 Hispanic	45 - 64 non-Hispanic
65 - 69 Hispanic	65 - 69 non-Hispanic
70 - 74 Hispanic	70 - 74 non-Hispanic
75 - 79 Hispanic	75 - 79 non-Hispanic
80 - 84 Hispanic	80 - 84 non-Hispanic
85 and over Hispanic	85 and over non-Hispanic

Sampling rates varied by stratum, with the strata containing younger beneficiaries with disabilities (under 45), elderly beneficiaries (85 and over), and Hispanics being oversampled. The MCBS sampling design for an annual panel provides nearly self-weighting (i.e., equal probabilities of selection) samples of beneficiaries within each of the 14 sampling strata.

For the 2018 Panel, the historical target of 11,500 responding beneficiaries across all panels was reduced to 9,467[9] responding beneficiaries across all panels that would comprise the 2021[10] Cost Supplement File. It should be noted that the Hispanic oversample is based on the Survey File counts because it is an annual addition to the fall interview.[11] The reduced targeted annual completed sample size of 9,467 responding beneficiaries with Cost Supplement data is expected to be comprised of approximately 800-900 beneficiaries from each of the under 65 (disability) age groups and approximately 1,500-1,800 beneficiaries from each of the remaining age groups. As a point of reference, the traditional targeted annual completed sample size of 11,500 responding beneficiaries with Cost Supplement data is typically expected to be comprised of approximately 1,000 beneficiaries from each of the under 65 (disability) age groups and approximately 1,800-2,000 beneficiaries from each of the remaining age groups.

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[9] This new target was the maximum number of completed interviews achievable within budget.

[10] The target corresponds to the 2021, rather than the 2018, Cost Supplement File because 2021 is the final year that the 2018 Panel beneficiaries will contribute to a Cost Supplement File. The goal is to start with a large enough sample to achieve, after attrition and deaths, the required number of completes in the panel’s final Cost Supplement year.

[11] While the base sample sizes are calculated with a Cost Supplement File target in mind, the oversamples were calculated based on a Survey File goal. This is because the oversamples are built over time via additional completes from the newest panel each year, which is easiest to enumerate in terms of Survey File yield.

3.2 Selection of MCBS PSUs

The original MCBS PSU sample was selected in 1991 using a sampling frame that was developed using 1980 Census data. In 2001, the set of PSUs was redesigned and reselected. For the redesign, those PSUs in the continental U.S. with at least 224,000 Medicare beneficiaries, according to the June 2000 enrollment data 5-percent file, were included in the sample with certainty. The cutoff of 224,000 corresponds roughly to a probability of selection of 0.75 under a PPS (probability-proportionate-to-size) sample design. The use of the specified cutoff resulted in designating the 28 largest PSUs in the continental U.S. as certainty PSUs. Of these, 27 were also certainties in the original design, and one had been selected as a non-certainty PSU in the original design. In addition, the largest PSU in Puerto Rico (the central part of the San Juan Metropolitan Statistical Area (MSA)) was included in the sample with certainty.

The remaining non-certainty PSUs were grouped by census region and MSA status (where Puerto Rico was treated as a separate "region" for sampling purposes). Within each major group of PSUs, detailed sampling strata were formed by sorting PSUs by the percentage of Medicare beneficiaries enrolled in Health Maintenance Organization (HMO) plans (and in some cases also by the percentage of Medicare beneficiaries who were minorities) and then forming strata of roughly equal size from this sorted list. Thirty-eight non-certainty strata were formed within the continental U.S., and one was formed in Puerto Rico. Two PSUs were then selected from each stratum with probabilities proportionate to size using procedures designed to maximize overlap with the existing MCBS sample. The procedure developed by Ernst (1986)[12] was used for this purpose. In the Ernst approach, each stratum in the new design is treated as a separate linear programming problem, and the optimization of the linear programming problem determines a set of coefficients that are used to select the new sample.

The PSUs are examined periodically for representativeness to the national Medicare population. The most recent analysis was conducted in 2016, and it was determined that a reselection of PSUs was not necessary at that time. In 2017, three Puerto Rico PSUs were removed from the sample, leaving a set of 104 PSUs to be used for sample selection.

3.3 Selection of MCBS SSUs

Prior to 2014, MCBS SSUs were defined as clusters of ZIP Codes and ZIP Code fragments. In 2014, the MCBS SSUs were reselected using census tracts. This change reduces the need for maintenance of SSUs previously required due to the nature of ZIP Code boundary changes and allows for easier merging of MCBS data with U.S. Census Bureau data and other aggregate level geographic or environmental extant data.

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[12] Ernst, L. (1986). Maximizing the overlap between surveys when information is incomplete, *European Journal of Operational Research*, 27, 192-20.

The creation and selection of SSUs involved several steps. First, the enrollment data[13] were geocoded to the tract level. Next, enrollment data counts by tract were used to calculate SSU measures of size. Small tracts were combined to create SSUs that met a minimum measure of size. (The SSUs were sized to provide for a full twenty years of sampling for the MCBS.) Finally, a core sample of 703 SSUs, plus an additional reserve sample of 339 SSUs, were selected from a frame of 24,212 SSUs within the 107 PSUs using systematic probability proportional to size selection. A fixed number of SSUs was selected from each of the 78 non-certainty PSUs (subject to a maximum of six), and the remainder were proportionally allocated to the certainty PSUs (subject to a minimum of six and constrained to an even number).

A total of 703 core SSUs, comprised of 242 SSUs from the certainty PSUs and 461 SSUs from the non-certainty PSUs, were selected in 2014. An additional reserve sample of 339 SSUs (122 from certainty PSUs and 217 from the non-certainty PSUs) was also selected to provide CMS the possibilities to expand the sample or to study special rare populations in future years. As noted above, in 2017, three Puerto Rico PSUs were removed from the sample; correspondingly, 18 SSUs selected from those three PSUs were also removed from the sample, leaving a set of 685 core SSUs to be used for sample selection.

3.4 Selection of Beneficiaries for the 2018 MCBS Panel

The third stage of sampling is the selection of Medicare beneficiaries from within each SSU. In 2015, two major design innovations were introduced at this stage and have been carried forward in the 2018 sample selection. First, current-year Medicare enrollees were eligible to be sampled as part of each new annual panel. Their inclusion will allow for the release of data files up to one year earlier than previously possible.[14] Second, Hispanic beneficiaries were oversampled. These innovations and their implementation in the 2018 sample selection process are discussed in detail below.

3.4.1 Current-Year Enrollee Sample

Historically, to be eligible for sample selection, beneficiaries had to be eligible for Medicare and enrolled by January 1st of the sampling year (*t*), which resulted in the release of data products containing information about the cost and use of health care services (i.e., the Cost Supplement File) in reference year *t* during the middle of the year two years later (year *t* + 2).[15] Such late

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[13] Because the enrollment data are so plentiful and the geocoding process so laborious, only enrollment data records falling into ZIP Codes that overlapped with one of the 107 PSUs were geocoded to the tract level. Then, only those falling into one of the 107 PSUs were kept for the selection of SSUs.

[14] Persons who became eligible for Medicare during 2015, for example, could have incurred health care costs in 2015. By including such persons in the sampling process up to a year earlier than was done previously, they can be appropriately represented in the 2015 Cost Supplement File up to a year earlier. The same is true for all years beyond 2015 as well.

[15] Final versions of Medicare claims for a calendar year are available six months after the start of the subsequent calendar year.

release arose because the year *t* cohort of beneficiaries, which contributes to the cost and use of health care services in reference year *t*, was not even sampled until year *t* + 1 and not initially interviewed until the fall round of year *t* + 1.

Beginning in 2015, the year *t* cohort[16] of beneficiaries (i.e., the set of current-year enrollees) was included in the sampling frame of beneficiaries from which the year *t* panel[17] was selected and resulted in the collection of health care cost and utilization (Cost Supplement File) data for these cases one year earlier than previously possible. This allows for processing of these data to occur one year earlier than under the previous design, and may therefore allow for release of data files up to one year earlier.

The inclusion of the current-year enrollees introduced the need for multiple enrollment data extracts for sampling and multiple sample draws. Because not all 2018 enrollees are included in the enrollment data by the time the initial sampling needs to occur, additional extracts, or "updates" to the original enrollment data extract for the 2018 Panel, were required. The first, and largest, extract, which contained the bulk of the 2018 sampling frame, was delivered by CMS in March of 2018. The majority of the 2018 Panel was selected from this initial extract. Additional enrollment data extracts of 2018 enrollees were delivered in early August and early October 2018, and additional samples of 2018 enrollees were drawn from these extracts. The sampling frame for the 2018 Panel is made up of the beneficiaries in the three extracts falling into the MCBS PSUs and SSUs. A fourth and final extract was delivered in mid-January 2019 and used to fully enumerate the 2018 population of Medicare enrollees. Because data collection had already ended for Fall 2018, no sample was drawn from the January extract; however, the information was used for weights calibration. Please see the coverage analysis discussion later in this section for a detailed description of this extract and the results of the coverage analysis.

Timing of the Interview. Members of the year *t* cohort of beneficiaries sampled under the new design will all be enrolled in Medicare sometime during sampling year *t*. Because these individuals may be more cooperative after they become eligible and have a connection to Medicare, and because the interview is geared toward those who are already enrolled, these sampled individuals are interviewed only after they are enrolled. The majority become eligible and enroll before fall interviewing begins; for those not enrolled until after interviewing begins, an interview is conducted with the sampled beneficiary after he or she enrolls in Medicare (i.e., on or after their enrollment date in the enrollment data).

3.4.2 Hispanic Oversample

Also beginning in 2015, Hispanic beneficiaries living outside of Puerto Rico are oversampled in new panels. Hispanics are identified, and the sampling frame is stratified using a flag provided by CMS based on Census records of Hispanic surnames and other enrollment information, such as

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[16] An annual cohort is the set of beneficiaries who are enrolled in Medicare and appear in the Medicare enrollment data within a given year.

[17] An annual panel is the set of beneficiaries sampled in a given year and initially interviewed in the fall round of that year.

language preference. The Hispanic stratum was oversampled relative to the non-Hispanic stratum. The main goal of the oversampling is to increase the number of beneficiaries of Hispanic, Latino/a, or Spanish origin in the MCBS to allow for precise estimates of health disparities experienced by these populations; this is accomplished by increasing the proportion of MCBS Hispanic beneficiaries from outside Puerto Rico. (Note that beginning with the 2017 Panel, all beneficiaries sampled for the MCBS will be from the continental U.S. and therefore outside of Puerto Rico.) An additional 75 completed interviews with Hispanic beneficiaries were originally targeted annually with the goal of achieving 1,500 annual Hispanic completes across all panels by 2020.

The removal of Puerto Rico from the sampling frame in 2017 substantially reduced the total Hispanic sample in the MCBS. In order to compensate for the removal of the Puerto Rican Hispanics, Hispanics are further oversampled relative to non-Hispanics within the core MCBS sample. A gradual approach to Hispanic oversampling is expected to bring the MBCS Hispanic sample to within its target of 1,500 annual Hispanic completes in the coming years.

3.4.3 Sample Selection Overview

The sample of MCBS beneficiaries was selected using systematic sampling within each PSU, and specifically only within the 685 core SSUs selected within the 104 PSUs. In May 2018, the majority of the 2018 Panel was selected. In August and October, additional small samples of 2018 enrollees were selected using the same sampling rates as for the initial sample. The sample sizes for the 2018 Panel were determined in early Spring 2018 based on the most up-to-date response rates available at that point in time. Reserve sample was also selected as part of the 2018 Panel; however, because it was not used, it will not be enumerated or discussed here.

For the 2018 MCBS Panel, an initial sample of 11,288 beneficiaries (including the Hispanic oversample) was selected in May. In August, an additional 176 current-year enrollees were selected using the sampling rates computed for the first extract and added to the 2018 MCBS Panel. In October, 84 additional current-year enrollees were selected, again using the sampling rates computed for the first extract, and added to the 2018 MCBS Panel. As of October, the 2018 MCBS Panel was complete, with a total of 11,548 beneficiaries (including the Hispanic oversample).

Details of the determination of the sample size, the construction of the sampling frame, and the selection of the sample of beneficiaries for the 2018 MCBS Panel are given below.

3.4.4 Sample Size Determination

The sample size requirements for the 2018 Panel were derived using estimated sample losses due to “immortals,” deaths, and nonresponse. Immortals are defined as:

a) Persons in the CMS sampling frame who enrolled prior to the sampling year and are determined to be deceased at the first or second interview and whose date of death is confirmed by a proxy to be prior to the sampling year but for whom no death is recorded in CMS administrative updates;

b) Persons in the CMS sampling frame who enrolled prior to the sampling year and are determined to be ineligible for Medicare in the first or second interview and whose loss of entitlement is confirmed by the respondent or a proxy to be prior to the sampling year but for whom there is no record of having lost eligibility in CMS administrative updates; or

c) Persons who enrolled prior to the sampling year and died or lost Medicare eligibility prior to the sampling year based on CMS administrative updates.

These three types of immortals all share the characteristic that they would never have been sampled if up-to-date and accurate information on death and eligibility status had been available in the CMS sampling frame at the time of sampling.[18] Sampled beneficiaries who were deceased at the first or second interview and for whom a date of death **after** January 1 of the sampling year (or after the enrollment date, in the case of current-year enrollees) is recorded in CMS administrative updates or obtained from a proxy are "true" deaths, and, unlike the immortals, were alive and eligible for Medicare at the beginning of the sampling year (or as of their enrollment date, for current-year enrollees).[19] The essential difference is that the immortals are not eligible for inclusion in the MCBS, since by definition they could not have incurred any health care costs in the year in which they were sampled.

For sample size determination purposes, death rates,[20] response rates, and immortal rates were computed within each age group.[21] The immortal and death rates used were an average of historical rates and actual rates from Fall 2015, Fall 2016, and Fall 2017. The immortal rates apply to losses in the first fall interview round only. Similarly, the initial losses due to deaths in the sample selection year apply only to the first fall interview round. On the other hand, persons who completed one or more rounds of interviews but who later died in year *t* are eligible for inclusion in the Cost Supplement File covering year *t.* In other words, these later deaths do not necessarily result in a reduction in sample size in the Cost Supplement File corresponding to the year in which the beneficiary died, but do represent losses in the *subsequent* Cost Supplement Files. Thus, the "first-" and "second-year" death rates that were computed for sample design purposes are used to estimate losses in the second and third Cost Supplement Files, respectively, in which a particular panel can appear. Exhibit 3.4.1 below displays the assumed rates used in determining the sample sizes for the MCBS 2018 Panel. These rates were used in each of the Hispanic and non-Hispanic sampling strata within age group.

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[18] Note that members of the 2018 cohort (i.e., 2018 sampled panel members who first became eligible for Medicare during 2018) who died or lost eligibility during the sampling year (i.e., sometime during 2018 after becoming eligible) are not immortals and should still be sampled. These cases contribute to the 2018 Cost Supplement File.

[19] Data for beneficiaries in this group who were newly enrolled (i.e., enrolled during the sampling year) are, in fact, pursued, and proxy interviews are attempted. Their data will be used to aid in imputation of their cost and use data.

[20] Included in the calculation of death rates is a small number of persons who lost Medicare eligibility.

[21] Note that during Fall 2014 (Round 70), a decision was made by CMS to replace any newly sampled (Incoming Panel) beneficiaries found to be incarcerated in the first interview because they would not be eligible for benefits. These numbers are quite small and are currently not significant enough to warrant inclusion in the calculation of the sample size for the annual panel.

Exhibit 3.4.1: Assumed Rates (in Percent) Used in Determining Sample Sizes for the MCBS 2018 Panel, by Age Group

Sampling Rate	**Age Group (as of 12/31/2017)**							
	<45	**45-64**	**65-69**	**70-74**	**75-79**	**80-84**	**85+**	**Total**
Estimated "immortal" rate	0.3	0.2	0.0	0.0	0.0	0.0	0.1	0.1
Estimated selection year death rate	3.0	2.8	1.5	1.7	3.0	4.8	10.4	4.2
Selection year response rate	54.7	61.5	50.1	52.8	55.2	57.8	57.6	55.1
Post-fall round death/loss rate	2.0	0.4	0.0	0.0	0.0	0.0	0.1	0.2
First year response rate	62.6	68.2	70.4	69.8	69.0	68.7	65.0	67.9
Estimated first year death rate	2.1	2.3	1.2	1.8	3.7	5.6	10.8	4.5
Second year response rate	71.4	75.0	75.3	77.5	76.7	75.7	69.4	74.7
Estimated second year death rate	2.7	3.3	1.4	2.4	3.8	6.3	10.9	4.7
Third year response rate	81.6	79.7	85.1	83.8	82.4	79.1	71.4	80.8
Year 1 Retention rate[1]	32.5	40.5	34.7	36.2	37.0	37.8	33.5	35.7
Year 2 Retention rate[2]	69.9	73.2	74.4	76.1	73.9	71.4	61.9	71.3
Year 3 Retention rate[3]	79.4	77.1	83.9	81.8	79.3	74.1	63.6	77.0

SOURCE: 2018 MCBS Internal Sample Control File

[1] The Year 1 Retention rate takes into account the immortal rate, selection year death and response rates, post fall round death/lost entitlement rate, and first year response rate. Year 1 refers to the first year after the selection year.

[2] The Year 2 Retention rate takes into account the Year 1 death rate and the Year 2 response rate. Year 2 refers to the second year after the selection year.

[3] The Year 3 Retention rate takes into account the Year 2 death rate and the Year 3 response rate. Year 3 refers to the third year after the selection year.

The response rate for the selection year used in the sample size calculations (i.e., the proportion of sampled beneficiaries, excluding deaths and immortals, who complete the initial fall interview) was assumed to be 55 percent for the 2018, 2019, and 2020 Panels. This assumption is based on historical rates. The response rate for the first year in the survey (i.e., the proportion of persons completing the initial fall interview who provide substantially complete data for the first Cost Supplement File to which they contribute), the second year in the survey (i.e., the proportion of living respondents in the first Cost Supplement File who also provide substantially complete data for the second Cost Supplement File), and the third year in the survey (i.e., the proportion of living respondents in the second Cost Supplement File who also provide substantially complete data for the third Cost Supplement File) were based on averages of corresponding rates from 2015, 2016, and 2017.

The sample size projections also included adjustments to account for movement of beneficiaries from one age category to the next over the course of three years in the study. This adjustment affects primarily the youngest age category (under 45 years), the oldest age category (85 years or older), and the 65 to 69 year-old age category. As the panel ages, the oldest beneficiaries in the under 45 age category will move to the next age category, and there will be no migration into the under 45 age category. On the other hand, there will not be any migration out of the oldest age category (85 years or older), while about 19 to 20 percent of the beneficiaries from the 80 to 84 age group will move into this age group after one year. The 65 to 69 year-old age category will also be affected as the migration into this category from the 45 to 64 year-old age category will be less (about 7 percent) than the migration out of this category (about 19 to 25 percent) every year. The remaining age categories (45 to 64, 70 to 74, 75 to 79, and 80 to 84) are not affected as much since the migration in and out of these categories occurs at approximately the same rate.

The sample size target (including the Hispanic oversample) for the 2018 Panel was determined to be 11,564 beneficiaries. Exhibit 3.4.2 displays the initial sample size planning numbers and resulting projected Survey File completed interviews in 2018 and projected Cost Supplement File completed interviews in 2019, 2020, and 2021.

Exhibit 3.4.2: 2018 Fall Planning Sample Sizes and Resulting Projected Survey File and Cost Supplement File Estimates, by Age Group, Including Recent Enrollees and Hispanic Oversample

Age Category	Number Sampled for 2018 Panel: Fall 2018	Expected Total Survey File Completes from All Panels: 2018 Annual Estimates
<45	1,200	1,423
45-64	843	1,025
65-69	2,235	2,620
70-74	1,610	1,881
75-79	1,748	2,203
80-84	1,838	2,246
85+	2,090	2,524
Total	11,564	13,923

Age Category	Projected Total Cost Supplement File Completes from All Panels: 2018 Annual Estimates	Projected Total Cost Supplement File Completes from All Panels: 2019 Annual Estimates
<45	730	757
45-64	526	662
65-69	1,462	1,546
70-74	969	1,189
75-79	1,137	1,248
80-84	1,136	1,292
85+	1,128	1,367
Total	7,087	8,062

Age Category	Projected Total Cost Supplement File Completes from All Panels: 2020 Annual Estimates	Projected Total Cost Supplement File Completes from All Panels: 2021 Annual Estimates
<45	788	848
45-64	739	819
65-69	1,625	1,696
70-74	1,361	1,482
75-79	1,379	1,490
80-84	1,417	1,532
85+	1,472	1,601
Total	8,781	9,467

SOURCE: 2018 MCBS Internal Sample Control File

3.4.5 2018 Sampling Frame

As described earlier, the inclusion of current-year enrollees in the sampling frame requires additional steps to be taken in the building of the frame and sampling of beneficiaries from the frame because not all year *t* enrollees are included in the enrollment data by the spring of year *t*, when initial sampling operations occur. Instead, year *t* enrollees are added to the enrollment data in two distinct manners. First, beneficiaries who will be automatically enrolled in Medicare appear in the enrollment data up to four months prior to their automatic enrollment. Second, beneficiaries can self-enroll within a seven-month window comprised of the three months prior to their 65th birthday month, their 65th birthday month, and the three months following their 65th birthday month. Those who self-enroll typically appear in the enrollment data within a month after their enrollment in Medicare. Thus, someone enrolling in December 2018 may not appear in the enrollment data until January 2019.

In March 2018, when the first enrollment data extract was pulled to facilitate sampling for the fall round, only a portion of the current-year enrollees were included in the enrollment data. Beneficiaries who enrolled prior to March 1 of year *t* or who were automatically enrolled within four months of March (i.e., by July 1 of year *t*) were included in the enrollment data extract. However, any beneficiary who self-enrolled on or after March 1 or was automatically enrolled after July 1 of year *t* did not yet appear in the enrollment data. Thus, multiple enrollment data extracts were required to facilitate sampling of the full year *t* cohort.

Two additional enrollment data extracts are pulled each year and contribute to the year *t* sampling frame: (1) an extract in August, which contains additional self-enrollees through August 1 of year *t* and scheduled automatic enrollees through December 1 of year *t*; and (2) an extract in early October, which contains additional self-enrollees through October 1 of year *t* and scheduled automatic enrollees through December 31 of year *t*. The October extract is scheduled for the latest date possible to facilitate sampling and fielding in year *t*; however, it leaves a slight under-coverage of any self-enrollees between October 2 and December 31 of year *t*. A final extract is pulled in mid-January of year *t+1* to identify this under-coverage and account for it in weighting adjustments.

For the 2018 MCBS Panel, the first, or initial, extract of the enrollment data, delivered in March, included:

- Beneficiaries who were first eligible for Medicare before January 1, 2018 and still alive and eligible on January 1, 2018; and
- Beneficiaries who were first eligible for Medicare between January 1, 2018 and March 1, 2018 (inclusive), or who would be automatically enrolled in Medicare between March 2, 2018 and July 1, 2018 (inclusive), regardless of vital status.

To avoid duplication across the various panels of MCBS beneficiaries, a unique and disjoint 5-percent sample of the enrollment data[22] is specified annually by CMS, and a subset (based on the eligibility and mortality selection criteria listed above, as well as other data quality checks) is

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[22] The enrollment data include over 100,000,000 beneficiaries.

specified for the MCBS for use in sampling beneficiaries for the annual panels. This is referred to as the 2018 enrollment data subsample.

CMS subset each of its enrollment data extracts as described above, keeping only beneficiaries meeting the criteria for the 2018 enrollment data subsample. These enrollment data subsample extracts are further subset to include only beneficiaries falling within the 685 selected MCBS SSUs. Exhibit 3.4.3 shows the number of beneficiaries by sampling stratum (age group by ethnicity) in the three 2018 enrollment data subsample extracts and the resulting 2018 sampling frame. Of the 3,054,375 beneficiaries in the combined 2018 enrollment data subsample extracts, a total of 46,633 beneficiaries fell within the selected MCBS PSUs and SSUs and were eligible for sampling in 2018.

Exhibit 3.4.3: Number of Beneficiaries in 2018 Enrollment Data Subsample Extracts (Combined) and 2018 Sampling Frame, by Stratum

Stratum	Age Group/ Ethnicity	Three Extracts Combined	2018 Sampling Frame
1	<45, Hispanic	9,374	115
2	45-64, Hispanic	30,404	428
3	65-69, Hispanic	45,351	586
4	70-74, Hispanic	53,012	727
5	75-79, Hispanic	35,779	477
6	80-84, Hispanic	23,931	300
7	85+, Hispanic	23,751	267
8	<45, non-Hispanic	80,215	1,252
9	45-64, non-Hispanic	314,769	4,923
10	65-69, non-Hispanic	753,580	11,280
11	70-74, non-Hispanic	629,371	9,712
12	75-79, non-Hispanic	437,378	7,107
13	80-84, non-Hispanic	291,121	4,520
14	85+, non-Hispanic	326,339	4,939
Total		3,054,375	46,633

SOURCE: 2018 MCBS Internal Sample Control File

Using the initial 2018 enrollment data subsample extract in combination with previous annual enrollment data subsamples, the size of the total 2018 enrollment data subsample (containing all projected 2018 Medicare enrollees, through December 31, 2018, that would be available for sampling) could be forecast at the time of initial sampling (May 2018). This forecast was used to determine how much of the current-year enrollee sample was expected to be selected from the first extract and how much would be expected to be drawn from future extracts, and to determine the sampling fractions for beneficiaries.

A final enrollment data subsample extract was provided in mid-January 2019 and used to fully enumerate the 2018 cohort to (a) inform undercoverage of the 2018 sampling frame, and (b) contribute to weighting adjustments to account for this undercoverage. Results of these analyses are provided in the Coverage Analysis section below.

3.4.6 Sample Selection for the 2018 Panel

The goal for the 2018 Panel was to select a sample of 11,564 beneficiaries with targeted oversamples in the 64 and younger and 85 and over age groups; this sample also includes an oversample of Hispanic beneficiaries targeted to continue to compensate for the loss of Hispanic beneficiaries resulting from the removal of the Puerto Rico PSUs in 2017 as well as to yield interviews with 75 additional true (self-reported) Hispanic beneficiaries in 2018.

Sampling Fractions. As discussed earlier, the Hispanic flag provided by CMS and used for sampling is imperfect. Some cases flagged as Hispanic do not self-report as Hispanic, and others flagged as non-Hispanic actually self-report as Hispanic. The sampling fractions for the Hispanic and non-Hispanic strata, therefore, were jointly determined to compensate for the misclassification errors inherent in the Hispanic flag to achieve the required sample sizes of self-reported Hispanic and non-Hispanic beneficiaries. The sampling fractions for the MCBS were completed at the national level within the 14 strata (seven age groups by the Hispanic/non-Hispanic flag).

Probabilities of Selection. The probabilities of selection for beneficiaries were then computed. Let f_{1a} be the national sampling fraction for the Hispanic stratum in age group a, and let f_{-1a} be the national sampling fraction for the non-Hispanic stratum in age group a. The inclusion probability for the i-th PSU is denoted by π_i and the conditional inclusion probability for the j-th SSU given the i-th PSU is $\pi_{j|i}$. Thus, the conditional probability of selection for beneficiary k in the Hispanic stratum in age group a given PSU i and SSU j is

$$\rho_{1ak|ij} = \min\left(1, \frac{f_{1a}}{\pi_i \pi_{j|i}}\right), \quad a = 1, \dots, 7,$$

and for non-Hispanic beneficiary k in the non-Hispanic stratum in age group a given PSU i and SSU j is

$$\rho_{-1ak|ij} = \min\left(1, \frac{f_{-1a}}{\pi_i \pi_{j|i}}\right), \quad a = 1, \dots, 7.$$

Actual sample sizes can fall short of expectations when SSUs actually contain fewer beneficiaries in the enrollment data subsample extract than what is called for by the initial national sampling fractions. To avoid a shortfall, the initial sampling fractions must be adjusted and the conditional probabilities $\rho_{1ak|ij}$ and $\rho_{-1ak|ij}$ recomputed. Within each stratum, the cumulative sums of the probabilities of selection were formed. In an iterative process, the initial national sampling fractions were repeatedly adjusted until the cumulative sums were as close as possible to the final targeted sample sizes. Exhibit 3.4.4 displays the final sampling fractions used for calculating probabilities of selection, by stratum, for the 2018 Panel.

Exhibit 3.4.4: 2018 MCBS Panel, Final Sampling Fractions by Stratum

Stratum	Age Group / Ethnicity	Final Sampling Fraction, in Percent
1	<45, Hispanic	1.2269
2	45-64, Hispanic	0.4771
3	65-69, Hispanic	0.7093
4	70-74, Hispanic	0.3726
5	75-79, Hispanic	0.6932
6	80-84, Hispanic	1.3248
7	85+, Hispanic	2.6655
8	<45, non-Hispanic	1.9874
9	45-64, non-Hispanic	0.2532
10	65-69, non-Hispanic	0.2879
11	70-74, non-Hispanic	0.2491
12	75-79, non-Hispanic	0.3729
13	80-84, non-Hispanic	0.6103
14	85+, non-Hispanic	0.6385
Total		0.4485

SOURCE: 2018 MCBS Internal Sample Control File

Selection of the 2018 Panel. The 2018 Panel was drawn by systematic random sampling with probability proportional to the conditional probabilities of selection with an independently selected random start within each PSU. Beneficiaries were ordered within each PSU by age group, SSU (to approximate geographic serpentine sorting), ethnicity flag, and extract.[23] There were 1,294 beneficiaries with a conditional probability of selection equal to 1. These beneficiaries were selected with certainty, given the selection of their PSUs and SSUs.

3.4.7 Sampling Results

Exhibit 3.4.5 below shows the number of selected beneficiaries within each age group, and Exhibit 3.4.6 shows the number of selected beneficiaries within each stratum. These tables present the total number of beneficiaries in the 2018 Panel, including the Hispanic oversample.

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[23] The second extract was added to the end of the first extract, in the same sort order, and the systematic selection was continued into the range of newly enrolled beneficiaries. The same process was used for the third extract.

Exhibit 3.4.5: 2018 MCBS Panel, Number of Beneficiaries Selected by Age Group

Age Group (as of December 31, 2018)	Total Selected Beneficiaries
<45	1,184
45-64	864
65-69	2,217
70-74	1,609
75-79	1,747
80-84	1,837
85+	2,090
Total	11,548

SOURCE: 2018 MCBS Internal Sample Control File

Exhibit 3.4.6: 2018 MCBS Panel, Number of Beneficiaries Selected by Stratum

Stratum	Age Group/Ethnicity	Total Selected Beneficiaries
1	<45, Hispanic	115
2	45-64, Hispanic	122
3	65-69, Hispanic	253
4	70-74, Hispanic	182
5	75-79, Hispanic	198
6	80-84, Hispanic	208
7	85+, Hispanic	237
8	<45, non-Hispanic	1,069
9	45-64, non-Hispanic	742
10	65-69, non-Hispanic	1,964
11	70-74, non-Hispanic	1,427
12	75-79, non-Hispanic	1,549
13	80-84, non-Hispanic	1,629
14	85+, non-Hispanic	1,853
Total		11,548

SOURCE: 2018 MCBS Internal Sample Control File

The number of current-year enrollees (those who enrolled in 2018) selected into the 2018 Panel (including the Hispanic oversample) is displayed in Exhibit 3.4.7 below.

Exhibit 3.4.7: 2018 MCBS Panel, Number of Current-Year Enrollees Selected by Age Group

Age Group	Initial Extract	Three Extracts Combined
<45	33	80
45-64	21	45
65-69	129	318
Total	183	443

SOURCE: 2018 MCBS Internal Sample Control File

Several quality checks were performed after sample selection. These included the comparison of the weighted 2018 enrollment data subsample extract counts (combining all three extracts) with the corresponding weighted counts for the selected sample as well as the distributions of selected beneficiaries by PSU and SSU.

3.4.8 Coverage Analysis of the 2018 Sampling Frame

As discussed above, a final enrollment data 5-percent file extract was provided in mid-January 2019. This extract was used to fully enumerate the 2018 cohort to (a) inform undercoverage of the 2018 sampling frame, and (b) contribute to weighting adjustments to account for this undercoverage. The results of the analysis of this extract are given in this section.

Coverage Analysis. The fourth enrollment data subsample extract, along with the first three extracts, was used to fully enumerate both the 2018 enrollment data subsample and the 2018 MCBS population. In order to construct the full 2018 enrollment data subsample, all records of eligible beneficiaries enrolled through December 31, 2018, from the four extracts were combined. From that universe, the 2018 MCBS population was constructed by retaining only beneficiaries falling into the MCBS PSUs and SSUs. Including the fourth extract, which contains beneficiaries who were automatically enrolled or self-enrolled through the end of 2018, ensures that all eligible beneficiaries, particularly current-year enrollees who were not included in the first three extracts, are included in the final population. Thus, the final 2018 MCBS population includes all beneficiaries who were enrolled in Medicare in 2018 and reside in the MCBS PSUs and SSUs.

Exhibit 3.4.8 displays the full 2018 enrollment data subsample and the estimated 2018 eligible U.S. Medicare population, by stratum. This table builds on Exhibit 3.4.4, which displayed the 2018 enrollment data subsample file through the third extract.

The fourth enrollment data subsample extract is smaller in size than the third extract, at approximately 20,000 beneficiaries overall (compared to approximately 31,000). Further, the number of cases from the fourth extract falling into the MCBS PSUs and SSUs is also smaller than those in the third extract (333 in the fourth extract versus 489 in the third extract). Overall, the fourth extract accounts for 0.8 percent of the total 2018 MCBS population. While the cases included in the fourth extract consist exclusively of new enrollees, the exclusion of this extract from the frame could lead to imbalances in the representativeness of the sample. However, because the final extract accounts for such a small proportion of the overall population, it was expected to have minimal impact on the representativeness of the 2018 Panel. Any imbalance will be accounted for in adjustments made to the weights, discussed in Chapter 8.

Exhibit 3.4.8: Number of Beneficiaries in 2018 Enrollment Data Subsample and Estimated 2018 MCBS Population, by Stratum

Stratum	Age Group / Ethnicity	Beneficiaries in Four Enrollment Data Extracts Combined	Estimated Beneficiaries in Full U.S. Medicare Population
1	<45, Hispanic	9,414	188,280
2	45-64, Hispanic	30,538	610,760
3	65-69, Hispanic	46,635	932,700
4	70-74, Hispanic	53,107	1,062,140
5	75-79, Hispanic	35,809	716,180
6	80-84, Hispanic	23,950	479,000
7	85+, Hispanic	23,762	475,240
8	<45, non-Hispanic	80,655	1,613,100
9	45-64, non-Hispanic	316,096	6,321,920
10	65-69, non-Hispanic	773,878	15,477,560
11	70-74, non-Hispanic	629,766	12,595,320
12	75-79, non-Hispanic	437,484	8,749,680
13	80-84, non-Hispanic	291,170	5,823,400
14	85+, non-Hispanic	326,360	6,527,200
Total		3,078,624	61,572,480

SOURCE: 2018 MCBS Internal Sample Control File

Exhibit 3.4.9 compares the original forecast of the full sampling[24] 2018 enrollment data subsample, including all cases expected to be in the enrollment data through the end of the 2018 and available for sampling, to the actual count of beneficiaries in the combined three enrollment data subsample extracts. As described above, the forecast was used to develop sampling fractions for use in the selection of the 2018 MCBS Panel sample. The comparisons in Exhibit 3.4.9 are given by stratum and overall. The counts are quite close; the total actual overall count is only slightly higher than the forecast (3,054,375 actual versus 3,053,167 forecast beneficiaries), and the differences by stratum are small.

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[24] This includes the first three extracts of the 2018 enrollment data. Because we only sample from the first three extracts, our forecast only projects to the three-extract total. This allows for the highest degree of accuracy in the construction of sampling fractions.

Exhibit 3.4.9: Forecast Compared to Actual Beneficiaries in Full Sampling 2018 Enrollment Data Subsample, by Stratum

Stratum	Age Group/Ethnicity	Forecast[1] of Beneficiaries in Full 2018 Enrollment Data Subsample	Actual[2] Beneficiaries in Full 2018 Enrollment Data Subsample
1	<45, Hispanic	9,374	9,374
2	45-64, Hispanic	30,398	30,404
3	65-69, Hispanic	45,361	45,351
4	70-74, Hispanic	53,012	53,012
5	75-79, Hispanic	35,778	35,779
6	80-84, Hispanic	23,928	23,931
7	85+, Hispanic	23,748	23,751
8	<45, non-Hispanic	80,128	80,215
9	45-64, non-Hispanic	314,518	314,769
10	65-69, non-Hispanic	752,838	753,580
11	70-74, non-Hispanic	629,314	629,371
12	75-79, non-Hispanic	437,369	437,378
13	80-84, non-Hispanic	291,099	291,121
14	85+, non-Hispanic	326,303	326,339
Total		3,053,167	3,054,375

SOURCE: 2018 MCBS Internal Sample Control File

NOTE: The Full 2018 Enrollment Data Subsample in this table includes all current-year enrollees through December 31, 2018 that were available for sampling through the end of 2018 (i.e., all beneficiaries included in the first three enrollment data extracts).

[1] Forecast was calculated at the time of sampling (May 2018) and includes projected beneficiaries in the first three enrollment data extracts.

[2] Actual counts based on enrollment data records received for 2018 in the first three enrollment data extracts, but excluding those in final extract delivered in January 2019.

3.5 Continuing Sample (2014-2017 Panels)

Each Continuing Panel is fielded, along with the newly selected Incoming Panel, according to its rotation schedule. Panels are fielded for a total of 11 rounds, starting in the fall round of the year the panel is selected. In Winter 2018, the 2014 Panel completed its 11th and final round, the 2015 Panel was in its 8th round of participation, the 2016 Panel was in its 5th round, and the 2017 Panel was in its 2nd round.

3.6 Fielded Sample Sizes by Panel and Round

During 2018, sampled beneficiaries were interviewed during three rounds: a winter round, a summer round, and a fall round. As mentioned earlier, during Winter 2018, the 2014 Panel was interviewed for its final time, and in Fall 2018, the 2018 Panel was interviewed for its first time. The fielded sample sizes,[25] by panel, for each round are given in Exhibit 3.6.1.

Exhibit 3.6.1: 2018 Fielded Sample Sizes by Round for Each Panel

Round	Panel	Fielded Sample Sizes
Winter 2018	2014	2,581
	2015	2,054
	2016	3,809
	2017	6,188
	All	14,632
Summer 2018	2015	2,017
	2016	3,614
	2017	5,074
	All	10,705
Fall 2018	2015	1,931
	2016	3,329
	2017	4,402
	2018	11,283
	All	20,945

SOURCE: 2018 MCBS Internal Sample Control File

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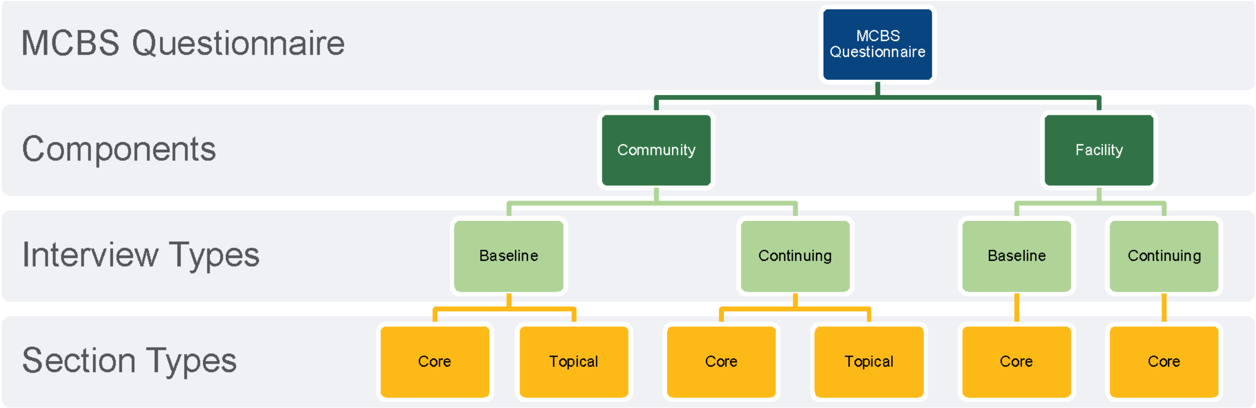
[25] Note that these are not the original sample sizes when the panel was selected (except in the case of the 2018 Panel), but the sample remaining in the round, less attrited beneficiaries and other sample losses, that are fielded in that round.

4. INSTRUMENT AND MATERIALS DESIGN

The MCBS Questionnaire structure features two components (Community and Facility), administered based on the beneficiary's residence status. Within each component, the flow and content of the questionnaire varies by interview type and data collection season (fall, winter, or summer). There are two types of interviews (Baseline and Continuing) containing two types of questionnaire sections (Core and Topical). The beneficiary's residence status determines which questionnaire component is used and how it is administered. Questionnaire items often ask respondents to recall events or experiences during a certain time period. A reference period is the timeframe to which a questionnaire item refers. See Exhibit 4.1 for a depiction of the MCBS Questionnaire structure.

- Community Component: Survey of beneficiaries living in the community at the time of the interview (i.e., their residence or a household). An interview may be conducted with the beneficiary or a proxy.
- Facility Component: Survey of respondents living in facilities, such as long-term care nursing homes or other institutions, during the reference period covered by the MCBS interview. Interviewers conduct the Facility component with staff members located at the facility (i.e., facility respondents); beneficiaries are not interviewed if they reside at a facility.

Exhibit 4.1: MCBS Questionnaire Overview



Interviews are conducted in one or both components in a given data collection round, depending on the beneficiary's living situation. Procedures for these "crossover" interviews (where the beneficiary moves from one component to another) are described in Section 6.2.

Within each component, there are two types of interviews – a Baseline interview and a Continuing interview.

- Baseline: The initial questionnaire administered to beneficiaries new to the study; administered in the fall of the year they are selected into the sample (interview #1).

- Continuing: The questionnaire administered to beneficiaries as they progress through the study (interviews #2-11).

MCBS uses dependent interviewing to ensure that the flow of the interview takes into account known and previously reported information, such as beneficiary sex, health insurance coverage, health status, and conditions. Dependent interviewing based on preloaded data is especially important for the design and flow of the Continuing questionnaire. This allows for a more streamlined interview by prompting the respondent for confirmation of previously-reported information, and for more complex queries to be crafted that address a beneficiary's particular situation. Section 7.2 describes the role of preloads in dependent interviewing in more detail.

Depending on the interview type and data collection season (fall, winter, or summer), the MCBS Questionnaire includes Core and Topical sections. See Exhibits 4.1.4 and 4.1.6 for tables of the 2018 Core and Topical sections.

Data collected by the Community and Facility components are released to users via two primary limited data sets (LDS) – the Survey File and the Cost Supplement File. The Survey File includes data collected via Core and Topical sections related to beneficiaries' access to care, health status, and other information regarding beneficiaries' knowledge, attitudes towards, and satisfaction with their health care. This file also contains demographic data and information on all types of health insurance coverage. The Cost Supplement File delivers information collected via Core sections on the use and costs of health care services as well as information on supplementary health insurance, living arrangements, income, health status, and physical functioning.

4.1 Community Questionnaire Content

The section that follows provides an overview of the Community component of the MCBS questionnaire. The actual content administered varies based upon several factors, including the questionnaire administration season or round, the type of interview which reflects the length of time the respondent has been in the MCBS, and the component of the most recent interview.

4.1.1 Interview Type

As MCBS is a panel survey, the type of interview a given beneficiary is eligible for depends on his or her status in the most recent round of data collection. Interview type (also referred to in this report by its Community Questionnaire variable name, INTTYPE) is a key determinant of the path followed through the Community Questionnaire. For example, the Baseline interview is an abbreviated interview that includes many Core and Topical sections but does not include questionnaire sections that collect health care utilization and cost information. For the purposes of administering the Community Questionnaire, there are eight interview types, summarized in Exhibit 4.1.1 below. Several of these interview types are applicable only in a certain season. For example, the Baseline interview (INTTYPE C003) is always conducted in the fall.

Exhibit 4.1.1: Community Questionnaire Interview Types

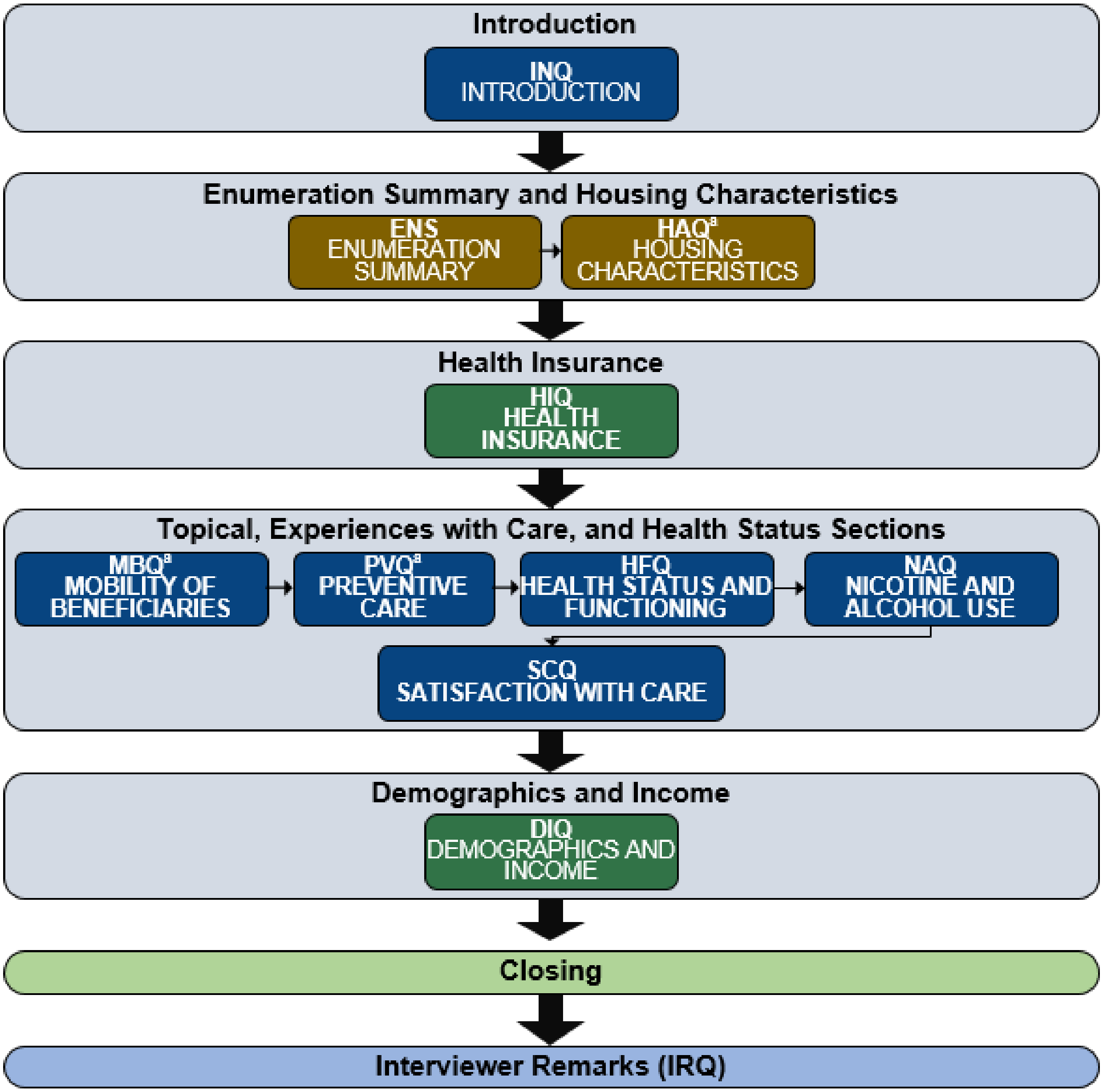
INTTYPE*	Description	Seasons
C001	Standard Continuing interview, meaning the most recent interview was in the community during the last round.	All
C002	New from facility, meaning the most recent interview was in a facility. No prior Community interview.	All
C003	Baseline interview. First round in the sample.	Fall
C004	Standard community "holdover," meaning the last round interview was skipped. Most recent interview was in the community.	All
C005	Facility "crossover," meaning the most recent interview was in a facility. Last Community interview was two rounds ago.	All
C006	Facility "crossover," meaning the most recent interview was in a facility. Last Community interview was three or more rounds ago.	All
C007	Second round interview. Most recent interview was the fall Baseline interview. The second round interview is the first time utilization and cost data are collected.	Winter
C010	Second round "holdover," meaning the winter interview was skipped. Most recent interview was the fall Baseline interview. The third round interview is the first time in which utilization and cost data are collected.	Summer

*Interview types for exit panel Community cases in the summer round (INTTYPEs C008 and C009) were removed from the questionnaire specifications in 2018.

4.1.2 Community Questionnaire Flow

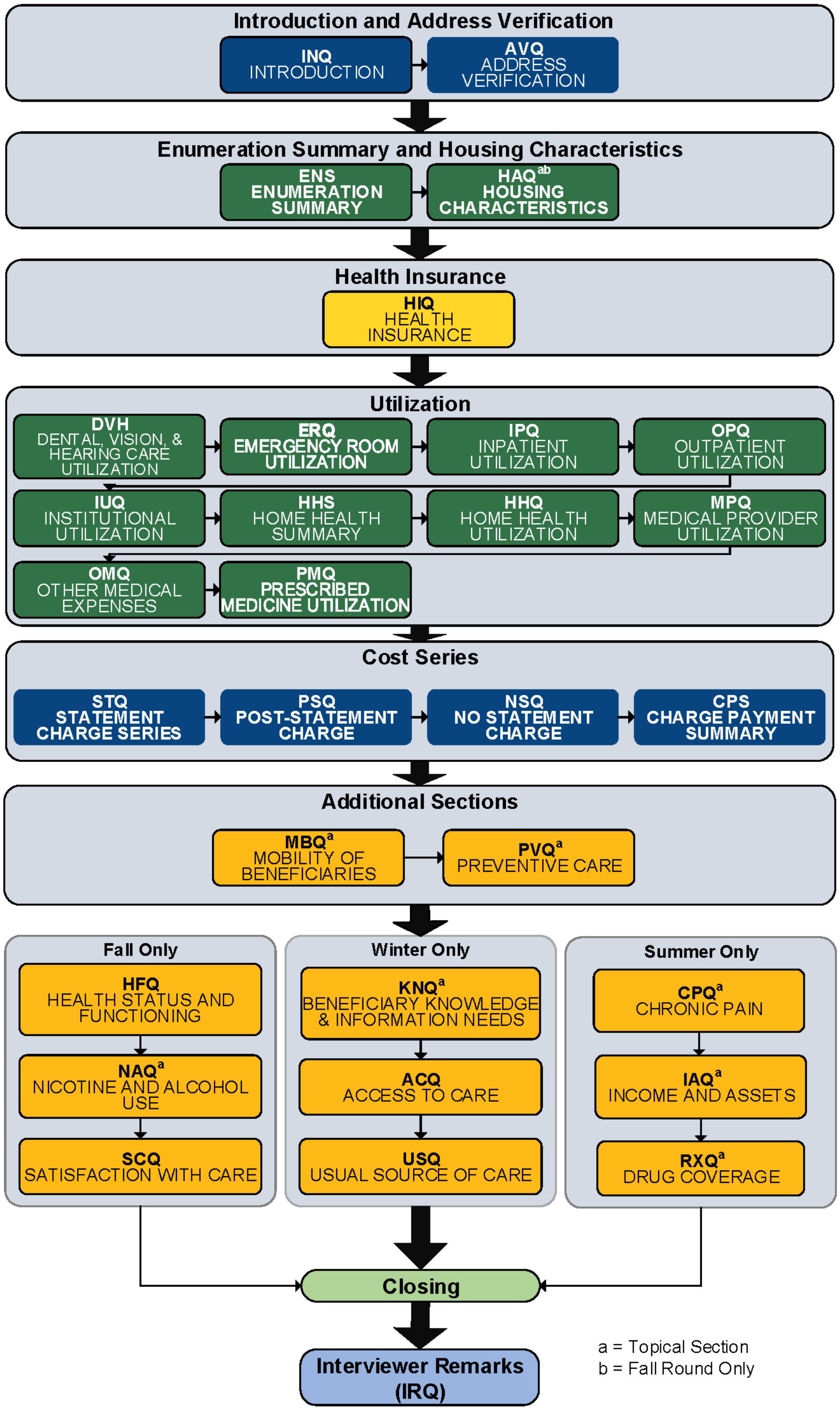
Interview type and data collection season (fall, winter, or summer) are the two main factors that determine the specific sections included in a given interview. Further factors include whether the interview is conducted with the beneficiary or with a proxy and, for proxy interviews, whether the beneficiary is living or deceased. The Baseline interview contains an abbreviated flow which does not include the utilization or cost sections of the questionnaire. Exhibit 4.1.2 shows the flow for the Baseline interview. Exhibit 4.1.3 shows the most common Community Questionnaire flow for standard Community Continuing sample.

Exhibit 4.1.2: 2018 MCBS Community Questionnaire Flow for Baseline Interview



a = Topical Section

Exhibit 4.1.3: 2018 MCBS Community Questionnaire Flow for Continuing Interview



4.1.3 Core Section Content

Core survey content is grouped into questionnaire sections that collect data central to the policy goals of the MCBS. These sections collect information related to socio-demographics, health insurance coverage, health care utilization and costs, beneficiary health status, and experiences with care, as well as operational and procedural data. Data from these questionnaire sections are found on the Survey File and Cost Supplement File data releases. Many of the Core sections are administered each round. The following pages describe Core sections of the Community Questionnaire, organized by topic of information collected. Exhibit 4.1.4 lists six questionnaire section groups along of the Core sections of the Community Questionnaire along with the data file they inform and the seasons in which they were collected.

A. Socio-Demographics

Two sections in the Community Questionnaire capture key socio-demographic characteristics of the beneficiary. The Demographics and Income section is administered for each Community beneficiary once during the Baseline interview. Income and Assets is administered to all Continuing beneficiaries once per year.

The **Demographics and Income (DIQ)** section includes traditional demographic items such as Hispanic origin, race, English proficiency, education, and total household income. This section is administered during the Baseline interview.

Income and Assets (IAQ) collects detailed information about income and assets of the beneficiary and spouse or partner (if applicable). IAQ covers beneficiary (and spouse/partner) income from employment, Social Security, Veteran's Administration, and pensions. The respondent is also asked to indicate the value of the beneficiary's (and spouse's/partner's) assets including retirement accounts, stocks, bonds, mutual funds, savings accounts, businesses, land or rental properties, and automobiles. Also included is homeownership or rental status, and food security items. The Income and Assets section is asked in the summer round to collect income and asset information about the previous calendar year. The Income section collected in the Summer of 2019 asked about income and assets for the 2018 calendar year.

Exhibit 4.1.4: 2018 MCBS Community Core Sections by Data File and Administration Schedule

Section Group	Abbr.	Section Name	LDS§	Data Collection Schedule
Socio-Demographics	IAQ	Income and Assets	SF	Summer 2019**
	DIQ	Demographics/Income	SF	Fall 2018, Baseline Interview
Health Insurance	HIQ	Health Insurance	SF	All Seasons
Utilization	DUQ	Dental Utilization	CS	All Seasons
	ERQ	Emergency Room Utilization	CS	All Seasons
	IPQ	Inpatient Hospital Utilization	CS	All Seasons
	OPQ	Outpatient Hospital Utilization	CS	All Seasons
	IUQ	Institutional Utilization	CS	All Seasons
	HHS	Home Health Summary±	CS	All Seasons
	HHQ	Home Health Utilization	CS	All Seasons
	MPQ	Medical Provider Utilization	CS	All Seasons
	OMQ	Other Medical Expenses Utilization	CS	All Seasons
	PMQ	Prescribed Medicine Utilization	CS	All Seasons
Cost	STQ	Statement Cost Series	CS	All Seasons
	PSQ	Post-Statement Charge	CS	All Seasons
	NSQ	No Statement Charge	CS	All Seasons
	CPS	Charge Payment Summary±	CS	All Seasons
Experiences with Care	ACQ	Access to Care	SF	Winter 2019**
	SCQ	Satisfaction with Care	SF	Fall 2018
	USQ	Usual Source of Care	SF	Winter 2019**
Health Status	HFQ	Health Status and Functioning	SF	Fall 2018

SOURCE: MCBS Community Questionnaire

*Certain procedural or operational management sections are collected specifically to manage the data collection process. These sections are not directly included in the LDS files (e.g., Introduction (INQ), Enumeration (ENS), and Interview Remarks (IRQ)).

**These sections are administered in the summer or winter rounds following the current data year given that the reference period is the prior year and data are included in the prior year data files.

±Summary sections: Updates and corrections are collected through the summary sections. The respondent is asked to verify summary information gathered in previous interviews. Changes are recorded if the respondent reports information that differs from what was previously recorded.

§ Limited Data Set (LDS) indicates the file where the questionnaire data appears (i.e., SF = Survey File, CS = Cost Supplement File).

B. Health Insurance

The Community Questionnaire captures health insurance information each round.

Health Insurance (HIQ) records all health insurance plans that the beneficiary has had since the beginning of the reference period. The survey prompts for coverage under each of the following types of plans: Medicare Advantage, Medicaid, Tricare, non-Medicare public plans, Medicare Prescription Drug Plans, and private (e.g., Medigap or supplemental) insurance plans. Detailed questions about coverage, costs, and payment are included for Medicare Advantage, Medicare Prescription Drug, and private insurance plans.

C. Utilization

The utilization sections of the questionnaire capture health care use by category. Generally, four types of health care utilization are recorded: provider service visits, home health care, other medical expenses, and prescribed medicines. Provider service visits include visits to dental providers, emergency rooms, inpatient and outpatient hospital departments, institutional stays, and medical providers. In these sections, visits are reported as unique events by date, although in cases where there are more than five visits to a single provider during the reference period, the events are entered by month with the number of visits specified. A slightly different reporting structure is used for home health care, other medical expenses, and prescribed medicines.

All utilization sections are administered in all Community Continuing interviews; these sections are not part of the Incoming Panel's Baseline interview. Additional detail is provided on each of the four types of health care utilization collected by the Community Questionnaire below.

Provider Service Visits

The utilization sections collecting provider service dates are as follows.

Dental Utilization (DUQ) collects information about dental visits during the reference period. DUQ collects the name and type of dental providers, dates of visits, services performed, and medicines prescribed during the visits.

Emergency Room Utilization (ERQ) records visits to hospital emergency rooms during the reference period. ERQ collects the names of the hospitals, dates of visits, whether the visit was associated with a particular condition, and medicines prescribed during the visits. If a reported emergency department visit resulted in hospital admission, an inpatient visit event is created, with follow up questions asked in the Inpatient Utilization section.

Inpatient Utilization (IPQ) collects information about inpatient stays during the reference period. IPQ collects the names of the hospitals, beginning and end dates of the stays, whether surgery was performed, whether the visit was associated with a particular condition, and medicines prescribed to be filled upon discharge from the hospital (medicines administered during the stay are not listed separately). Inpatient stays resulting from emergency room admissions are also covered.

Outpatient Hospital Utilization (OPQ) prompts for visits that the beneficiary may have made to hospital outpatient departments or clinics during the reference period. OPQ collects the name of the outpatient facility, dates of visits, whether surgery was performed, whether the visit was associated with a particular condition, and medicines prescribed during the visits.

Institutional Utilization (IUQ) collects information about stays in nursing homes or any similar facility during the reference period. IUQ collects the name of the institution(s) and the dates the beneficiary was admitted and discharged from the institution(s).

Medical Provider Utilization (MPQ) collects information about medical provider visits during the reference period. In addition to physicians and primary care providers, this includes visits with health practitioners that are not medical doctors (acupuncturists, audiologists, optometrists, chiropractors, podiatrists, homeopaths, naturopaths), mental health professionals, therapists (including speech, respiratory, occupational, and physical therapists), and other medical persons (nurses, nurse practitioners, paramedics, and physician's assistants). MPQ collects names and types of providers, dates, whether the visit is associated with a particular condition, and medicines prescribed during the visit.

Home Health Care Visits

A second type of health care utilization captured by the Community Questionnaire is home health care visits. For Continuing beneficiaries who reported home health events during the prior round, **Home Health Summary (HHS)** reviews those providers and confirms whether the same providers were visited during the current round. These visits are recorded not by date, but by the number of visits. In addition, the length of visits and services performed are recorded. **Home Health Utilization (HHQ)** then collects information about home health provider visits, both professional and non-professional, during the reference period. HHQ collects names and types of home health providers, number and length of visits, and services performed during visits.

Prescribed Medicines

The **Prescribed Medicine Utilization (PMQ)** section collects details about prescribed medicines obtained during the reference period. For medicines recorded in the provider service visit sections (in the context of those visits), PMQ collects the medicine strength, form, quantity, and number of purchases. Medicines that were not previously reported during the course of the provider service visit utilization sections, including those that are refilled or called in by phone, are also collected in this section. Unlike for provider service visits, event dates are not collected for prescribed medicines. Instead, the interviewer records the number of purchases or refills. Information about non-prescription medicines and prescriptions that are not filled are not recorded.

Other Medical Expenses

The Community Questionnaire also records other medical expenses. These expenses are reported using a slightly different reporting structure within the questionnaire. The reporting structure used to capture other medical expenses within the questionnaire differs slightly than that used for capturing provider services events. For example, as opposed to capturing details about a visit to a provider (e.g., provider name, date of visit, etc.), the questionnaire records the date(s) the beneficiary rented, purchased, or repaired each type of medical equipment.

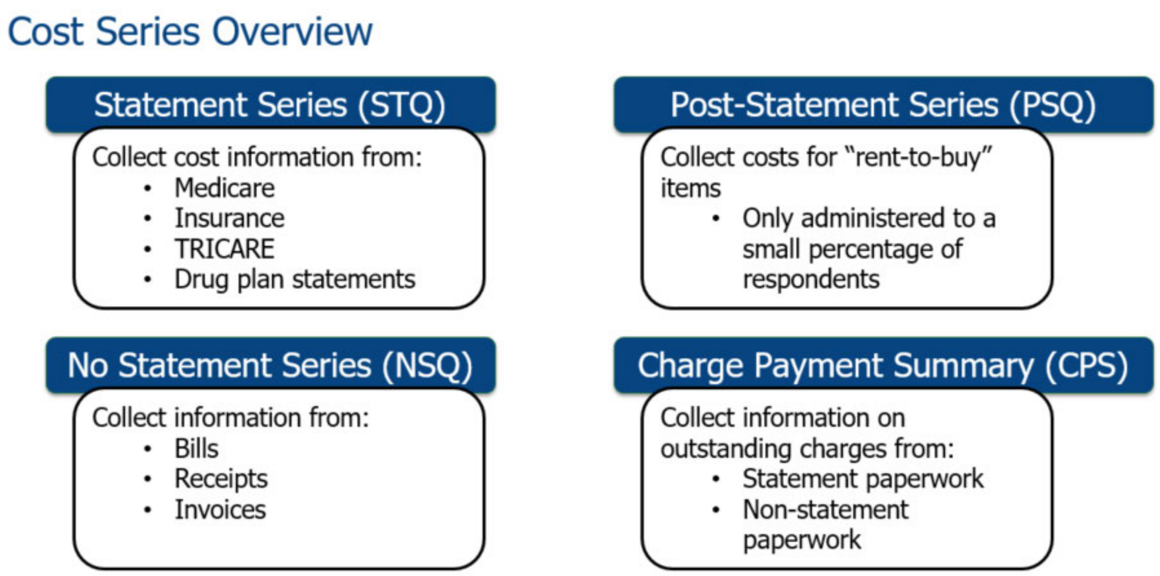
Other Medical Expenses Utilization (OMQ) collects information about medical equipment and other items (excluding prescriptions) that the beneficiary purchased, rented, or repaired during the reference period. Other medical expenses includes glasses, hearing devices, orthopedic items (wheelchairs, canes, etc.), diabetic equipment and supplies, dialysis equipment, prosthetics, oxygen-related equipment and supplies, ambulance services, other medical equipment (beds, chairs, disposable items, etc.) and alterations to the home or car. For each item, the date(s) of rental, purchase, or repair are recorded. For disposable medical items (e.g., bandages), the number of purchases is collected, rather than a date.

D. Cost Series

Once all utilization sections are completed, the questionnaire flows to the cost series, wherein the costs of all reported visits and purchases are recorded, along with the amount paid by various sources. Importantly, additional visits and purchases not reported in the utilization sections of the questionnaire could be recorded within the cost series, and all corresponding data for those events are collected within the cost series.

The cost series consists of four sections: Statement, Post-Statement, No Statement, and Charge Payment Summary. Each is summarized in Exhibit 4.1.5 and described below.

Exhibit 4.1.5: Cost Series Section Overview



Cost Series Overview

Statement Series (STQ)

Collect cost information from:
- Medicare
- Insurance
- TRICARE
- Drug plan statements

Post-Statement Series (PSQ)

Collect costs for "rent-to-buy" items
- Only administered to a small percentage of respondents

No Statement Series (NSQ)

Collect information from:
- Bills
- Receipts
- Invoices

Charge Payment Summary (CPS)

Collect information on outstanding charges from:
- Statement paperwork
- Non-statement paperwork

The **Statement section (STQ)** collects medical cost information directly from Medicare Summary Notices (MSNs), insurance explanations of benefits (EOB), Prescription Drug Plan statements, and TRICARE or other insurance statements. In cases where the beneficiary had more than one payer (e.g., Medicare and private insurance), interviewers organize statements into charge bundles, which are driven by the claim total on a MSN or EOB and may include one or more utilization events (visits, medicines, or purchases). Each charge bundle is entered separately, and all previously-reported events associated with the charge bundle are linked to the cost record. Payment details are entered from the statements and any remaining amount not accounted for is confirmed with the respondent. This process is repeated for all available, not previously recorded insurance statements containing events that occurred within the survey reference period (roughly the past year).

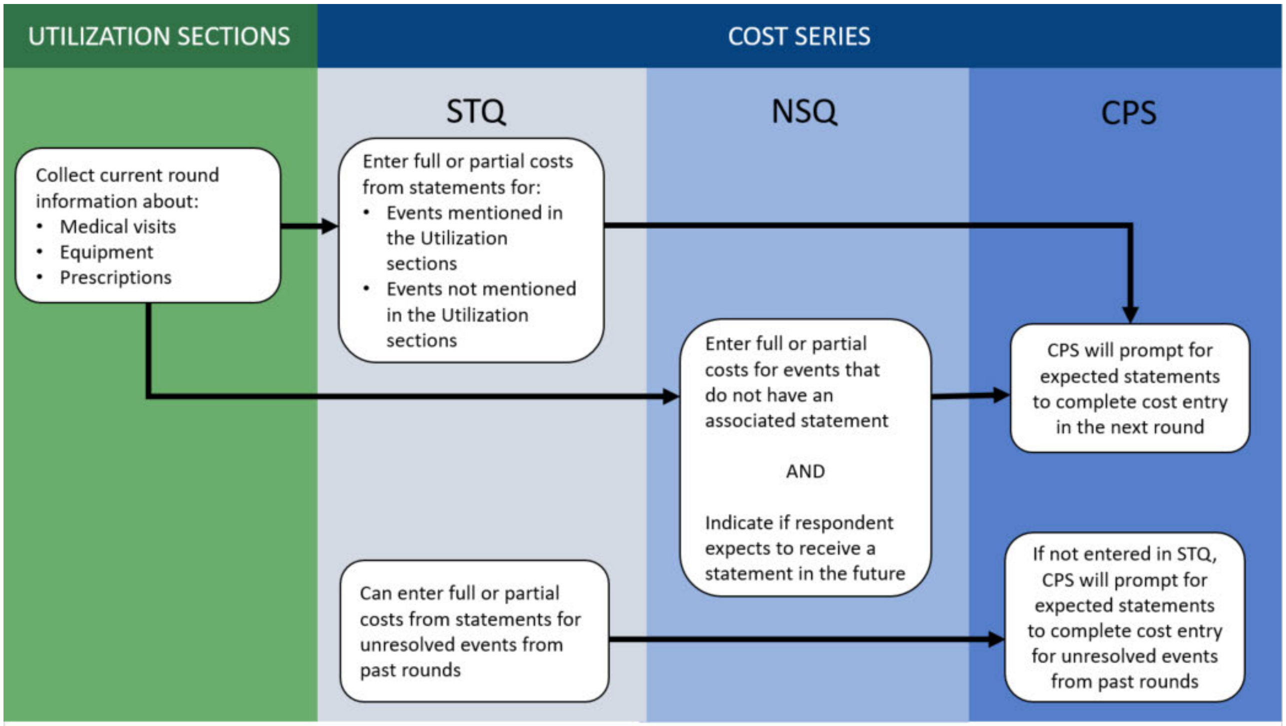
The **Post-Statement section (PSQ)** facilitates cost data collection for rental items that span multiple rounds of interviews (such as a long term wheelchair rental) and for which cost data has not yet been reported.

The **No Statement section (NSQ)** prompts for cost data for all events that do not have a Medicare, insurance, or TRICARE statement reported in the current round. This section attempts to capture cost data even in absence of insurance statements. The respondent may refer to non-statement paperwork such as bills or receipts to help collect accurate cost information. NSQ loops through a series of cost verification items for each event or purchase reported during the current round utilization but not already linked to a cost record via the Statement section. If respondents indicate a statement for the event is expected, then the NSQ items are bypassed.

The final cost series section, the **Charge Payment Summary (CPS)** reviews outstanding cost information reported from previous rounds. For example, if the respondent reported in the previous interview that he/she expected to receive an insurance statement for a particular event, then this event is carried forward to the next round CPS. Any charge bundle for which costs are not fully resolved is asked about in the next round CPS section. There are a variety of reasons a cost record might qualify to be asked about in CPS (referred to as “CPS Reasons”). For example, a respondent may have been expecting to receive a statement related to the event or may have reported payments that account for only part of the total charge. The amount of information collected in CPS and the path through the section is determined by the CPS reason for the cost record. One case can have multiple cost records flagged for CPS with a variety of CPS reasons. The questionnaire loops through each eligible cost record in an attempt to collect further cost data.

The flow of sections and questions within the cost series varies depending on data collected in the current round (e.g., whether the beneficiary had a health insurance statement for a visit reported in the current round) and data collected in prior rounds (i.e., whether there was outstanding cost information reported from a prior round). Exhibit 4.1.6illustrates how paths through these sections may vary depending on health care utilization and cost information collected in the current and previous rounds.

Exhibit 4.1.6: Utilization and Cost Section Flow



E. Experiences with Care

Three sections cover the beneficiary's experience with care in various medical settings.

Access to Care (ACQ) is administered in the winter round interview for Continuing respondents and focuses on the beneficiary's experience with particular types of medical encounters (hospital emergency room, hospital clinic or outpatient department, long-term care facility, or medical doctor visits) during the reference period. If the beneficiary had one or more of a particular type of medical encounter, additional items collect information about services received and waiting times associated with the most recent encounter.

Satisfaction with Care (SCQ) is part of the fall round interview for Incoming Panel and Continuing respondents and collects the respondent's opinions about the health care that the beneficiary had received. The questions refer to medical care received from all medical providers, including both doctors and hospitals.

The **Usual Source of Care (USQ)** section is administered in the winter round interview for Continuing respondents and collects specific information about the usual source of health care for the beneficiary as well as any specialists seen during the reference period.

F. Health Status

Health Status and Functioning (HFQ) collects information on the beneficiary's general health status and needs. This includes specific health areas such as disabilities, vision, hearing, and preventive health measures. HFQ includes measures of the beneficiary's ability to perform physical activities, moderate and vigorous exercise, health care maintenance and needs, and standard measures of Instrumental Activities of Daily Living (using the telephone, preparing meals, etc.), and Activities of Daily Living (bathing, walking, etc.). In addition, HFQ asks about medical diagnoses for common conditions (cancer, arthritis, hypertension, etc.). Finally, the section covers mental health conditions, falls, urinary incontinence, and a more extensive series of questions for beneficiaries with high blood pressure and diabetes.

G. Operational and Procedural

These sections help guide the interviewer through the interview, providing scripts for introducing and ending the interview. They also facilitate collection of address and household information to augment sample information for the purposes of locating respondents for follow-up interviews. Data collected in these sections are not included in the Survey or Cost Supplement data files.

Introduction (INQ) introduces the survey and records whether the interview was completed by the beneficiary or a proxy. For interviews completed by a proxy, the introduction collects the proxy's name and relationship to the beneficiary and determines if the proxy is a member of the beneficiary's household. The introduction is part of every Community Questionnaire.

The **Closing (END)** section is administered to close the interview for all respondents. During the exit interview, this section contains additional scripts to thank the respondent for participation over the four years of the MCBS.

Enumeration (ENS) collects household information and a roster of persons living in the household. For each household member added to the roster, his/her relationship to the beneficiary, sex, date of birth, age, and employment status are collected. ENS is administered in all rounds except the final exit interview.

The **Interviewer Remarks Questionnaire (IRQ)** captures additional metadata about the interview, as recorded by the interviewer. This includes the length of the interview, assistance the respondent may have received, perceived reliability of the information provided during the interview, and comments the interviewer had about the interviewing situation. IRQ is administered after every interview, but is generally completed after leaving the respondent's home, as none of the questions are directed to the respondent.

4.1.4 Topical Section Content

In addition to the Core content, there are several Topical questionnaire sections that capture data on a variety of key topics that relate to the beneficiary's housing characteristics, health behaviors, knowledge about Medicare, and health-related decision making. All data from the Topical sections are included in the Survey File data release. Each Topical section is described below, organized by information collected. Exhibit 4.1.7 lists the Topical sections and administration schedule.

Exhibit 4.1.7: 2018 MCBS Community Topical Sections by Data File and Administration Schedule

Section Group	Abbr.	Section Name	LDS*	Data Collection Schedule
Housing Characteristics	HAQ	Housing Characteristics	SF	Fall 2018
Social Determinants of Health or Health Behaviors	MBQ	Mobility of Beneficiaries	SF	Fall 2018, Winter 2019, Summer 2019 ±
	NAQ	Nicotine and Alcohol Use	SF	Fall 2018
	PVQ	Preventive Care	SF	Fall 2018, Winter 2019, Summer 2019 ±
	IAQ	Food Insecurity items	SF	Summer 2019**±
Knowledge and Decision Making	KNQ	Beneficiary Knowledge and Information Needs	SF	Winter 2019±
	RXQ	Drug Coverage	SF	Summer 2019±

SOURCE: MCBS Community Questionnaire

*Limited Data Set (LDS) indicates the file where the questionnaire data appears (i.e., SF = Survey File, CS = Cost Supplement File).

**The Food Insecurity items are included within the Income and Assets Questionnaire (IAQ).

±Section is administered in a round following the current data year. The reference period for this section is the prior year and data are included in the prior year data files.

A. Housing Characteristics

Housing Characteristics (HAQ) collects information on the beneficiary's housing situation. This includes the type of dwelling, facilities available in the household (e.g., kitchen and bathrooms), accessibility, and modifications to the home (e.g., ramps, railings, and bathroom modifications). This section also records if the beneficiary lives in an independent or assisted living community (distinct from a nursing or long-term care facility) where services like meals, transportation, and laundry may be provided. HAQ is administered in the fall for all beneficiaries in the Community component.

B. Social Determinants of Health or Health Behaviors

Three questionnaire sections record additional information about health behaviors, specifically mobility, preventive care, and nicotine and alcohol use.

Mobility of Beneficiaries (MBQ) determines the beneficiary's use of available transportation options, with a focus on reduced mobility and increased reliance on others for transportation.

The **Preventive Care (PVQ)** section collects information about beneficiaries' preventive health behaviors. Questions administered in this section vary by data collection season. In the winter round, the PVQ focuses on the influenza vaccine, while in the summer round, the PVQ asks about the shingles and pneumonia vaccines. In the fall round, the PVQ asks whether the beneficiary has received various types of applicable preventive screenings or tests, such as a mammogram, Pap smear, or digital rectum exam.

Nicotine and Alcohol Use (NAQ) collects information on beneficiaries' smoking behavior, including past and current use of cigarettes, cigars, "smokeless" tobacco, and e-cigarettes. It also asks about past and current drinking behavior.

C. Knowledge and Decision-Making

Respondent's knowledge of Medicare and health-related decision-making is captured in three Topical sections.

The **Beneficiary Knowledge and Information Needs (KNQ)** section is administered in the winter round. These items measure the respondent's self-reported understanding of Medicare and common sources of information about health care and Medicare.

The **Drug Coverage (RXQ)** section is a summer round section that focuses on the Medicare Prescription Drug benefit, including respondent knowledge of the benefit, and opinions of the beneficiary's drug coverage, whether through a Medicare Prescription Drug Plan, a Medicare Advantage plan with prescription drug coverage, or a private insurance plan that covers prescription drugs.

4.1.5 Changes to the Community Questionnaire for 2018

The MCBS introduced several Community Questionnaire updates in 2018 to enhance survey content and data quality, improve interviewer and respondent experience, and reduce respondent burden.

These changes included the addition of a new section measuring beneficiary's experience with chronic pain and the implementation of several new items, including those on weight management counseling, depression screening, smoking cessation, and how beneficiaries with Limited English Proficiency (LEP) usually communicate with health care providers. Additional details about questionnaire content and changes made in 2018 can be found in Section 3.2.2.

Summary of Item- and Section-Level Questionnaire Revisions

Chronic Pain (CPQ)

- The Chronic Pain (CPQ) section was administered for the first time in Summer 2019 and is released in the 2018 LDS. Questionnaire items were developed by the National Pain Strategy (NPS) Population Research Working Group for inclusion in federal surveys. The CPQ begins with PAINOFTN, which asks whether or not beneficiaries experienced pain within the last three months. If so, the section asks more detailed questions about the beneficiary's experience with pain and what types of services and activities they have used to manage their pain. The CPQ section is not administered to proxy respondents.

Drug Coverage (RXQ)

- In Summer 2018, two questions that ask about the drug coverage gap, or “donut hole” (SC8I-DHPLAN and SC8L-DHTHISYR), were removed from the questionnaire because the information is available in administrative data. These two deleted items served as filter questions to determine when follow-up items about the drug coverage gap are applicable to the beneficiary. With the removal of the filter questions, all beneficiaries were asked follow-up items SC8M-DHSTART and SC8N-DHEND about the donut hole. However, some of these beneficiaries should have filtered out of these questions because they have not yet reached the start of the coverage gap or have private prescription drug coverage. In Summer 2019, the two questions about the coverage gap (SC8I-DHPLAN and SC8L-DHTHISYR) were added back to this series in their original form. As the questionnaire is administered the summer following the year of interest, the data collected in Summer 2019 are released in the 2018 LDS.

Health Status and Functioning (HFQ)

- In Fall 2018, two new screening items were added to the Health Status and Functioning (HFQ) questionnaire. Due to the longitudinal nature of the MCBS, the survey contains two variables for each screening item. Respondents participating in their Baseline interview are asked if the beneficiary has ever had the screening; a second similar version is administered to respondents participating in their Continuing interview and asks if the beneficiary has had the screening in the past year. The first new item was adapted from the Consumer Assessment of Healthcare Providers and Systems (CAHPS) for Accountable Care Organizations (ACOs) to collect information about depression screening (HFJ47-BASKDEPRS and HFJ48-CASKDEPRES). The other item was sourced from the National Health and Nutrition Examination Survey (NHANES) and asks about weight management counseling (HFJ45-BLOSWGHT and HFJ46-CLOSWGHT).

Nicotine and Alcohol Use (NAQ)

- One new item on tobacco cessation sourced from the National Health Interview Survey (NHIS) was added to the Nicotine and Alcohol Use (NAQ) section in Fall 2018 (NA25-BDOCSMOK or NA26-CDOCSMOK). For beneficiaries who report smoking every day or some days, this item asks whether a doctor or other health professional has ever talked to them about their smoking.

Preventive Care (PVQ)

- For data collected in Summer 2019, routing logic in the Preventive Care (PVQ) section was updated to ask all respondents who did not report a flu shot in the Winter round (PVF1-FLUSHOT) the reason for not receiving the flu shot (PV2-FLUCODE).

Usual Source of Care (USQ)

- Items PP1-REMINDAPPT and PP2-PREPARE in the USQ section, which ask about communication from doctor’s offices prior to an upcoming appointment, have been updated to add a new response option of “(996) NOT APPLICABLE / R DID NOT HAVE AN APPOINTMENT” to each of these two items.

4.2 Facility Instrument Content

The following section provides an overview of the content of the Facility component of the MCBS questionnaire. The content of the Facility Instrument varies based upon several factors, including the season of data collection, the type of interview (which reflects the length of time the beneficiary has been in the facility), and the component of the most recent interview.

4.2.1 Interview Type

Similar to the Community Questionnaire, the Facility Instrument uses interview type as a key determinant of which questionnaire sections to administer during a facility interview.

The MCBS uses five interview types, also known as sample types, to describe MCBS beneficiaries who reside in a facility, summarized in Exhibit 4.2.1.

Exhibit 4.2.1: Facility Instrument Interview Types

INTTYPE	Description	Season
CFR	Continuing Facility Resident. Beneficiary for whom the previous round interview was in a facility and who currently lives at the same facility.	Any
CFC	Community-Facility-Crossover. Beneficiary who was interviewed in the community previously and has now moved to a long-term care facility.	Any
FFC	Facility-Facility-Crossover. Beneficiary for whom an interview was previously interviewed in a long-term care facility and has now moved to a different facility.	Any
FCF	Facility-Community-Facility Crossover. Beneficiary whose last interview was in the community and for whom an interview in a facility has been conducted in a previous round, and who has been admitted to a new facility or readmitted to a facility where the beneficiary had a previous stay. This sample type is rarely encountered.	Any
IPR	Incoming Panel Respondent. Beneficiary who was just added to the MCBS sample (fall round only) and currently lives in a facility.	Fall

NOTE: Interview type (INTTYPE) is typically referred to as Sample Type in the Facility Instrument section specifications.

4.2.2 Facility Screener

The Facility Screener is administered to a facility staff member when a beneficiary moves to a new facility setting. The Facility Screener confirms whether the beneficiary is currently living at the facility (or lived at the facility at some point during the reference period) and determines whether the facility is a public or private residence.

4.2.3 Facility Instrument Flow

The Facility Instrument collects similar data to the Community Questionnaire. However, the Facility Instrument is administered to facility staff and not to the beneficiary; that is, the beneficiary does not answer questions during a Facility component – instead, facility administrators and staff answer questions on behalf of the beneficiary.

Just like the Community Questionnaire, the sections administered in a given Facility component vary by interview type and data collection season (fall, winter, or summer). The Baseline interview, administered to Incoming Panel respondents, contains an abbreviated flow, which does not include the utilization or cost sections of the questionnaire. Exhibit 4.2.2 shows the flow for the Baseline interview.

Exhibit 4.2.2: 2018 MCBS Facility Instrument Flow for Baseline Interview

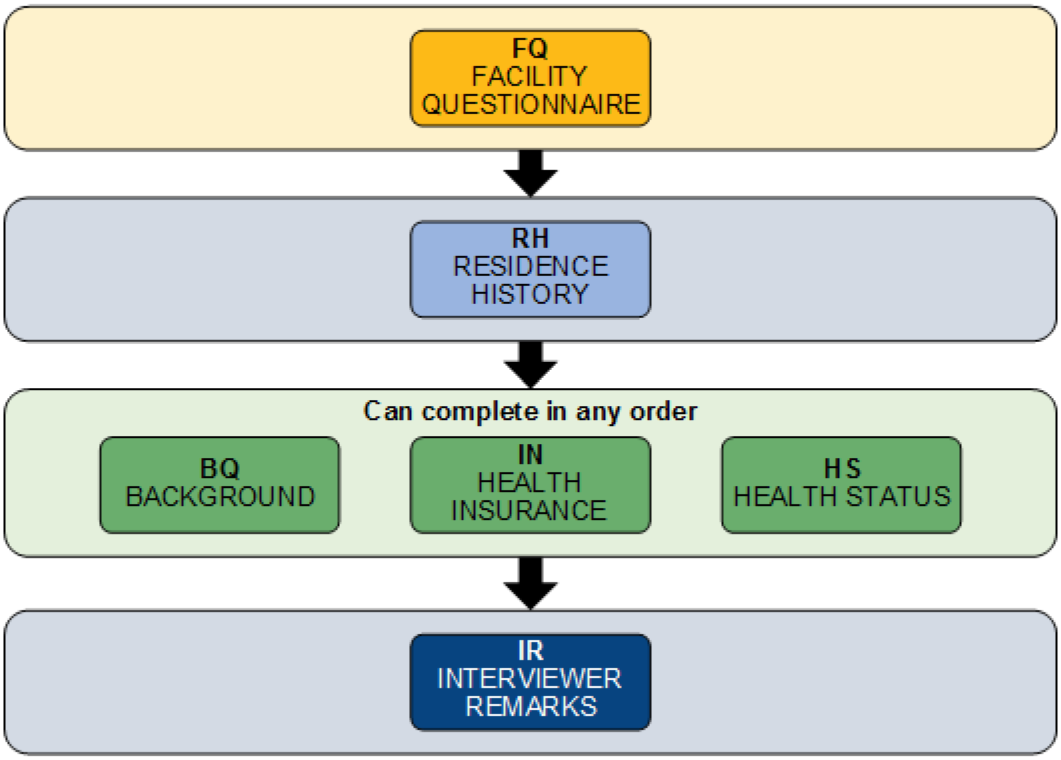
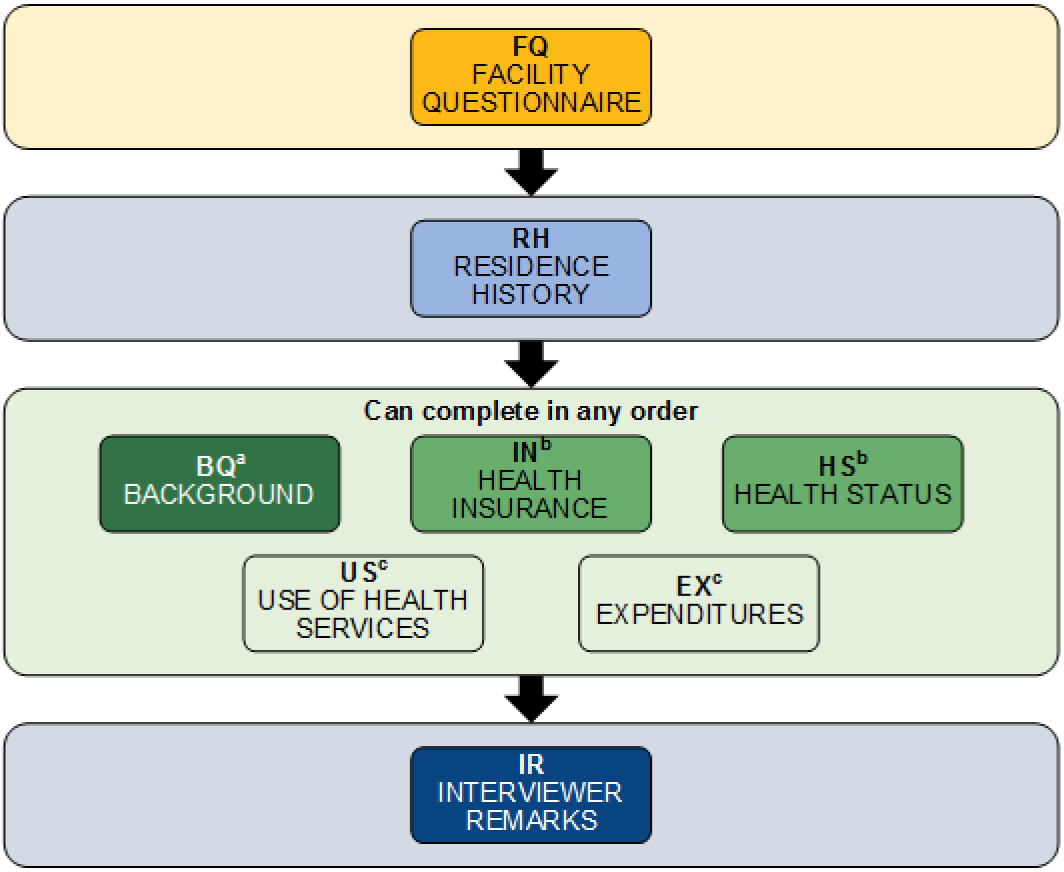


Exhibit 4.2.3 shows the flow for the Continuing and crossover interview types.

Because the Facility Instrument is administered to facility staff and not directly to the beneficiary, the Facility Instrument is designed to have a modular, flexible flow. The interviewer first completes the Facility Questionnaire (FQ) section. Next, the interviewer administers the Residence History (RH) section. The remaining sections may be completed in any order. Interviewers are instructed to conduct the sections in the order most suitable to the facility structure and the availability of facility staff. For example, the interviewer may conduct three sections with the head nurse and then visit the billing office to complete the remaining sections. Interviewers complete the Interviewer Remarks (IR) section at the end of the interview.

Exhibit 4.2.3: 2018 MCBS Facility Instrument Flow for Continuing and Crossover Interviews



a = Administered only for Community to Facility interviews

b = Administered to all sample types in Fall round. Otherwise, administered only for Community to Facility, Facility to Facility, and for beneficiaries residing in a Facility whose last interview was a Community interview and who completed a Facility interview in a prior round.

c = Administered for all Facility interviews

4.2.4 Core Section Content

The Facility Instrument consists of only Core sections with no Topical content. The following pages describe Core sections of the Facility Instrument, organized by topic of information collected. Exhibit 4.2.4 shows the Core sections of the Facility Instrument along with the data file they inform and the seasons in which they are administered.

Exhibit 4.2.4: Facility Core Sections by Data File and Administration Schedule*

Section Group	Abbrev	Section Name	LDS§	Data Collection Schedule
Facility Characteristics	FQ	Facility Questionnaire	SF	All seasons
Socio-Demographics	RH	Residence History	SF	All seasons
	BQ	Background	SF	Fall 2018, Baseline Interview**
Health Insurance	IN	Health Insurance	SF	Fall 2018±
Utilization	US	Use of Health Services	CS	All seasons
	PM	Prescribed Medicines	CS	All seasons
Cost	EX	Expenditures	CS	All seasons
Health Status	HS	Health Status	SF	Fall 2018±

SOURCE: 2018 MCBS Facility Instrument

*Certain procedural or operational management sections are collected specifically to manage the data collection process. These sections are not directly included in the LDS files (e.g., Interview Remarks (IR)).

**The BQ section is administered to Community to Facility cases each season and Baseline cases in the fall round.

±The IN and HS sections are also administered to Community to Facility and Facility to Facility cases each season.

§ Limited Data Set (LDS) indicates the file where the questionnaire data appears (i.e., SF = Survey File, CS = Cost Supplement File).

A. Facility Characteristics

The Facility Characteristics Core section contains the **Facility Questionnaire (FQ)** section of the Facility Instrument. The FQ section collects information on the number, classification, and certification status of beds within the facility; sources of payment for facility residents; and facility rates. Interviewers typically conduct the FQ with the facility administrator. Interviewers are not allowed to abstract this section of the interview; it must be conducted with a facility staff member.

B. Socio-Demographics

The Socio-Demographics Core sections capture key characteristics of the interview and the beneficiary. These include residence history and demographics.

The **Residence History (RH)** section collects information about all of the places that the beneficiary stayed during the reference period. Information is collected about where the beneficiary was just before entering the facility and where he/she went if they had been discharged. For each stay, the interviewer collects the name of the place of residence, the type of place it is, and the start and end date for the period the beneficiary was living there.

The RH section creates a timeline of the beneficiary’s whereabouts from the date the beneficiary entered the facility or the date of the last interview, through the date of interview, date of discharge, or date of death. The goal is to obtain a complete picture of the beneficiary’s stays during the reference period, including any stays of one night or more in hospitals, other facilities, or any other place.

The **Background Questionnaire (BQ)** collects background information about the beneficiary, such as use of long-term care before admission to the facility, level of education, race, ethnicity, service in the Armed Forces, marital status, spouse's health status, living children, and income. The BQ is completed only once for each beneficiary during their first interview in the Facility.

C. Health Insurance

The Health Insurance Core section contains the **Health Insurance (IN)** section of the Facility Instrument. The IN section collects information about the beneficiary's type(s) of health insurance coverage. This includes questions about all types of health insurance coverage the beneficiary had in addition to Medicare: private insurance, long-term care insurance, Department of Veterans Affairs eligibility, and TRICARE or CHAMPVA.

Because of differences in interview setting, the content collected in the IN section differs from the content collected in the INQ section of the Community Questionnaire. For example, because the Facility Instrument is administered to facility staff, as opposed to interviewing the beneficiary directly, the Facility Instrument collects the name of the insurance company for a beneficiary's private insurance plan but does not collect follow-up details about whether the plan was purchased through an employer or some other way.

D. Utilization

The Utilization sections collect data on the beneficiary's use of health care and prescribed medicines. These sections are administered to all sample types except for the Incoming Panel.

The **Use of Health Care Services (US)** section collects information on the beneficiary's use of health care services while a resident of the facility. This includes visits with a range of providers including medical doctors, dentists, and specialists; visits to the hospital emergency room; and other medical supplies, equipment, and other types of medical services provided to the beneficiary.

The best facility respondent for this questionnaire section is usually someone directly involved with the beneficiary's care or someone who is familiar with the medical records.

The **Prescribed Medicines (PM)** section collects data on the beneficiary's monthly use of prescribed medicines while in the facility. The data collected includes the medicine name, form, strength, dosage, how often it is administered, and the total times per month that the medicine is taken. The data for this section may be obtained by abstracting from the Medication Administration Record (MAR), which is the report that serves as a legal record of the medications administered to a patient at a facility by a health care professional. MARs are commonly referred to as drug charts. Unlike other parts of the questionnaire, the PM section collects data by month, asking for each month separately.

In the Facility Instrument, prescribed medicines are defined as medicines ordered by a physician through a written or verbal order for a pharmacist to fill. In the long-term care setting, doctors often order medications that do not require a prescription in the community setting, such as vitamins. This is a key difference between the Facility and Community components. As a result, medications that are not considered prescribed medicines in the Community Questionnaire are collected as prescribed medicines in the Facility Instrument. Prescribed medicine data collected via the Facility Instrument are not incorporated into data products that are shared with users, because this data is by dose, not by fill. Prescribed medicine data from Medicare Part D claims for facility respondents are incorporated into the Cost Supplement File. In Summer 2018 (Round 81), the MCBS discontinued the collection of PM data in the Facility Instrument given that the majority of prescribed medications in the Facility setting are captured by Medicare Part D claims.

E. Cost

The Facility Cost component consists of the **Expenditures (EX)** section. The EX section collects information about bills for the beneficiary's care at a facility and payments by source for those charges. Data are only collected for the time period when the beneficiary was a resident of the facility at which the interview takes place. The EX section collects information by billing period (e.g., monthly semi-monthly, quarterly, etc.).

Unlike the Community Questionnaire, which collects cost information for each service, the EX section collects only the fees the facility bills for the beneficiary's care. The EX section collects information on the amount billed for the beneficiary's basic care and for any health related ancillary services. Typically, the EX section is administered to facility staff located in the billing office.

F. Health Status

The **Health Status (HS)** section collects information on the beneficiary's general health status, ability to perform various physical activities, general health conditions, instrumental activities of daily living, and activities of daily living.

Most of the information needed to conduct the HS section may be found in a medical chart. The Federal Government requires that all nursing facilities certified by Medicaid or Medicare conduct comprehensive and standardized assessments of each resident's health status when the resident is admitted to the nursing home and at regular intervals thereafter.[26] These assessments are captured by the Long-Term Care Minimum Data Set (MDS),[27] which contains a set of key items measuring a resident's capacity to function independently. Nursing homes use this information to assess each resident's health status, identify problem areas and, where problems exist, formulate care plans to address them.

The HS section is designed to mirror the flow and wording of the MDS items; it contains a subset of the MDS items. In addition, the HS section contains some questions that are not found on the MDS that are administered to provide information comparable to items asked during the Community questionnaire. Examples include items about prostate exams and mammograms, Instrumental Activities of Daily Living, vaccinations, smoking history, and general health.

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[26] Centers for Medicare & Medicaid Services. *Long-Term Care Facility Resident Assessment Instrument 3.0 User's Manual v. 1.16.* Baltimore, MD, October 2018.

[27] https://www.cms.gov/Research-Statistics-Data-and-Systems/Computer-Data-and-Systems/Minimum-Data-Set-3-0-Public-Reports/index

Interviewers ask these questions of someone knowledgeable about the beneficiary's care or find the information in the medical chart.

G. Operational and Procedural

The **Interviewer Remarks (IR)** section captures additional metadata about the interview, as recorded by the interviewer. This includes comments the interviewer may have about the interviewing situation and notes to themselves for use in gaining cooperation in the future. Data from this section are not included in the Survey File or the Cost Supplement File.

H. Missing Data Sections

There are three additional sections, called missing data sections, which are activated when essential survey information is coded as "don't know" or "refused" in the Facility Questionnaire (FQ), Residence History (RH), or Background (BQ) sections. The missing data sections prompt the interviewer for the specific piece of information that is missing. There are no new questions in the missing data sections, just repeats of questions initially asked in the FQ, RH, or BQ. Examples of the type of missing information that activate the missing data sections are the name of the facility or date of death.

The purpose of the missing data sections is to reduce item non-response for key variables in a modular, flexible format. If the interviewer is able to obtain the missing information from another facility staff member or from a different medical document, then the interviewer uses the missing data section to capture a non-missing response for the key questionnaire item without modifying responses for the other already-completed items in the FQ, RH, and BQ sections. If the interviewer is unable to obtain the missing information, either "don't know" or "refused" is entered in the missing data sections.

The missing data sections are:

- Facility Questionnaire Missing Data (FQ_MD): collects data missing from the FQ section of the interview;
- Residence History Questionnaire Missing Data (RH_MD): collects data missing from the RH section;
- Background Questionnaire Missing Data (BQ_MD): collects data missing from the BQ section.

4.2.5 Changes to the Facility Instrument for 2018

There were several changes to the Facility Instrument in 2018, including updates to question text, response options, programming logic, and text fills.

General Questionnaire Updates Made for 2018

In 2018, one general maintenance questionnaire update was made to the Facility Instrument. In a number of sections, question wording and response options were updated to use the term "Intermediate Care Facility for Individuals with Intellectual Disabilities (ICF/IID)" instead of the outdated term "Intermediate Care Facility for the Mentally Retarded (ICF-MR)."

Summary of Item- and Section-Level Questionnaire Revisions

There were several changes to the Facility Instrument in 2018, including updates to question text, response options, programming logic, and text fills.

Facility Questionnaire (FQ)

- In Fall 2018, the routing of billing rate questions was updated to maximize the amount of data collected. A Facility respondent who does not know the high billing rate at item FR3-HIGHRATE now has the opportunity to report a low billing rate at FR4-LOWRATE.

Health Status (HS)

- Several changes were made to the Health Status (HS) section to better align with the Long-Term Care Minimum Data Set (MDS). In Fall 2018, new programming logic was added for the Brief Interview for Mental Status (BIMS) assessment items to be consistent with how the MDS form handles incomplete BIMS assessments. Like the MDS, the Facility Instrument now collects information about the Staff Assessment for Mental Status in instances when the BIMS assessment was not completed. In Fall 2018, "Don't Know" and "Refused" response options were added to items HA29B-HA29BCOD, HA37AB-HA37ABCO, and HA37BB-HA37BBCO to ensure more accurate data entry in situations where no response options were selected on the MDS form.

4.3 CAPI and Case Management System Programming and Testing

MCBS interviewers receive project laptops with Computer-Assisted Personal Interviewing (CAPI) software and an electronic case management system to facilitate data collection activities and questionnaire administration. Interviewers conduct the MCBS interviews using the CAPI software on the laptops and organize their cases and workload using the case management system. This section describes the CAPI and case management systems.

4.3.1 Community Questionnaire

The MCBS Community Questionnaire used in 2018 was programmed in UNICOM® Intelligence data collection software (formerly IBM® SPSS® Data Collection or mrInterview). The software allows for full control of interviewer routing through the complex questionnaire. It uses built-in data quality measures, such as range and logic checks, dynamic text fills, and respondent exit and re-entry management. Several lookup tools are also included within the questionnaire to allow for more effective identification of some types of health insurance plans (Medicare Advantage and Prescription Drug plans), medical providers, and prescribed medicines. Throughout the questionnaire, specially formatted grid screens allow interviewers to easily reference providers, health care events, and medicines added in the current round, as well as those added in prior rounds (and preloaded into the questionnaire). In addition, screen-by-screen help text is available to assist interviewers with definitions and additional instruction.

4.3.2 Facility Screener and Instrument

The MCBS Facility Instrument is programmed in Blaise® interview software. Unlike the Community Questionnaire, the Facility Instrument is modular, meaning the software allows the interviewer to select sections based on the interviewing situation, rather than on a set order (with some restrictions, see Section 4.2 for more information). Like the Community Questionnaire, the Facility Instrument includes built-in data quality checks such as range and logic checks, dynamic text fills, respondent exit and re-entry, and a prescribed medicine lookup utility. The Facility Instrument also features a facility stay history timeline.

The Facility Screener is a separate instrument programmed in UNICOM® Intelligence. This module allows for basic information about a facility to be recorded electronically and transferred to an interviewer certified to complete the Facility interview.[28]

4.3.3 Case Management System

The case management system facilitates management of interviewer case assignments and questionnaire administration. It is a web-based application that provides interviewers and other project staff with a consistent way to access, update, and organize case information (e.g., contact names, addresses, telephone numbers, date and location of the last interview, and optimal contact time). The system includes a portal-based case management view and a laptop-based interviewing module. Field managers and other project staff use the management portal to monitor interviewer workload and productivity. Interviewers use the laptop-based module to view their MCBS case assignments, record attempts to locate and contact respondents, update respondents' personal contact information, schedule appointments, and record case status information. The case management system is the gateway for interviewers to access the Community Questionnaire, the Facility Instrument, and the Facility Screener. Interviews are conducted off-line and case management and survey data are synchronized between the laptop database and the central office servers over a secure, encrypted internet connection.

Paradata elements captured within the case management system include contact level information, mode of contact attempt, source of contact information referenced (phone, address, email, etc.), and the result of the contact attempt. The case management system integrates questionnaire and case management data both within and across rounds, allowing interviewers to identify the best or most recent telephone numbers and locations for expedited contacting.

The case management system also includes the Automated Crossover Process (ACP), which automatically transfers cases from the Community component to the Facility component. The ACP creates case management updates and questionnaire preloads for these cases through a set of stored procedures, allowing interviewers to conduct an interview with the facility as quickly as one day after they located and screened the facility. The ACP automates transfers of all cases from the

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[28] Not all interviewers may complete Facility interviews – additional training and certification is required beyond the standard Community interview training.

Community component to the Facility component. Transfers of cases between Facilities and from the Facility component to the Community component are completed manually.

4.4 Letters and Other Respondent Materials

A series of materials and other resources provides respondents with information about the MCBS and requests their cooperation and participation in the survey. Respondents receive letters by mail and additional materials from interviewers during their visits. In addition, a MCBS respondent website, a project toll-free number, and project email address are available for respondent communication.

Respondent materials include a variety of standard letters, such as advance letters mailed prior to the Baseline interviews and a community authority letter. This letter is sent to communicate legitimacy of the survey to entities such as state resources for senior citizens. Materials are tailored to whether respondents reside in the community or in facilities. In addition to the standard letter mailings, a set of contacting and refusal conversion letters are used to address common contacting problems and respondent concerns about participating in the study.

Interviewers or managers may use various materials provided at their discretion to assist in gaining cooperation.

5. INTERVIEWER RECRUITMENT AND TRAINING

5.1 Interviewer Recruitment and Staffing

A professional interviewer staff is required to complete in-person interviews throughout the year. In 2018, most MCBS interviewers were experienced, having conducted MCBS interviews for at least a year or more. Some new interviewers were recruited to replace those who had left the project; annual hiring is targeted based on local staffing needs and MCBS-specific skill requirements. The set of preferred skills included experience with financial data and complex surveys; language skills; working with individuals who have hearing, visual, or cognitive challenges; and experience interviewing people with disabilities and the elderly. In 2018, about 200 interviewers worked on the MCBS.

5.2 Interviewer Training Programs for 2018

The 2018 MCBS Training Program included in-person and remote trainings which varied based upon interview component (Community or Facility), sample type (Incoming Panel or Continuing), and season-specific requirements (new questionnaire sections or data collection protocols). The program was structured to expose all field staff to the same training content, ensuring that the performance of data collection responsibilities was standardized, methodical, and measurable.

Remote trainings targeted MCBS-experienced interviewers in advance of each round of data collection. In-person trainings educated new interviewers on the project's background and purpose, preparations for gaining cooperation under various circumstances, and proper administration of the MCBS questionnaires to both Incoming Panel and Continuing respondents.

In-person interviewer training programs were implemented to instruct three different types of interviewer staff: a refresher for all experienced staff hired prior to Summer 2018, a subset of experienced staff identified to be trained on the Facility Instrument, and new interviewer staff recruited to administer the Community Questionnaire.

6. DATA COLLECTION

NORC and CMS are committed to protecting respondent confidentiality and privacy, and both organizations diligently uphold provisions established under the Privacy Act of 1974, the NORC Institutional Review Board (IRB), the Office of Management and Budget (OMB), and the Federal Information Security Management Act of 2002. As such, MCBS data collection activities include a set of approved procedures designed to guide outreach and questionnaire administration with beneficiaries across three rounds of continuous data collection each year. In-person data collection is facilitated through a series of protocols that define eligibility for the survey, provide instruction for questionnaire administration by round and component (Community and Facility), and establish rules for how to conduct the interview within a given round. Quality control procedures are also instituted to ensure high quality data are collected.

6.1. Clearance

6.1.1 OMB Approval

The Office of Management and Budget (OMB) regularly re-authorizes data collection for the MCBS. In January 2018, in anticipation of changes required for Fall 2018, CMS submitted a non-substantive change to the approved collection (OMB control number 0938-0568, expiration date 6/30/19) for questionnaire revisions. The changes included the addition of three preventive services items - one item on tobacco cessation to the Nicotine and Alcohol (NAQ) section, one item on depression screening to the Health Status and Functioning (HFQ) section, and one item on weight loss and obesity management to the HFQ section. The changes were approved by OMB on February 26, 2018. CMS also submitted a revision to the approved collection in March 2018 for implementation beginning in Winter 2019. These revisions included revising the Preventive Care Questionnaire (PVQ) to add questions on HIV testing; modifying the collection of utilization data by expanding the Dental Utilization Questionnaire (DUQ) into a new section called Dental, Vision, and Hearing Care Utilization Questionnaire (DVH); adding a new section on Chronic Pain Prevalence and Management (CPQ); revising the Health Status and Functioning (HFQ) section to add three new physical measures and one recall question to measure cognitive functioning; reducing the content of Facility interviews for Medicare certified facilities when CASPER and MDS administrative data are available; and discontinuing the collection of Prescribed Medicines (PM) data during the Facility interview. OMB clearance was received on September 25, 2018, with an expiration date of September 30, 2021.

Also, CMS requested an extension without change to the Generic Clearance for Questionnaire Testing and Methodological Research for the Medicare Current Beneficiary Survey (OMB control number 0938-1275, expiration 5/31/2018) in late 2017. The extension was approved on May 18, 2018, with an expiration date of May 31, 2021.

Under the Generic Clearance, in July 2018 CMS submitted a request to conduct cognitive testing on a newly developed set of questions on self-management of chronic conditions. The goal of the cognitive testing was to identify any potential issues to the items and to seek OMB approval to add the final set of questions to the Health Status and Functioning (HFQ) section beginning in Fall 2020. The request was approved by OMB on September 27, 2018.

Finally, in October 2018, CMBS submitted a request to conduct testing of a revised MCBS Community advance letter under the Generic Clearance. The testing was requested under the split ballot field testing activity approved under the Generic Clearance. The goal of the testing was to analyze differences in response rates and other paradata between the 2019 Incoming Panel sample who received the revised advance letter and those who received the current version of the advance letter. The request was approved by OMB on December 3, 2018.

6.1.2 IRB Approval

The NORC Institutional Review Board (IRB) reviews and approves all MCBS data collection protocols, questionnaires, and respondent materials to ensure human subject protections are properly addressed before field data collection began. For MCBS data collection, the research protocol and consent procedures were first approved by NORC's IRB in July 2014, with subsequent changes to the protocol approved through amendments and annual renewal.

6.2. Data Collection Process and Procedures

The MCBS data collection process includes a timeline to fulfill three continuous rounds of annual data collection. MCBS data collection procedures define how beneficiaries are contacted, determine when a MCBS beneficiary is eligible to participate, and include protocols designed to facilitate longitudinal data collection, establish contacting rules, and maintain beneficiary participation throughout 11 rounds over a four-year period.

6.2.1 Data Collection Schedule and Timeline

The annual MCBS fielding schedule includes three rounds of data collection, with the winter and summer rounds typically lasting 16 to 17 weeks and a slightly longer fall data collection round of 24 weeks. The fall round is scheduled as a longer data collection period to accommodate contacting and interviewing efforts for the Incoming Panel.

In 2018, Winter 2018 (Round 80) data collection started January 10, 2018 and concluded April 29, 2018; Summer 2018 (Round 81) data collection started May 9, 2018 and concluded August 19, 2018. Fall 2018 data collection started July 23, 2018 and concluded January 6, 2019. Thus, data collection represented in 2018 annual files includes data collected from January 10, 2018 through January 6, 2019; with a reference period start date of January 1, 2018 for health care event data.

6.2.2 Sample Releases and Preloads

For a given round, MCBS data collection is structured around several case releases. This is primarily due to the cyclical nature of fielding the MCBS as a continuous longitudinal survey. For members of Continuing Panels, questionnaire data from the prior round need to be cleaned using structure, logic and reasonableness checks, edited, and preloaded before a case is released into production for the next round (see Chapter 7: Data Processing and Data Delivery for more information). Continuing cases are staged and released in batches scheduled throughout the data collection round.

Contacting Efforts and Outreach Rules. Given the longitudinal panel design of the MCBS, it is imperative that sampled beneficiaries engage with the study throughout the 11 rounds of data collection to minimize non-response bias and the impact of sample attrition over time. Recall that the MCBS data collection design no longer follows a beneficiary who misses two consecutive rounds of data collection. While beneficiaries can miss a single round, non-completion of an interview in a previous round can lead to long recall periods and less complete information collected. Various data collection strategies are used to limit respondent burden, strengthen the beneficiary's commitment to the survey and maximize response rates across rounds.

Contacting Protocols. During each case release, interviewers receive case assignments for contacting and questionnaire administration. Interviewers are trained to establish contact with respondents using guidelines on the frequency and type of contact, typically starting with initial contacts to introduce the survey and gain cooperation, schedule an interview, and administer the questionnaire.

Following CMS guidance, and shown in Exhibit 6.2.2, interviewers use contacting strategies that promote efficiency and ensure continuity in contacts across all beneficiaries actively fielded during a given round. The contacting effort required often corresponds to the number of rounds a beneficiary has previously participated. For example, greater effort, in terms of the number and types of contacts made, is invested in contacting the Incoming Panel beneficiaries in the first-interview fall and second-interview winter rounds as activities, such as locating, gaining cooperation, and establishing familiarity with the MCBS, are often required. Contacting efforts for the 3rd through 11th interviews typically require a reduced number of attempts necessary to make contact with respondents by phone and schedule appointments to interview respondents in person.

Exhibit 6.2.2: MCBS Contacting Guidelines by Interview Round

	Interview 1	Interview 2	Interviews 3-11
Attempts made prior to initial contact with beneficiary, designated proxy, or facility staff	10 attempts	8 attempts	4 attempts
Contact attempts after initial contact to secure appointment	8 attempts	8 attempts	4 attempts
Visits to complete interview	2 visits	2 visits	2 visits

Case Management. Interviewers access their case assignments using a case management system. This system collects and displays primary contact information, contacting histories and key elements that describe case status which interviewers use to facilitate efficient outreach and questionnaire administration in a secure and standardized manner. They also use the case management system to update contact information, describe and classify outcomes of contact attempts and launch the CAPI questionnaires. This information is synchronized with central office databases for reporting and data processing tasks. See Section 4.3 for more information about the case management system.

The case management system also houses historical summaries of previously reported utilization and cost records captured during past interviews. These summaries are produced for all Community Continuing cases and are used by interviewers to prepare for the interview. They include information such as previously reported medicines, previously entered insurance statements, previously reported utilization without associated costs collected, and summaries of utilization events reported during the last interview.

6.2.3 Beneficiary Eligibility for MCBS Survey

Eligibility to participate in the survey depends upon a number of factors encountered throughout the four years of panel participation. Changes in survey eligibility are generally identified either by the interviewer while attempting to contact the beneficiary in a given round, or from Medicare program eligibility updates reported by CMS on a regular basis throughout the year. Factors that impact whether future interviews will be conducted include whether beneficiaries are deceased, have lost Medicare entitlement, have relocated outside of PSU boundaries, or are no longer fielded due to *Not-in-Round* case finalization rules.

Recently Deceased. Sampled beneficiaries reported as deceased during data collection are finalized as *Complete-Deceased* at the end of the round. The standard data collection procedure for a beneficiary reported as having died at any point between the 2nd and 11th interview is to attempt an interview with a proxy in order to collect utilization and cost data between the date of the last interview and the beneficiary's date of death. A proxy completes the questionnaire in the Community setting or a final interview is completed at a facility before the case is finalized and no longer contacted in future rounds.

Fielding procedures are also in place to handle Incoming Panel beneficiaries reported as deceased. The date of death reported and the beneficiary's enrollment year are key drivers for determining when an interviewer pursues a proxy interview during the first and second interviews. Any Incoming Panel beneficiary reported as deceased who became eligible for Medicare prior to the Incoming Panel year (e.g., for 2018, any Incoming Panel beneficiary who enrolled in Medicare prior to 2018) is finalized as deceased without pursuing a proxy interview. Any Incoming Panel beneficiary reported as deceased who enrolled in Medicare during the same year (e.g., for 2018, any Incoming Panel beneficiary who became eligible for Medicare in 2018) is fielded for a proxy interview before being finalized as deceased. These rules apply to any Incoming Panel beneficiary who is reported as deceased at any point during the Incoming Panel year. This also impacts fielding considerations in the second round winter interview.

Lost Medicare Entitlement. Beneficiaries are no longer eligible for participation in MCBS after Medicare entitlement is lost. The CMS uses enrollment records to provide periodic updates for beneficiaries selected to participate in the MCBS who have lost entitlement. These updates are compared with current round case management status to determine fielding procedures. If entitlement is lost while a case is being fielded as part of the Incoming Panel (first round interview), the case status is finalized as *Ineligible for Contact.* If the beneficiary has lost entitlement during the data collection round for any Continuing interview, an interview attempt is made in order to collect utilization and costs associated with the period of time when the beneficiary still maintained coverage. At the end of the Continuing round, the case is finalized as *Lost Entitlement* and is no longer fielded in future rounds.

Beneficiaries Who Move Outside of Sampled PSUs. Consistent with fielding rules from past MCBS data collection rounds, if a beneficiary permanently moved or relocated more than 30 miles outside of MCBS sampled PSU boundaries, the case is finalized as *Moved out of Area* and not fielded in future rounds.

Case Finalization and Holdover Consideration for Fielding Next Round. Each actively fielded case is assigned a final disposition to represent the status of the case at the end of a round. Any case without a completed interview is reviewed by field management and assigned a final disposition to reflect the not-in-round status. Cases assigned not-in-round status such as final refusal or final unlocatable are no longer fielded in future rounds. The majority of beneficiaries finalized as not-in-round are no longer fielded in future rounds.

Holdover Rules for Participation. For data collection purposes, any respondent finalized as not-in-round for two consecutive rounds is no longer considered eligible for participation. However, to ensure participation can continue for beneficiaries unavailable in a present round but likely to participate in the future, a holdover process is used to prepare the case for fielding in the subsequent round. For example, a beneficiary could be away for an extended family visit; a beneficiary could be staying at a second home not in the area; or a beneficiary could have canceled appointments but without seeming to be a hard refusal. Cases meeting similar criteria are finalized as *Unavailable this Round* and are staged for fielding in the following round.

6.2.4 MCBS Data Collection Protocols

A primary objective of the MCBS is to collect complete information about medical care, services, and costs for each beneficiary residing in a community or a facility setting across all eleven data collection rounds. To facilitate collecting a full and complete picture of beneficiary utilization and costs, data collection protocols are used to ensure the proper mode of administration, to conduct the interview in the correct setting, and to identify rules for who responds on behalf of the beneficiary to complete the interview.

Community Questionnaire Administration. The Community Questionnaire is administered in person. Longstanding MCBS protocols have required that Incoming Panel beneficiaries be contacted and interviewed in person. This approach ensures survey legitimacy is established early on and allows the interviewer to establish rapport with the respondent, provide context for future rounds, and introduce materials in support of future rounds.

A key goal of Continuing interviews involves associating health care events with costs and payments. In preparation for the future rounds, interviewers provide respondents with a calendar and instructional aid that reminds them to document medical events and save any Medicare or insurance statements and any other health care-related paperwork received after the date of the current interview. During the subsequent round, interviewers review calendars with respondents, as well as sort and match any hardcopy documentation associated with past reported medical events, such as Medical Summary Notices (MSNs), explanation of benefits (EOBs) and other supplemental insurance forms, and medicine summaries. Interviewers are trained to match these documents into charge bundles to ensure streamlined entry within the questionnaire (see Section 4.1 for more information on how these statements are used during the cost series).

Facility Component Interviewing. If a beneficiary spent time in both the community and a long-term care facility during a given round of data collection, both Community and Facility components may be administered to ensure that continuous records are obtained for the entire reference period. Prior to conducting a Facility component, a potential facility must be screened to ensure the facility meets the MCBS facility definition.

MCBS Definition of a Facility. For the MCBS, a Facility component is conducted when the beneficiary lives in a long-term care or other residential facility with three or more beds that meets the following conditions.

- Certified by Medicare as a Skilled Nursing Facility (SNF); or
- Certified by Medicaid as a Nursing Facility or an Intermediate Care Facility for the Mentally Challenged; or
- Licensed as a Personal Care Home, Board and Care Home, Assisted Living Facility, Domiciliary Care Home or Rest Home by a state or local government agency; or
- Provides 24 hours a day, 7 days a week supervision by a person willing and able to provide personal care; or
- Provides personal care services to residents (personal care may include assistance with eating, dressing, walking, preparing meals, etc.).

If a facility does not meet the above definition, or if the beneficiary does not reside in the section of the facility that provides long-term care, then a Community Questionnaire is administered to collect the data.

Most beneficiaries who reside in a place that meets the MCBS definition of a facility live in a type of nursing home. Other qualifying facilities include institutions for people with mental disabilities, domiciliary or personal care homes, retirement homes, mental health facilities, assisted living, board and care homes, rehabilitation facilities, and group homes. Institutions such as jails and prisons do not meet the MCBS facility definition.

The Facility Screener and the Facility Questionnaire (FQ) section, the first section within the Facility Instrument, are used to confirm that a facility meets the MCBS definition. The Screener and FQ work in tandem to determine whether a case is eligible for the Facility component.

Facility Screener. When an interviewer learns that a beneficiary who was previously residing in the community has moved into a facility, or a beneficiary who was residing at a facility has moved to a new facility, the interviewer determines whether the new facility meets the MCBS definition of a facility and therefore is eligible for the Facility component.

As a first step in determining eligibility for the Facility component, the interviewer administers a Facility Screener over the phone to a facility contact. The Facility Screener serves to confirm the beneficiary has lived in the facility during the reference period, identifies the current location of the beneficiary, and verifies the location of the facility and relevant contact information.

Facility Instrument Administration. Unlike in the Community component, interviewers never directly administer the questionnaire to the beneficiary during a Facility component. Instead, the interviewer administers the questionnaire to staff at the facility, referred to as “facility respondents,” who answer questions about the beneficiary. It is common for field interviewers to interview more than one person at the facility because different staff at the facility have the most complete information for specific sections of the questionnaire.

Much of the content of the Facility component can be found in medical documentation. Therefore, facility staff may refer to records, such as the beneficiary’s medical chart, during the interview. Further, facility staff may allow the interviewer to abstract responses directly from medical records. The extent of abstraction conducted varies greatly by instrument section, facility structure, and number of events occurring at the facility on the day of the interview.

6.2.5 Crossover Definitions and Procedures

If a beneficiary spends time in both the community and a long-term care facility during a given round of data collection or since the date of the last interview, both Community and Facility interviews are staged for administration to ensure that continuous records are obtained for the entire reference period. Crossovers are cases that have moved into a new setting since the last interview.[29] In a crossover situation, because the beneficiary has spent part of the reference period in more than one setting, interviewers complete two separate questionnaires to collect data from both locations.

Survey administration of Incoming Panel cases in Winter and Summer 2018 followed a different protocol that depended on when the beneficiary entered the new component and when s/he gained Medicare entitlement. All other crossover cases in their 3rd-11th interviews follow the crossover procedures outlined below.

Community-to-Facility Crossover. When a contact attempt with a Community Continuing beneficiary leads to the discovery that the beneficiary moved into a facility since the last interview, a Community-to-Facility crossover occurs. An interviewer first attempts to administer the Community interview to a proxy followed by administering the Facility Screener to staff at the facility where the beneficiary is residing. Once the Facility Screener confirms that the facility meets the MCBS definition, an appointment is scheduled to conduct the Facility interview. An automated crossover process for staging a Facility interview allows both the Community and Facility components to be fielded within the same round.

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[29] Crossovers do not include respondents that have moved, but remained within the Community setting.

Facility-to-Community Crossover. When contact with a facility where a Continuing beneficiary was residing during the last interview indicates that the beneficiary moved back to the community setting, a Facility-to-Community crossover occurs. An interviewer first administers the Facility interview with the original facility to cover utilization and costs from the date of the last interview through the time of the move into the Community. The interviewer also collects information such as the date the beneficiary left the facility as well as the beneficiary's current community residence. The Community interview will be administered in the following round.

Facility-to-Facility Crossover. When contact with a facility where a Continuing beneficiary was residing during the last interview indicates that the beneficiary moved to another facility since the date of the last interview, a Facility-to-Facility crossover occurs. An interviewer first administers the Facility interview with the original facility to cover utilization and costs from the date of the last interview through the time of the move into the new facility. The interviewer then collects the required facility screener information for the case to be fielded in the second Facility setting. This second facility will be contacted in the following round.

6.2.6 Proxy Interviews and Assistants

Beneficiaries often require assistance in providing the detailed information needed to accurately respond to survey items. During the course of data collection, the beneficiary may designate a proxy to participate in the interview on his or her behalf or an assistant to provide help when responding to specific survey questions.

Proxies and Assistants. A proxy is a person, generally designated by the beneficiary, who is sufficiently familiar with the beneficiary's health care events and costs and responds on behalf of the beneficiary. In addition, a proxy completes a Community component when a beneficiary is no longer able to participate, including when a beneficiary died since the date of the last interview, or has entered a Facility setting. Similar to past years, in 2018, the percent of interviews completed by a proxy ranged from 10-11% depending on the round.

An assistant helps the beneficiary answer specific questions, but unlike a proxy, an assistant does not answer all questions on behalf of the beneficiary. The assistant is chosen by the beneficiary to help in situations where the beneficiary could respond to the interview as long as he/she received some help from another knowledgeable person. Some examples of this are where a spouse or partner manages the Medicare statements for the household or maintains a calendar of medical visits and appointments. The percent of interviews completed with the help of an assistant in 2018 ranged from 15-17%, again depending on the round.

Criteria for Proxy Selection. During Community Questionnaire administration, all beneficiaries are asked to identify a person or persons best able to provide information about health care visits and the costs of any health care the beneficiary may receive should the beneficiary not be able to complete a future interview. For Continuing round interviews, the named proxy is in the case management system, along with information indicating if a proxy completed the interview in the prior round. Community components conducted with proxies follow a slightly different path than those administered directly to the beneficiary (see Section 4.1 for the Community Questionnaire flow and 4.1.3: Operational and Procedural for a description of the INQ).

When initial contacts with Incoming Panel beneficiaries suggest possible comprehension or physical impairments that would make the interview difficult, interviewers work with their managers to determine if an assistant or proxy is necessary, and whom an appropriate person would be to serve as a proxy or assistant.

6.2.7 Interviewing Languages

The Community Questionnaire is programmed for administration in English or Spanish. The Facility Instrument is available for administration in English. Approximately 4 percent of Community components were conducted in Spanish in 2018.

Bilingual field interviewers are trained to administer the Community Questionnaire in both English and Spanish. The language of administration is captured within the questionnaire. In rare instances in which the beneficiary speaks a language other than English or Spanish, the interview is conducted in English with an English-speaking proxy or assistant acting as an interpreter for the beneficiary.

6.2.8 Questionnaire Breakoffs

Interviewers are able to suspend the interview prior to completion while administering both the Community and Facility components. This break-off feature provides flexibility to address schedule constraints, technical issues, and other extenuating circumstances that prevent completion of the interview in one sitting. Once restarted, the CAPI resumes at the screen of the last question administered. If a questionnaire is broken off, it must be fully administered before the end of the round to count as a completed interview. If the suspended questionnaire is never completed, it is finalized as a *Final Breakoff* at the end of the round (see Chapter 8 for more information on weighting and imputation procedures).

6.3 Data Collection Results

An interview is considered to be complete once administration of all questionnaire sections to the respondent has concluded, the Interviewer Remarks Questionnaire (IRQ) is completed, and data are fully transmitted. In 2018, the mean length of interviews was reduced from 2017 due to improvements in the flow of the questionnaire and the ease of using look up tools. The mean length of winter round Community components was about 56 minutes, while the mean length of summer round Community components was about 61 minutes. The mean length of fall round interviews was about 54 minutes for the Incoming Panel and approximately 75 minutes for Continuing beneficiaries.

Exhibit 6.3.1 provides the count of completed interviews by round and component for 2018. Detailed information on response rates can be found in Chapter 9.

Exhibit 6.3.1: 2018 Completed Interviews by Component

Round	Component	Completed Interviews	Mean Interview Duration (minutes)
Winter 2018	Community	11,443	55.8
	Facility	871	42.1
Summer 2018	Community	8,362	61.3
	Facility	661	23.4*
Fall 2018	Community	13441	62.6
	Facility	1,005	45.7

*This decrease is due to the removal of the Prescribed Medicines section. See section 7.4.2 for more information.

6.4 Data Collection and Quality Control

To ensure the collection of high quality data, several quality control procedures are conducted including systematic review of questionnaire data and case management paradata, follow-up contacts with respondents, and ongoing interviewer coaching. Systematic review of interview recordings and ride-along observations of in-person interviews are used to directly observe interviewer interaction with beneficiaries and provide feedback. Verification phone calls and review of survey data are also conducted to validate interviewer performance.

The systematic monitoring and evaluation of interview performance and verification is primarily conducted via digital computer-assisted recorded interview (CARI) recordings. A subset of questionnaire items is recorded with respondent consent. By listening to a random sample of CARI recordings, supervisors identify areas where interviewers require correction in administration, stress the improvement of interviewer techniques to add clarity or minimize potential bias, and emphasize standardization in approach and administration. Any serious deviations from protocol or data quality concerns are reviewed for corrective action in consultation with field management.

Data review procedures are also enacted to identify any systematic CAPI issues resulting from the data collection effort. In 2018, data review procedures consisted of two components: review of survey data within the preload data cleaning process, and review of metadata to assess interviewer performance. Because the Continuing interview by design is highly dependent upon data collected in prior rounds, a multistep cross-team process is used to review questionnaire data prior to preloading for the next data collection round (see Section 7.1). The data cleaning process, including structure, logic and reasonableness checks, informs future questionnaire development as well as additional training and follow-up.

Finally, field managers periodically contact respondents throughout the round to verify the interview was conducted, confirm the interviewer was present, and collect administration information. When necessary, field managers use CARI reports and data review feedback that indicate potential quality issues to prioritize follow-up contacts in order to collect additional information for coaching purposes.

7. DATA PROCESSING AND DATA DELIVERY

Longitudinal data collection requires both interim and final post-processing of the data in order to prepare them for release. These activities include data editing, for both preloading subsequent round instruments and final file production, data concatenation and reconciliation for the annual data products including the Survey File and Cost Supplement File, and the development of other post-processing inputs to the files. This chapter describes both the data editing process and the annual data concatenation and reconciliation process.

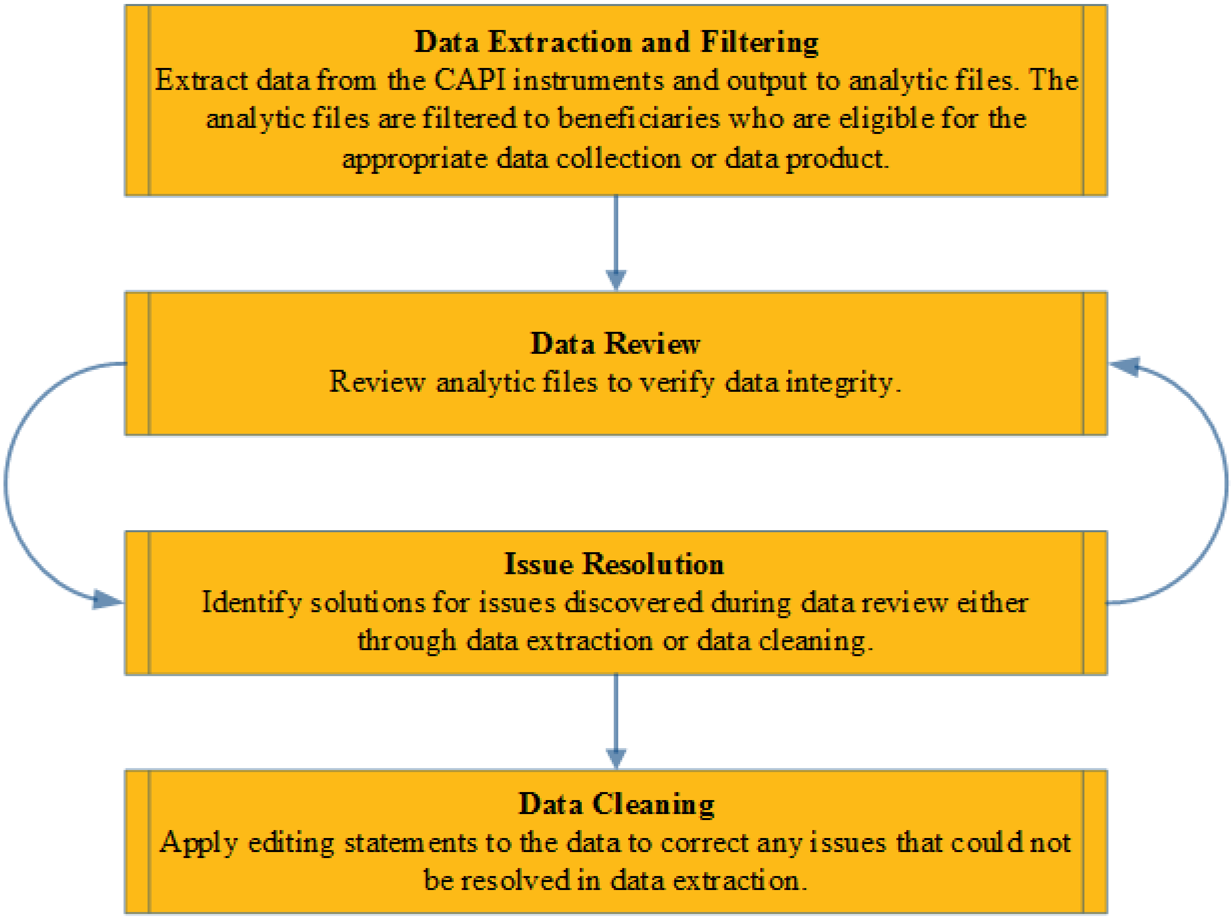
7.1 Data Processing Overview

During the interview process, beneficiaries may provide information that is either incomplete or inconsistent (internally or with administrative records). These data require further processing to ensure the highest quality of estimates produced from the MCBS. The processing may involve resolving inconsistencies using logical methods or utilizing imputation techniques, where appropriate, to fill in missing information. Thus, CAPI data are reviewed and processed for three primary purposes: Community Questionnaire and Facility Instrument preloads, the 2018 Survey File, and the 2018 Cost Supplement File. The same types of data review and processing protocols are used for each effort, with different source instruments and editing protocols. This section provides an overview of data review and processing procedures. The sections that follow will provide further description of the data cleaning efforts.

7.1.1 Process Description

Exhibit 7.1.1 illustrates the steps and iterative nature of the data review and editing process.

Exhibit 7.1.1: Data Review and Editing Process



Data Extraction and Filtering. At the conclusion of data collection in each round, data are extracted from the raw Community and Facility CAPI instruments and transformed into SAS analytic files for further processing. This extraction includes the development of appropriate questionnaire metadata. Prior to data review, the individual records and associated analytic files are limited to beneficiaries who are deemed eligible for the appropriate data collection or data product.

Data Review and Issue Resolution. Given the complexity of the data structure, the analytic files undergo column and row checks to confirm each individual analytic file is structurally sound. Column checks confirm that all necessary variables are on the file, verify variable attributes, and identify high rates of missingness or out of range values. Row checks confirm the inclusion of expected beneficiary IDs and check for duplicate or missing linking variables. Structural issues discovered during this process may reinitiate the data extraction process or may be resolved in data cleaning.

Logic and reasonableness checks follow for each analytic file. Logic checks are used to verify that the questionnaire worked as expected, particularly with respect to questionnaire routing and skip logic. The complexity of the event and cost questionnaire sections requires particular attention to the CAPI routing routines specific to these portions of the questionnaire. Errors identified during logic checking result in two types of data edits: flagging values that were incorrectly skipped or setting incorrectly populated values to null to indicate a valid missing.

Furthermore, unreasonable or impossible values are identified via checks for values that are not explicitly disallowed by the questionnaire. For example, in the Community Questionnaire, male beneficiaries should not report female-only conditions, like cervical cancer. Continuous variables are reviewed to identify illogical extreme values. For instance, in the Community Questionnaire, the number of living children reported by the beneficiary cannot exceed 20. Based on the results of this data review, edits are developed to either set the unreasonable or impossible value to a logical value or an inadmissible code during data cleaning.

Beginning in 2017 and continuing in 2018, other specify responses for open-ended variables are reviewed and backcoded into existing codeframes when possible.

A number of cleaning steps also fix common misspellings and other errors, such as typos, in the verbatim fields entered by interviewers and standardize the spacing, punctuation, abbreviations, and other formatting of the prescription medicine information. Another cleaning step populates prescription medicine name, strength, brand name, generic name, form, and form code with values from the First Databank (FDB) through a look up tool. This simplifies the subsequent CMS process of matching the PMED list to FDB list of prescription medicines and to administrative claims information.

Data Cleaning. Once the data review and issue resolution steps are complete for each analytic file, data cleaning routines are implemented. During data cleaning, any needed edits identified above are applied to the analytic file and additional quality control (QC) is conducted to ensure that the edits are applied correctly.

7.2 Preload Editing and File Production

This section describes Community Questionnaire and Facility Instrument preload production, including the purpose of preloads, examples of preloaded variables, and a general description of timeline and processes. The preload process feeds back questionnaire data from previous rounds' interviews and populates the Community and Facility CAPI instruments to help drive data collection in the subsequent round. Preloaded data serve to both forestall asking MCBS respondents the same questions in subsequent rounds and to act as the basis for collecting additional information about a medical event, insurer, or associated financial cost or payment. As the data must be loaded into an active CAPI instrument available to interviewers, it requires that the preload data are in a form that is recognized by the case management system, which supplies it to the Community Questionnaire and Facility Instrument in the field. Preloaded information is used to determine questionnaire routing and text fills.

For example, if a beneficiary previously reported having ever smoked cigarettes in his/her lifetime, the questionnaire can then use this information in a subsequent round to probe if the respondent is still smoking. The logic within the questionnaire that determines whether such a question is asked in the next round is driven by preload variables set during the preload process. Examples of preloaded data included information on health plans, medical events, insurance claims, prescription medicines, household members, facility characteristics, and facility stay history.

Preloads generally fall into two categories: direct response data and derived variables. Direct response data are raw questionnaire responses generated in one round that are passed through to the next round. For example, the list of a beneficiary's medical care providers are passed from one round's Community Questionnaire to the next via the preload process. Similarly, facility name and address are passed from one round's Facility Instrument to the next.

Derived variables require modification of the source data before being preloaded into the next round. Some modifications are quite complex and many derived variables have a significant impact on questionnaire functioning. Examples of derived variables include sample type assignments, Facility Instrument and Community Questionnaire reference dates, and the reason a cost is sent through Charge Payment Summary (CPS reason) (see Section 4.1 for more details on this questionnaire section).

7.2.1 Community and Facility Preload Process Description

The Community Questionnaire and Facility Instrument preload creation processes consist of five steps: data extraction and filtering, data review, issue resolution, data cleaning, and rollover. The first four steps were described in Section 7.1. The final phase of preload creation, which was not described previously, is the rollover process. After data review and editing occur, datasets are constructed with the data required for preloading. Key items set during the rollover process are the derived variables that assign sample type, reference dates, and CPS reason. Sample type assignment is based on previous interview history, including whether respondents missed the previous interview, crossed over from one component to the other, or are in their first year of the MCBS. This information is used to determine which questionnaire sections and items are administered and to set the reference dates for questionnaire items. Reference dates are used in the Community Questionnaire and Facility Instrument to define the time periods about which data will be collected in the upcoming round. There are a number of reference dates that are derived from the dates of the respondents' prior interviews. CPS reason determines which medical costs are collected in the Community Questionnaire based on whether the respondent has a billing statement for that item and whether the total charges were accounted for in previous rounds.

The rollover process, which is designed to ensure that all of the preload data are loaded properly into the questionnaire, occurs before every sample load in a round. The eligible population for each subsequent round is determined by examining case dispositions in the current round.

Thorough quality control steps, including ensuring the data types, dates, and variable definitions are appropriate, are conducted to ensure that preloaded data are successfully created according to the round-based specifications. The preload data needs to be in the specified format acceptable to the case management system, which then makes the preload data available to be called into the Community Questionnaire and/or Facility Instrument for the upcoming round.

7.2.2 Which Community data are included in the MCBS Limited Data Sets (LDS's)?

Community data that are incorporated into the Survey File LDS and Cost Supplement LDS for sampled beneficiaries eligible for Medicare in benefit year 2018 depend on a variety of factors, including beneficiary panel type, the four annual panels of sampled beneficiaries, multiple rounds of data collection, and different types of questionnaire items. The data that are collected in each round depend on the type of panel and the reference periods used by the questionnaires in the interview. Although one data year consists of one calendar year, data included in the LDS are actually collected over three years. Some data collected in the previous year are pulled forward to fill in data for the current data year. This happens when questionnaire items are administered only once (such as demographics) or when data are missing for the data year but valid values exist for the previous year. However, most data are collected during and after the data year.

When information for the data year is collected in the following year, it is generally because the reference period for the questionnaire extends back into the data year and the items are asked of the Medicare population enrolled and eligible in the data year. In the example below (Exhibit 7.2.3), the data year is 2018. There are four panels involved in data collection for 2018: one Incoming Panel (selected in 2018), two Continuing Panels (selected in 2016 and 2017), and one exit panel (selected in 2015). The rounds of data collection that fall within the data year are the Winter, Summer, and Fall rounds of 2018, with additional data for 2018 collected in the Winter and Summer rounds of 2019 (see Exhibit 7.2.3).

The Survey File LDS consists of questionnaire items collected as part of the Community Core questionnaire sections as well as items collected in the Community Topical questionnaire sections. The Core Survey File data for 2018 were collected in Summer and Fall 2018 and in Winter 2019. The Topical Survey File data were collected in Fall 2018 and Winter and Summer 2019. Each round's interview is based on reference periods, which extend from the time of the previous interview. For example, the Core Survey File Health Insurance (HIQ) questionnaire asks about changes to insurance plans during the reference period. In the Fall 2018 interview, this period would cover the time since completion of the Summer 2018 interview, while in Winter 2019 it would cover the time since completion of the Fall 2018 interview, meaning the reference period extends back into 2018. A reference period may also cover the entire data year. For example, the Income and Assets questionnaire is a Topical questionnaire section collected in the Summer 2019, but it collected beneficiaries' financial information for the 2018 data year. Beneficiaries in the Incoming Panel provided 2018 Survey File LDS data through participation in their first and second interviews in Fall 2018 and Winter 2019 and provided additional Topical data in Summer 2019. Members of the Continuing Panels have some of their data pulled forward from rounds collected in 2017, but provided most of their data through participation in the Summer and Fall of 2018 and Winter and Summer of 2019. Members of the exit panel likewise have data pulled forward from 2017 and were interviewed in Summer and Fall 2018 and Winter 2019, but were not interviewed in Summer 2019.

The Cost Supplement LDS consists of utilization and cost data for the 2018 data year. These data are collected from the five rounds that can have reference periods covering any part of the data year; for the 2018 data year, this includes the rounds from Fall 2017 through Winter 2019. Each interview's reference period covers the time between completion of the previous round and the current round. In the case that a beneficiary skips a round, the reference period for the following round covers the missing period by extending back to the date of the most recently completed interview. The Incoming Panel does not provide Cost Supplement data until their second interview in the winter following the data year. For newly eligible beneficiaries who enrolled in Medicare in 2018, the winter round reference period extends back to the date of completion of the Fall 2018 round, collecting utilization and cost data for the latter part of 2018. Members of the Incoming Panel who enrolled prior to 2018 have a Winter 2019 reference period that began on 1/1/2019 and will only provide Cost Supplement data for 2019 and later. For the Continuing and exit panels, a small amount of utilization and cost data comes from the Fall 2017 interview for cases who completed that round after the start of 2018 and had reference periods covering the beginning of 2018. However, most of the Cost Supplement data for these panels were collected through participation in the rounds from Winter 2018 through Winter 2019. The exit panel exited the survey in Winter 2019 and had a reference period that ended at 12/31/2018.

7.2.3 Which Facility data are included in the MCBS Limited Data Sets (LDS's)?

Like Community, Facility data that are incorporated into the Survey File LDS and Cost Supplement LDS for sampled beneficiaries eligible for Medicare in benefit year 2018 depend on a variety of factors, including beneficiary panel type, the round of data collection, and type of questionnaire item. As with Community data, some Facility data collected in a previous year are pulled forward to fill in data for the current data year. This happens when questionnaire items are administered only once or when data are missing for the data year but valid values exist from a previous year. However, most data are collected during and after the data year.

The Survey File LDS Facility data for 2018 were collected in Winter, Summer, Fall 2018, and Winter 2019 as part of the Facility Core questionnaire sections. Unlike the Community Questionnaire, the Facility Instrument does not contain any Topical sections.

Like Community, the Cost Supplement LDS consists of Facility utilization and cost data for the 2018 data year. These data are collected from the four rounds that can have reference periods covering any part of the data year; for the 2018 data year, this includes the rounds from Winter 2018 through Winter 2019. Each interview's reference period covers the time between completion of the previous round and the current round. In the case that a beneficiary skips a round, the reference period for the following round covers the missing period by extending back to the date of the most recently completed interview.

Regarding which panels have data in the Cost Supplement LDS, the Incoming Panel is not included in the Facility Cost Supplement data. The Cost Supplement data for the Continuing Panel was collected through participation in the rounds from Winter 2018 through Winter 2019. The exit panel exited the survey in Winter 2019 and had a reference period that ended at 12/31/2018.

Exhibit 7.2.3: Rounds of Data Collection and Reference Periods for Community Data Included in the 2018 Limited Data Sets*

Incoming Panel

Calendar Year 1 (CY1) - 2018												**Calendar Year 2 (CY2) - 2019**							
Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug
Winter			**Summer**				**Fall**					**Winter**				**Summer**			
							Topical					Topical				Topical			
							Survey File					Survey File				Survey File			
												Cost Supplement Newly eligible enrollees: (data only collected through 12/31/CY1) 2018 Incoming Panel (data collected only from 1/1/CY2)				Cost Supplement			

Continuing Panel

CY1 – 2018												**CY2 - 2019**							
Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug
Winter			**Summer**				**Fall**					**Winter**				**Summer**			
							Topical					Topical				Topical			
Survey File			Survey File				Survey File					Survey File				Survey File			
Cost Supplement			Cost Supplement				Cost Supplement					Cost Supplement (data through 12/31/CY1)				Cost Supplement			

Continuing Panel - Exit Year

CY1 – 2018												**CY2 - 2019**							
Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug
Winter			**Summer**				**Fall**					**Winter**				**Summer**			
							Topical					Topical							
Survey File			Survey File				Survey File					Survey File							
Cost Supplement			Cost Supplement				Cost Supplement					Cost Supplement (data through 12/31/CY1)							

*Note: *Note: Data in this table were collected in calendar years 2018 and/or 2019 and included in the LDS released in 2018. Cost Supplement data reflect the data year of interest (i.e., 1/1/CY1 – 12/31/CY1). In other words, the data included in the 2018 Cost Supplement LDS are based on survey reported information within the year of interest not rounds of data collection. In contrast, for the 2018 Survey File LDS, data were collected in Summer and Fall 2018 and Winter 2019. Data collected in Winter 2019 are included in the 2018 Survey File LDS if the survey items ask about experiences/coverage since the date of the beneficiary's last fall interview in 2018. For some Topical sections such as RXQ and the food insecurity items in the IAQ, the data are collected in Summer 2019, but included with the 2018 LDS's given the reference period is between 1/1/CY1 – 12/31/CY1.

Exhibit 7.2.4: Rounds of Data Collection and Reference Periods for Facility Data Included in the 2018 Limited Data Sets*

Incoming Panel

Calendar Year 1 (CY1) - 2018												Calendar Year 2 (CY2) - 2019			
Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec	Jan	Feb	Mar	Apr
Winter			**Summer**				**Fall**					**Winter**			
							Survey File					Survey File			

Continuing Panel

CY1 – 2018												CY2 - 2019			
Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec	Jan	Feb	Mar	Apr
Winter			**Summer**				**Fall**					**Winter**			
Survey File			Survey File				Survey File					Survey File			
Cost Supplement			Cost Supplement				Cost Supplement					Cost Supplement (data through 12/31/CY1)			

Continuing Panel - Exit Year

CY1 - 2018												CY2 - 2019			
Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec	Jan	Feb	Mar	Apr
Winter			**Summer**				**Fall**					**Winter**			
Survey File			Survey File				Survey File					Survey File			
Cost Supplement			Cost Supplement				Cost Supplement (data through 12/31 CY1)					Cost Supplement (data through 12/31/CY1)			

*Note: Data in table were collected in calendar year 2018 and calendar year 2019 and included in the LDS released in 2018.

7.3 MCBS 2018 Survey File

The 2018 Survey File release is built from 39 analytic data files encompassing Community and Facility data collection from five rounds of data including Winter 2018, Summer 2018, Fall 2018, Winter 2019, and Summer 2019. These files are input into CMS processes that generate the final data files available to the public. More detail about the 2018 Survey File LDS is provided in the *2018 Data User's Guide: Survey File*. This section describes the eligibility criteria for the analytic files, file preparation, and file contents.

7.3.1 File Eligibility Criteria

The Core Survey File data for 2018 were collected in Winter, Summer, and Fall 2018. The Topical questionnaire data were collected in Fall 2018 and Winter and Summer 2019. The inclusion criteria for these analytic files include: beneficiaries continuously residing in the Community or Facility, beneficiaries who move between a Facility and the Community, proxy respondents for deceased beneficiaries, or individuals who lost entitlement to Medicare. A beneficiary only needs to have completed a Community or Facility component in one of the data collection rounds of interest to be included in these analytic files. That is, if a beneficiary has a completed interview in any eligible round in any component (i.e., Community or Facility), then that beneficiary's data are included in the analytic files. However, specific files have additional criteria that a case needs to meet for inclusion. For example, some segments require that beneficiaries reside in a facility at the time of their fall interview in order to be included in the file (see also Exhibit 7.1.1 for an overview of the steps in and iterative nature of the data review and editing process).

7.3.2 File Contents

Community. There are two subcategories of Community analytic files included in the MCBS Survey File. First, the Community Continuing questionnaire section analytic files contain data collected in questionnaire sections critical to the purpose of the MCBS. Core data are collected in each round of an annual data collection cycle. Second, the Community Topical questionnaire section analytic files contain data collected in questionnaire sections that cover special interest issues. Topical data may be collected every round or on a seasonal basis. See Chapter 4 (Exhibits 4.1.4 and 4.1.6) for a list of the Community questionnaire sections included in each data file.

Community Continuing Questionnaire Sections

The Community Survey File contains information about access to medical care, health status and functioning, health insurance plans, medical providers, and income and assets. The Survey File does not include survey-reported cost, health care utilization, or case management data.

Community Topical Questionnaire Sections

The Community Questionnaire includes sections that are focused on specific topics of interest, such as mobility of beneficiaries and preventive care and drug coverage. The 2018 Survey File contains data from some sections that were administered in the Winter 2019 (Round 83) and Summer 2019 (Round 84) but have reference periods for 2018. These files are processed in combination with the 2018 Survey File deliveries and as a result, Topical analytic files are considered part of the MCBS 2018 Survey File.

Facility. The Facility analytic files only contain Core questionnaire sections critical to the purpose of the MCBS. There are no Facility Topical questionnaire section analytic files.

Facility Continuing Questionnaire Sections

Facility Survey File data contains information about access to medical care, health status and functioning, health insurance plans, facility characteristics, and beneficiary characteristics. See Chapter 4 (Exhibit 4.2.4) for a list of Facility Instrument sections included in each data file. The Survey File does not include cost, health care utilization, or case management data.

7.3.3 Reference Period

Reference Period is a data editing process that uses case management data to define time periods in 2018 covered by Community and Facility survey data. Along with Insurance Timeline discussed below, it is an interim data product that is not part of the final Survey File or Cost Supplement File LDS's because it feeds into the final segments. Reference Period is run for all beneficiaries who had interviews in 2018 and includes all beneficiaries with a positive Survey File Ever Enrolled weight. Reference Period creates a calendar history of a beneficiary's MCBS interviews as it compares to the beneficiary's residence in the Community and/or in the Facility during the year. This calendar of residence and interview activity is used to create the residence timeline (RESTMLN) segment file and to determine in which files to include Community and Facility data for each beneficiary.

7.3.4 Insurance Timeline

Insurance Timeline is a production process that creates a calendar history of a beneficiary's insurance plans and types of insurance coverage. The process pulls together health insurance plan data from the Community Questionnaire, Facility Instrument, and administrative records. Insurance Timeline in 2018 was produced for the same population as was assigned a Survey File Ever Enrolled weight. A combination of survey-collected data and administrative data are used to create the timeline of health insurance coverage for the period in which a beneficiary participated in the survey. For beneficiaries who leave the survey prior to completion of their full study tenure, the end date of their insurance coverage is recorded as the date of the last completed interview. It should be noted that in all likelihood, their insurance coverage extends beyond this date, but no data are available to determine the actual coverage end date.

Insurance plan timelines are constructed independently across these three data sources. Plans that are identical across data collection periods are collapsed into one record, with each time period identified as having definite or possible coverage by the plan. Plans identified as "Medicare HMO" in the Community Questionnaire data are linked to Medicare Advantage (MA) plans in the administrative and claims data. Finally, the timelines from each of the three data sources are concatenated. The resulting dataset allows these timelines to be examined independently or together to understand insurance coverage in the calendar year for each beneficiary. Plan coverage data from the Insurance Timeline are used downstream to define potential sources of payment in the Event Cost Consolidation process as well as to construct monthly insurance coverage records for each beneficiary.

7.4 MCBS 2018 Cost Supplement File

The Cost Supplement File data include information on beneficiaries' medical events occurring in 2018 and the cost of those events. The Cost Supplement File LDS contains cost and utilization data collected in Winter, Summer, and Fall 2018 about utilization and expenditures occurring in 2018. Cost and utilization collected in Fall 2017 and Winter 2019 are also included, provided they fall within the 2018 reference period. More detail about the 2018 MCBS Cost Supplement File LDS is described in the *2018 Data User's Guide: Cost Supplement File*.

Substantial post-processing is applied to the questionnaire items related to health care events, the costs and payments associated with those events, and the source of payments. This is the result of the way in which the annual data collection occurs. Four processes are used to create the inputs to the final data files. The four processes build annualized files, define eligibility for the Cost Supplement File, and create events that are linked to defined payers and the cost of the services provided. The first three analytic processes are inputs to the claims match process that return matched events for additional post-processing and imputation. The final process, the facility stay file, combines all the steps already described for the Community Questionnaire and adds the claims match into a single step. The facility stay process then generates data files for the production of the Cost Supplement File release.

These processes (event cost consolidation, prescription medicine file, and facility stay file) are described below. The shared goals of all of these interim analytic steps are to combine data across rounds, annualize eligibility for data release, and create analytic products that can be consumed in the context of the final file production. These interim data products are not part of the final Survey File or Cost Supplement File releases because they feed into the final. Each interim analytic product is described below.

7.4.1 Event Cost Consolidation

Event Cost Consolidation creates a file containing health care events and their associated costs, payments, provider information, and dates of service for all health care utilization reported by or on behalf of beneficiaries residing in the community. The process matches events to reported periods of insurance coverage as summarized by Insurance Timeline to identify possible and definite sources of coverage for each event. Reported charges and payments are matched before being appended to the file of events. The process then applies global editing rules to resolve partial charges and charges with incomplete cost information. Finally, records for recurring events are replicated to represent repeated instances of these events. The resulting dataset of consolidated event and cost information is used to match survey-reported events to Medicare claims. These matched results are the inputs to the Prescription Medicine and non-Prescription Medicine Imputation processes and the final Cost Supplement Files.

7.4.2 Prescription Medicine File

The Prescription Medicine (PMED) file is a list of all prescription medicines that are collected by the MCBS. For 2018, the list included every combination of prescription medicine names, forms, and strengths provided by MCBS respondents during interviews conducted in 2018 (including a total of five rounds between Fall 2017 and Winter 2019). It includes both medicines that were reported by MCBS respondents for the first time during one of these five rounds and refilled medications that were originally reported earlier, but updated as being currently prescribed during one of these five rounds. It only includes medicines that were reported during the Community Questionnaire administration for beneficiaries who were eligible to be included in the Cost Supplement File.

The process of creating the PMED file includes assembling a full list of all beneficiaries' reported prescribed medicines for 2018 from the Community Questionnaire, de-duplicating it, developing and implementing cleaning rules, and then de-duplicating the list again after the cleaning process was complete. For the 2018 data, the final file included just over 9,500 unique medicines. This represents a substantial decrease in file size compared to 2017, which included just over 28,000 records. The decrease reflects an increase in the data quality of prescription medicine information, facilitated by the addition of the Prescription Medicine Lookup tool to the MCBS questionnaire in the fall of 2017, which led to improved efficiency and standardization.

7.4.3 Facility Stay File

The Facility Stay File summarizes data related to facility characteristics, costs and payments, and health care utilization for interviews conducted on behalf of beneficiaries residing in facilities. The process brings in data from the Facility Instrument and reconfigures the data to create one record per facility stay during the calendar year. Medicare Claims data for inpatient hospital visits and skilled nursing facility visits are matched to Facility Instrument data to provide more accurate reporting of Medicare payments. Three imputation routines are applied within the context of the Facility Stay process to remedy missing data issues with payments, as well as edit outliers and other anomalies. The Facility Stay File population in 2018 included any beneficiaries in the Continuing Panels completing one or more Facility Instrument interviews covering residence in an MCBS-eligible facility for one or more days in 2018.

8. WEIGHTING AND IMPUTATION

8.1 Overview

Weighting and imputation are used in surveys to enhance the usability of the data for analysis and increase the accuracy of resulting estimates. Weights are calculated to reduce potential nonresponse and sample coverage bias, ensuring that the sample is representative of the population of interest. They are especially important when particular sampling methods are in place, such as stratification, cluster sampling, and oversampling of particular populations. The MCBS employs all of these sampling methods; weights then account for the resulting differences in probabilities of selection as well as nonresponse, and are also calibrated to control totals using post-stratification. Imputation is used to replace missing values of survey variables with admissible complete values and create data where they were not actually collected, allowing for the retention of observations for statistical analysis that would otherwise be excluded. MCBS imputation falls under two umbrellas that focus on imputing monetary amounts: Income and Asset (IA) imputation, and Event, Payer, and Cost imputation, which includes imputation for Prescription Medicine (PM) and Non Prescription Medicine (Non PM) events and costs. The weighting and imputation methods used for the MCBS are described in detail below.

8.2 MCBS Weighting Procedures

8.2.1 Overview

Weighting activities for the 2018 data year consist primarily of four main stages. The first is the initial weighting stage in which the members of the Incoming Panel are given base weights, and these weights are then raked to population control totals and adjusted for nonresponse at the first interview (Fall 2018). The remaining three stages of weighting each lead to delivered weights files. These are the Survey File weights, the Cost Supplement weights, and the weights for Topical questionnaire sections. A listing of all of the weights for the MCBS is presented in Exhibit 8.2.1.

Exhibit 8.2.1: 2018 MCBS Data Files Summary of Weights

Limited Data Set	Description	Segment	Full-Sample Weight	Replicate Weights	Population
Survey File	Continuously Enrolled Cross-Sectional Weights	CENWGTS	CEYRSWGT	CEYRS001-CEYRS100	Continuously enrolled from 1/1/2018 through the fall of 2018
Survey File	Ever Enrolled Cross-Sectional Weights	EVRWGTS	EEYRSWGT	EEYRS001-EEYRS100	Ever enrolled for at least one day at any time during 2018
Survey File	Continuously Enrolled Two-Year Longitudinal Weights	LNG2WGTS	L2YRSWGT	L2YRS001-L2YRS100	Continuously enrolled from 1/1/2017 through the fall of 2018
Survey File	Continuously Enrolled Three-Year Longitudinal Weights	LNG3WGTS	L3YRSWGT	L3YRS001-L3YRS100	Continuously enrolled from 1/1/2016 through the fall of 2018
Survey File	Continuously Enrolled Four-Year Longitudinal Weights	LNG4WGTS	L4YRSWGT	L4YRS001-L4YRS100	Continuously enrolled from 1/1/2015 through the fall of 2018
Cost Supplement File	Ever Enrolled Cross-Sectional Weights	CSEVRWGT	CSEVRWGT	CSEVR001-CSEVR100	Ever enrolled for at least one day at any time during 2018

Limited Data Set	Description	Segment	Full-Sample Weight	Replicate Weights	Population
Cost Supplement File	Two-Year Longitudinal Weights	CSL2WGTS	CSL2YWGT	CSL2Y001- CSL2Y100	Enrolled at any time during both 2017 and 2018
Cost Supplement File	Three-Year Longitudinal Weights	CSL3WGTS	CSL3YWGT	CSL3Y001- CSL3Y100	Enrolled at any time during each of 2016, 2017, and 2018
Survey File Topical Section	KNQ Survey File Ever Enrolled	MCREPLNQ	KNSEWT	KNSE1-KNSE100	Ever enrolled in 2018 and still alive, entitled, and not residing in a facility in Winter 2019
Survey File Topical Section	KNQ Survey File Continuously Enrolled	MCREPLNQ	KNSCWT	KNSC1-KNSC100	Continuously enrolled in 2018 and still alive, entitled, and not residing in a facility in Winter 2019
Survey File Topical Section	KNQ Cost Supplement Ever Enrolled	MCREPLNQ	KNCEWT	KNCE1-KNCE100	Ever enrolled in 2018 and still alive, entitled, and not residing in a facility in Winter 2019
Survey File Topical Section	ACQ Survey File Ever Enrolled	ACCSSMED	ACSEWT	ACSE1-ACSE100	Ever enrolled in 2018 and still alive, entitled, and not residing in a facility in Winter 2019

Limited Data Set	Description	Segment	Full-Sample Weight	Replicate Weights	Population
Survey File Topical Section	ACQ Survey File Continuously Enrolled	ACCSSMED	ACSCWT	ACSC1-ACSC100	Continuously enrolled in 2018 and still alive, entitled, and not residing in a facility in Winter 2019
Survey File Topical Section	ACQ Cost Supplement Ever Enrolled	ACCSSMED	ACCEWT	ACSFCE1-ACSFCE100	Ever enrolled in 2018 and still alive, entitled, and not residing in a facility in Winter 2019
Survey File Topical Section	USQ Survey File Ever Enrolled	USCARE	USSEWT	USSE1-USSE100	Ever enrolled in 2018 and still alive, entitled, and not residing in a facility in Winter 2019
Survey File Topical Section	USQ Survey File Continuously Enrolled	USCARE	USSCWT	USSC1-USSC100	Continuously enrolled in 2018 and still alive, entitled, and not residing in a facility in Winter 2019
Survey File Topical Section	USQ Cost Supplement Ever Enrolled	USCARE	USCEWT	USCE1-USCE100	Ever enrolled in 2018 and still alive, entitled, and not residing in a facility in Winter 2019

Limited Data Set	Description	Segment	Full-Sample Weight	Replicate Weights	Population
Survey File Topical Section	IAQ Survey File Ever Enrolled	INCASSET	INSEWT	INSE1-INSE100	Ever enrolled in 2018 and still alive, entitled, and not residing in a facility in Summer 2019
Survey File Topical Section	IAQ Survey File Continuously Enrolled	INCASSET	INSCWT	INSC1-INSC100	Continuously enrolled in 2018 and still alive, entitled, and not residing in a facility in Summer 2019
Survey File Topical Section	IAQ Cost Supplement Ever Enrolled	INCASSET	INCEWT	INCE1-INCE100	Ever enrolled in 2018 and still alive, entitled, and not residing in a facility in Summer 2019
Survey File Topical Section	IAQ Survey File Ever Enrolled	FOODINS	FDSEWT	FDSE1-FDSE100	Ever enrolled in 2018 and still alive, entitled, and not residing in a facility in Summer 2019
Survey File Topical Section	IAQ Survey File Continuously Enrolled	FOODINS	FDSCWT	FDSC1-FDSC100	Continuously enrolled in 2018 and still alive, entitled, and not residing in a facility in Summer 2019

Limited Data Set	Description	Segment	Full-Sample Weight	Replicate Weights	Population
Survey File Topical Section	IAQ Cost Supplement Ever Enrolled	FOODINS	FDCEWT	FDCE1-FDCE100	Ever enrolled in 2018 and still alive, entitled, and not residing in a facility in Summer 2019
Survey File Topical Section	PAQ Survey File Enrolled	PNTACT	PASEWT	PASE1-PASE100	Ever enrolled for at least one day at any time during 2018
Survey File Topical Section	PAQ Survey File Continuously Enrolled	PNTACT	PASCWT	PASC1-PASC100	Continuously enrolled from 1/1/2018 through the fall of 2019
Survey File Topical Section	PAQ Cost Supplement Ever Enrolled	PNTACT	PACEWT	PACE1-PACE100	Ever enrolled for at least one day at any time during 2018
Survey File Topical Section	RXQ Survey File Ever Enrolled	RXMED	RXSEWT	RXSE1-RXSE100	Ever enrolled in 2018 and still alive, entitled, and not residing in a facility in Summer 2019
Survey File Topical Section	RXQ Survey File Continuously Enrolled	RXMED	RXSCWT	RXSC1-RXSC100	Continuously enrolled in 2018 and still alive, entitled, and not residing in a facility in Summer 2019

Limited Data Set	Description	Segment	Full-Sample Weight	Replicate Weights	Population
Survey File Topical Section	RXQ Cost Supplement Ever Enrolled	RXMED	RXCEWT	RXCE1-RXCE100	Ever enrolled in 2018 and still alive, entitled, and not residing in a facility in Summer 2019
Survey File Topical Section	CPQ Survey File Ever Enrolled	CHRNPAIN	CPSEWT	CPSE1-CPSE100	Ever enrolled in 2018 and still alive, entitled, and not residing in a facility in Summer 2019
Survey File Topical Section	CPQ Survey File Continuously Enrolled	CHRNPAIN	CPSCWT	CPSC1-CPSC100	Continuously enrolled in 2018 and still alive, entitled, and not residing in a facility in Summer 2019
Survey File Topical Section	CPQ Cost Supplement Ever Enrolled	CHRNPAIN	CPCEWT	CPCE1-CPCE100	Ever enrolled in 2018 and still alive, entitled, and not residing in a facility in Summer 2019

8.2.2 Process

Initial weighting requires receipt of the final combined enrollment data extracts and the finalization of the interview dispositions in the fall round of the data year (i.e., Round 82 for the 2018 data year). Survey File weighting follows initial weighting. Cost Supplement File weighting requires completion of the Survey File weighting process and the Reference Period process. Topical questionnaire sections related to the Survey File and Cost Supplement File are weighted separately as they are fielded in the winter and summer rounds following the data year.

8.2.3 2018 Initial Weighting

In the initial weighting stage, the initial nonresponse adjusted weights for the Incoming Panel of Medicare beneficiaries, which for the 2018 data year is referred to as the “2018 Panel” or the “Incoming Panel”, are derived. First, base weights are calculated based on the probabilities of selection for the beneficiaries in the panel and 100 replicate weights for use in variance estimation are created. Then, these weights are raked to population control totals. Finally, the weights are adjusted for nonresponse at the first interview in Fall 2018.

Full-sample and Replicate Raked Base Weights. A full-sample base weight is derived for all beneficiaries in the 2018 Panel. The base weight is equal to the inverse of the beneficiary’s overall probability of selection and reflects probabilities at the PSU, SSU, and beneficiary (USU) sampling stages. Let $\pi k \mid i j$ be the conditional probability of selection for beneficiary k given the PSU i and the SSU j, such that $\pi k \mid i j = \rho 1ak|i j$ for beneficiaries in the Hispanic sampling stratum and age group a, and similarly equals $\rho\text{-}1ak|i j$ and $\rho 2ak|i j$ for beneficiaries in the non-Hispanic and Puerto Rico sampling strata, respectively, as described in Chapter 3. Then, for all selected beneficiaries, the base weights are defined by

$$W_{1ijk} = \frac{20}{\pi_i \pi_{j|i} \pi_{k|ij}}$$

where πi is the probability of selection for the PSU, $\pi j \mid i$ is the conditional probability of selection for the j-th SSU given the PSU, and $\pi k \mid i j$ is the conditional probability of selection for the k -th beneficiary in the 5-percent enrollment data extract given the PSU and SSU.

Then, one hundred replicate base weights are derived from the full sample base weights, using the variance stratum and the variance unit of the beneficiary. The variance strata and variance units are derived from the PSUs and SSUs used for sampling. For sampled beneficiary ijk as described above, the $\alpha = 1, \ldots, 100$ replicate weights for BRR estimation are defined by

$$W_{1ijk\alpha} = \begin{cases} \{\tau(H_{h\alpha}+1) + (1-\tau)(1-H_{h\alpha})\}\, W_{1ijk} & \text{if in stratum } h \text{ and unit 1} \\ \{\tau(1-H_{h\alpha}) + (1-\tau)(H_{h\alpha}+1)\}\, W_{1ijk} & \text{if in stratum } h \text{ and unit 2} \end{cases}$$

where H_{ha} is the associated element in a 100x100 Hadamard matrix. For calculation purposes, this can be written as

$$W_{1ijk\alpha} = 2\left[\tau\delta_{j\alpha} + (1-\tau)(1-\delta_{j\alpha})\right] W_{1ijk}$$

where τ is a compositing factor between zero and one, δ_{ja} is a 0-1 indicator of whether the beneficiary is in replicate half-sample a as determined by the value of H_{ha} , and W_{1ijk} is the base sampling weight for the beneficiary. A value of τ = 0.85 is used, continuing the practice used in prior MCBS years.

The full-sample and replicate base weights are then adjusted in such a way that the sum of the weights for various demographic domains are equal to pre-determined control totals based on the enrollment data extracts, through a process called "raking." The final enrollment data 5-percent extract, received in January 2019, contained additional records for beneficiaries who became eligible near the end of 2018. Due to the timing of this file, these newly-added beneficiaries were not subjected to sampling and could not be included in the 2018 Panel. This small amount of effective population undercoverage is adjusted for in this raking step. Thus, even though those beneficiaries are not eligible for sampling, they are counted in the population totals. This ensures that the weights for the 2018 Panel sum to the correct population total.

The raked full-sample weight is defined by

$$W_{2ijk} = \varphi_{ijk} W_{1ijk}$$

where φ_{ijk} is the raking step adjustment factor for beneficiary ijk. The raking process calibrates the weights by adjusting them to match the control totals for the first raking dimension, then for the second raking dimension, then for the third dimension, and so on, iterating until the weights perfectly match the control totals in all dimensions. The four dimensions used at this raking step are

1. Age Group (5-level) × Sex (2-level) × Race (2-level)
2. Census Region (4-level) × Age Group (5-level)
3. Metropolitan Status (2-level) × Age Group (5-level)
4. Accretion year (6-level; year of enrollment in Medicare)
5. Medicare Advantage (MA) plan enrollment (2-level; MA plan or traditional Medicare)

This adjustment, and all adjustments mentioned in the remainder of this chapter, are made both to the full-sample weights and the 100 replicate weights.

Initial Nonresponse Adjustments. The raked base weights for the 2018 Panel are then adjusted for nonresponse at the first interview in Fall 2018. The response statuses in Fall 2018 are determined, where a respondent is a beneficiary that is alive and entitled and completed the Fall 2018 interview. Nonresponse adjustment cells are constructed prior to performing the adjustment. First, the beneficiaries are divided into three primary adjustment cells: alive community, deceased community, and facility residents.

Separately within each of these main adjustment cells, response propensity models are fit using logistic regression to model the probability of response at Fall 2018 as a function of covariates derived from multiple sources. These include county-level American Community Survey (ACS) estimates, tract-level ACS estimates, county-level physician fee schedules, rural-urban and Metropolitan Statistical Area (MSA) information, and administrative and claims data at the beneficiary level. Generally, the covariates are selected into the logistic regression model using stepwise selection procedure with an entry p-value of 0.10 and a stay p-value of 0.15. Using the predicted response probabilities, beneficiaries are grouped into cells of approximately 100 each. Separately within each of these cells, a ratio adjustment is performed to distribute the weights of the nonrespondents to the respondents, where the adjusted weights are defined by

$$W_{3ijk} = \left(\frac{\sum_{ijk} W_{2ijk}}{\sum_{ijk} I(ijk \in R) W_{2ijk}} \right) W_{2ijk}$$

where $I(ijk \in R)$ is a 0-1 indicator function indicating whether beneficiary $i\,j\,k$ was a respondent to the first round of interviewing. In other words, the raked weights are adjusted by a factor equal to the ratio of the sum of the weights in the sample in the cell to the sum of the weights among only the respondents in the adjustment cell. The resulting weights are the initial nonresponse-adjusted weights for the 2017 panel.

8.2.4 2018 Survey File Weights

The 2018 Survey File data were collected in Summer and Fall 2018 from beneficiaries sampled in the 2015 through 2018 annual panels. To facilitate estimation from the resulting data, six sets of full-sample and replicate weights are derived. These include 2018 continuously enrolled cross-sectional weights; 2-year longitudinal weights for analysis of 2017-2018 data; 3-year longitudinal weights for analysis of 2016-2018 data; 4-year longitudinal weights for analysis of 2015-2018 data; and finally, the 2018 ever enrolled weights. In addition to the weights, the dataset includes the panel (selection year) identifier, and variance strata and variance unit variables for variance estimation. These variance strata and variance unit variables, along with the weights, capture all of the sampling design information necessary to estimate variances and make inferences to the population of Medicare beneficiaries.

Composition of Sample and Populations of Interest. The weights file includes records for beneficiaries who were sampled in the 2015, 2016, 2017, and 2018 Panels. The 2015, 2016, and 2017 Panels are referred to as Continuing Panels, while the 2018 Panel is referred to as the Incoming Panel as members of this sample were interviewed for the first time in Fall 2018. The Survey File weights include both continuously enrolled and ever enrolled weights in addition to the longitudinal weights. The continuously enrolled weights represent a population of beneficiaries who were enrolled continuously between January 1st of the data year and completion of the fall interview. The ever enrolled weights represent the population of beneficiaries who were enrolled in Medicare for at least one day at any time during the data year.

The 2018 Survey File continuously enrolled cross-sectional weights are populated for the subset of records with a completed Fall 2018 interview that are alive and entitled at the time of the interview. The resulting cross-sectional weights represent the population of beneficiaries who were continuously enrolled in Medicare from January 1, 2018, through completion of the Fall 2018 interview.

The two-year longitudinal weights are populated for members of the 2015, 2016, and 2017 Panels that were continuously enrolled in both 2017 and 2018. The resulting weights represent the population of Medicare beneficiaries who enrolled on or before January 1, 2017, and are still alive and entitled as of Fall 2018. The three-year longitudinal weights are populated only for members of the 2015 and 2016 panels who were continuously enrolled in each of the years 2016, 2017, and 2018. The population represented by these weights is the population of beneficiaries enrolled on or before January 1, 2016, and surviving and entitled as of Fall 2018. Finally, the four-year longitudinal weights are populated only for members of the 2015 panel who were continuously enrolled during all of the years 2015-2018. The resulting weights represent the population of Medicare beneficiaries who enrolled on or before January 1, 2015, and are still alive and entitled as of Fall 2018.

The 2018 Survey File ever enrolled weights are populated for all records on the delivered file and include continuously enrolled beneficiaries and beneficiaries who died or lost entitlement prior to completing the Fall 2018 interview. Beneficiaries who first became enrolled in 2018 are also included; these current-year enrollees were sampled and interviewed for the first time in 2018. The resulting weights represent the population of beneficiaries who were enrolled in Medicare on at least one day at any point in 2018.

Continuously Enrolled Cross-Sectional Weights. The continuously enrolled cross-sectional weights are the traditional Survey File weights and have been provided every year. They represent the population of beneficiaries who were enrolled in Medicare for the entire period between the first of the year through the Fall 2018 interview period.

Fall 2018 Nonresponse Adjustment

Continuing sample from the 2015, 2016, and 2017 Panels are adjusted for nonresponse through Fall 2018. The process begins with weights for these panels that were previously adjusted through Fall 2017. Response status in Winter 2018, Summer 2018, and Fall 2018 is then identified, where a respondent is a beneficiary that was alive and entitled with a complete Fall 2018 interview, or who died or lost entitlement at some time in prior to Fall 2018 but had a completed final interview after death (via proxy) or loss of entitlement.

Nonresponse adjustment cells are constructed prior to performing the adjustment. First, the beneficiaries are divided into five primary adjustment cells: alive community, deceased community, alive facility, deceased facility, and Fall 2017 nonrespondents.

Separately within each of these main adjustment cells, and separately by panel, response propensity models are fit using logistic regression to model the probability of response through Fall 2018 as a function of covariates derived from the Fall 2017 Survey File data. Generally, the covariates are selected into the logistic regression model using stepwise selection with an entry p-value of 0.10 and a stay p-value of 0.15. Using the predicted response probabilities, beneficiaries are grouped into cells of approximately 100 each. Across all panels, there are a total of 121 adjustment cells formed following the response modeling process. Separately within each of these cells, a ratio adjustment to distribute the weights of the nonrespondents to the respondents is performed. The resulting weights are the within-panel weights adjusted for response through Fall 2018.

Derivation of the Continuously Enrolled Weights

The next step takes the weights for Continuing Panels that are now adjusted through Fall 2018 and combines them with the weights for the 2018 Panel that were separately adjusted for initial nonresponse at the first interview (Fall 2018) as part of the initial weighting process. Next, the process removes cases that either died or lost entitlement prior to the Fall 2018 interview, or were cases from the 2018 Panel that enrolled after January 1, 2018.

At this stage there is quadruple coverage of beneficiaries who accreted before January 1, 2016, triple coverage of beneficiaries who accreted from January 1, 2016 through December 31, 2016, and double coverage of beneficiaries who accreted from January 1, 2017 through December 31, 2017. To account for this overlap, the weights for the four panels are adjusted by compositing factors derived from the number of effective completes by accretion year and age group across the four panels.

The compositing factor applied to beneficiaries from panel p in accretion year/age group domain d is

$$\varphi_{pd} = \frac{n_{pd}^{eff}}{\sum_{p\in P} n_{pd}^{eff}}$$

Where n_{pd}^{eff} is the effective number of Fall 2018 completes in panel i in accretion year/age group domain d. The subscript p indexes the four panels in the set of active panels P. The effective sample sizes are calculated as

$$n_{id}^{eff} = \frac{n_{id}^{act}}{1+\left(\frac{S_{id}}{\overline{w}_{id}}\right)^{2}}$$

where n_{pd}^{act} is the actual number of completed interviews, $\overline{w}_{id}$ is the average of the Fall 2018 adjusted weights for the panel, and S_{id} is the standard deviation of these weights.

The resulting weights are the final continuously enrolled cross-sectional weights for the 2018 Survey File (SF). They represent the 2018 continuously enrolled population.

Longitudinal Weights for the 2018 Survey File[30]. The derivation of two-year longitudinal weights begins with the weights adjusted through Fall 2018 from the 2015, 2016, and 2017 panels, subset to beneficiaries who were alive and entitled at the Fall 2018 interview. A ratio

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[30] Beginning with the 2016 LDS, the Survey File longitudinal weight names reflect the number of years the beneficiary was enrolled in Medicare (i.e., LNG2WGTS weights are referred to as 'two-year' rather than 'one-year' as they represent the population continuously enrolled for two years). This change was made to align the names of the longitudinal weights in the Survey File LDS with the naming convention used for the Cost Supplement LDS.

adjustment accounted for cases that did not have complete Survey File data in both 2017 and 2018. The weights were then further adjusted to account for triple coverage of those accreting on or before January 1, 2015, and double coverage of those accreting from January 2, 2015 through December 31, 2016, using compositing factors derived similarly as described in the previous section. The final resulting weights represent the two-year longitudinal population, which is the population of beneficiaries who enrolled on or before January 1, 2017, and were alive and entitled as of Fall 2018.

The derivation of three-year longitudinal weights begins with the weights adjusted through Fall 2018 from the 2015 and 2016 Panels, subset to beneficiaries who were alive and entitled at the Fall 2018 interview. A ratio adjustment accounted for cases that did not have complete Survey File data in both 2016 and 2018. The weights are then further adjusted to account for double coverage of those accreting on or before January 1, 2015, using compositing factors. The final resulting weights represent the three-year longitudinal population, which is the population of beneficiaries who enrolled on or before January 1, 2016, and were alive and entitled as of the Fall 2018 interview.

The four-year longitudinal weights are comprised of members of the 2015 Panel and are equal to the weights adjusted through Fall 2018 for this panel, subset to beneficiaries who were alive and entitled at the Fall 2018 interview. There is no need for further adjustment by compositing factors because there is only one panel providing four-year data so the weights are equal to the final cross-sectional weights for these beneficiaries. The final weights represent the four-year longitudinal population, which is the population of beneficiaries who enrolled on or before January 1, 2015, and were alive and entitled as of the Fall 2018 interview.

Ever Enrolled Cross-Sectional Weights. Ever enrolled Survey File weights represent the population of Medicare beneficiaries who were ever enrolled at any time during 2018 (i.e., enrolled on at least one day in 2018). The continuously enrolled beneficiaries are a subset of the ever enrolled beneficiaries in two ways, both in terms of the real-world populations they represent and in terms of the sampled and interviewed beneficiaries that appear on the Survey File.

Fall 2018 Nonresponse Adjustment

The Continuing sample from the 2015, 2016, and 2017 Panels is adjusted for nonresponse through Fall 2018. As with the continuously enrolled weights, the process begins with weights for these panels that were previously adjusted through Fall 2017. The response status in Winter 2018, Summer 2018, and Fall 2018 is then identified. Under the ever enrolled design, respondents include beneficiaries with a complete Fall 2018 interview, those who lost entitlement prior to Fall 2018 and had a final complete interview, those who died prior to Fall 2018 whether or not a final proxy interview was obtained, and Fall 2018 nonrespondents who were successfully re-fielded in Winter 2019.

Next, the weights are adjusted for nonresponse through Fall 2018, using the same cells that are created for the adjustment of the weights under the continuously enrolled design. Following ratio adjustments within these cells, the resulting weights are the within-panel weights adjusted for response through Fall 2018 for purposes of the ever enrolled weights.

Derivation of the Ever Enrolled Weights

The next step begins with the weights for the Continuing Panels adjusted through Fall 2018 in the previous step and combines them with the weights for the 2018 Panel that are separately adjusted for initial nonresponse at the first interview (Fall 2018). Next, the small number of cases that died or lost entitlement prior to January 1, 2018, and hence were never enrolled in 2018, are removed.

At this stage, beneficiaries from the Continuing Panels who died or lost entitlement during 2018 are included. However, the 2018 Panel cases include only those who were respondents to the Fall 2018 initial interview, and as such they do not include any beneficiaries who died or lost entitlement prior to Fall 2018. Beneficiaries who enrolled before January 1, 2018, who died or lost entitlement are accounted for by the Continuing Panels. Enrollees on or after January 1, 2018, who died or lost entitlement are not represented by any other panels, but they are few in number and are accounted for during final poststratification.

As with the continuously enrolled and longitudinal weights, the ever enrolled weights for the four panels are adjusted by compositing factors to account for overlap between the panels. These are derived from the number of effective completes by accretion year and age group. For the ever enrolled weights, beneficiaries from the Continuing Panels who died or lost entitlement in 2018 are combined separately to account for the fact that these beneficiaries are not represented by the 2018 Panel.

To finalize the ever enrolled weights, the raking technique to calibrate the weights to known population control totals for the ever enrolled population is used. These are derived from the enrollment data extracts for drawing the 2018 Panel. The raking dimensions used are age category (7-level) and accretion year (6-level). The raking process adjusts the weights to match the control totals for the first raking dimension, then for the second raking dimension, then for the first dimension again, and so on until the weights perfectly match the control totals in both dimensions. The resulting weights are the final ever enrolled weights for 2018. They represent the population of beneficiaries who were enrolled for at least one day at any time in 2018. Exhibit 8.2.2 and 8.2.3 present the control totals used for the raking adjustment step.

Exhibit 8.2.2: Control Totals for Ever Enrolled Weight Raking, Dimension 1: Age Group

Age Group	Control Total
< 45 Years	1,788,060
45 -64 Years	6,925,440
65 - 69 Years	16,377,800
70 - 74 Years	13,474,620
75 - 79 Years	9,323,340
80 - 84 Years	6,201,540
85+ Years	6,837,180
Total	**60,927,980**

Exhibit 8.2.3: Control Totals for Ever Enrolled Weight Raking, Dimension 2: Enrollment Year

Enrollment Year	Control Total
< 2013	43,215,680
2014	3,513,080
2015	3,543,760
2016	3,633,980
2017	3,503,120
2018	3,518,360
Total	**60,927,980**

8.2.5 2018 Cost Supplement Weights

Data for the 2018 Cost Supplement File were collected in Fall 2017 through Winter 2019. The weights include beneficiaries sampled in the 2015 through 2017 Panels, plus members of the 2018 Panel who were enrolled in Medicare during 2018. These Cost Supplement File weights are ever enrolled weights representing the population of beneficiaries who were enrolled for at least one day in 2018. In addition to the weights, the dataset includes panel (selection year) identifier, and variance strata and unit variables for variance estimation.

Composition of Sample and Populations of Interest. The 2018 Cost Supplement weights include beneficiaries who were sampled in the 2015, 2016, 2017, and 208 panels. The 2015, 2016, and 2017 panels are referred to as Continuing Panels and provide survey-reported cost and utilization for 2018 through participation in the MCBS during Fall 2016 through Winter 2019. Members of the 2018 panel who were first enrolled in 2018 are referred to as “current-year enrollees.” They were first interviewed in Fall 2018 and did not provide cost and utilization data for the period of time between enrollment and completion of the Fall 2018 interview; cost and utilization data for the period between the Fall 2018 interview and the end of 2018 were collected in Winter 2019. A combination of the survey-collected data for the end of the year and Medicare claims data were used to impute beneficiary-level data for the entire period of enrollment in 2018. The final weights, which include both the Continuing Panels and the recent enrollees, represent the population of beneficiaries who were enrolled in Medicare at any time during 2018.

Adjustment Derivation of Cross-Sectional Weights for the Continuing Panels

The process begins with weights for the 2015, 2016, and 2017 panels that were previously adjusted through Fall 2018 as part of the 2018 Survey File weights. These weights are further adjusted based on a product of the 2018 Reference Period process that identifies which beneficiaries contributed enough cost and utilization data to be included in the final data products. To be included, sample members must meet at least one of the following three criteria: (a) the ratio of days covered by interviews to the number of days enrolled in Medicare in 2018 is equal to or greater than 0.66; (b) the difference between the number of days enrolled in Medicare and the number of days covered by interviews is less than or equal to 60 days; or (c) the beneficiary is a recent enrollee from the 2018 Panel who completed the initial Fall 2018 interview. Beneficiaries who died or lost entitlement prior to January 1, 2018, are ineligible and removed at this stage. Beneficiaries who survived into 2018 but do not meet the above criteria are considered to be nonrespondents for the 2018 Cost Supplement File and are adjusted for in the resulting weights. The adjustment cells used for this ratio adjustment are the same cells that were created during weighting for the 2018 Survey File weights.

Note that at this stage there is triple coverage of beneficiaries who accreted before January 1, 2016, in the Continuing Panels, and double coverage of beneficiaries who accreted from January 1, 2016 through December 31, 2016. Therefore, the weights for the three panels are adjusted by compositing factors derived from the effective number of completes by panel, accretion year, and age group. The resulting weights are the pre-raked cross-sectional weights for the Continuing Panels.

Cross-Sectional Weights for the Recent Enrollees. The “recent enrollees” are those who enrolled between January 1, 2018, and December 31, 2018, inclusive. This step begins with the initial weights for the 2018 Panel, adjusted for nonresponse at the Fall 2018 interview. The subset of all Fall 2018 respondents from the 2018 Panel that are recent enrollees is isolated, and the resulting weights for this subset are the pre-raked cross-sectional weights for the recent enrollees.

Cross-Sectional Ever Enrolled Weights for the Cost Supplement. The sum of the combined weights across all four panels (the three Continuing Panels plus the recent enrollees from the 2018 Panel), provides an estimate of the ever enrolled population in 2018, but is not exact. To finalize the ever enrolled weights, the raking technique is used to calibrate the weights to known population control totals for the ever enrolled population. The raking dimensions used are age category (7-level) and accretion year (6-level), and the control totals used are the same as those used for the Survey File ever enrolled weights calibration presented in Exhibit 8.3.2. The resulting weights are the final weights for the 2018 Cost Supplement File. They represent the population of beneficiaries who were enrolled for at least one day at any time in 2018.

Longitudinal Weights for the 2018 Cost Supplement. The two-year longitudinal weights are populated for members of the 2015, 2016, and 2017 Panels who were enrolled in both 2017 and 2018 and provided utilization and cost data for both years. Members of the 2015 and 2016 Panels provided data for the 2017 and 2018 data years through participation in the MCBS during Fall 2016 through Winter 2019. Members of the 2017 panel who first enrolled in 2017 provided data for the end of 2017 in the Winter 2018 interview, and provided data for the 2018 data year in Winter 2018 through Winter 2019. The final two-year longitudinal weights represent the population of beneficiaries who were ever enrolled in Medicare at any time during both 2017 and 2018.

The three-year longitudinal weights are populated for members of the 2015 and 2016 Panels who were enrolled in 2016, 2017, and 2018, and provided utilization and cost data for all three years. Members of the 2015 Panel provided data for the 2016-2018 data years through participation in the MCBS during Fall 2015 through Winter 2019. Members of the 2016 Panel who first enrolled in 2015 provided data for the end of 2016 in the Winter 2017 interview, and provided data for 2017 and 2018 in Winter 2017 through Winter 2019. The final three-year longitudinal weights represent the population of beneficiaries who were ever enrolled in Medicare at any time during each of 2016, 2017, and 2018, implying continuous enrollment during 2017.

8.2.6 2018 Topical Weights

The Patient Activation (PA) questions were administered during the Fall 2018 (Round 82) Community Questionnaire to living beneficiaries not responding by proxy. The Beneficiary Knowledge Questionnaire (KNQ), Access to Care Questionnaire (ACQ), and Usual Source of Care Questionnaire (USQ) were administered in the Community Questionnaire in Winter 2019 (Round 83). The Summer 2019 (Round 84) Community Questionnaire included the Income and Assets Questionnaire (IAQ) and the Prescription Medicine Questionnaire (RXQ) administered to all respondents, and the Chronic Pain Questionnaire (CPQ), administered to beneficiaries responding without a proxy. To facilitate estimation from the resulting data, three sets of full-sample and replicate weights were derived for each set of seasonal sections: one based on the 2018 Survey File ever enrolled population, one based on the 2018 Survey File continuously enrolled population, and the last based on the 2018 Cost Supplement ever enrolled population. These weights can be used to conduct joint analyses of Topical section data, Survey File data, and Cost Supplement data. Exhibit 8.2.1 lists the Topical weights for these rounds.

Note that counts of cases with positive Topical weights may vary within the data year and may change across years due to response rates, sample sizes, and fielding methods. The Topical weights account for these changes. Please see Exhibit 8.2.1 for the segment location and name of Topical weights provided with the 2018 Survey File LDS. Please see Exhibit 8.2.4 for further details regarding the 2018 Topical Survey Weights including the record and variable counts and descriptions of additional adjustments to the weights.

Exhibit 8.2.4: 2018 Data Year Topical Survey Weights Datasets and Contents

Segment Name	Record Count	Variable Count	Full-Sample Weight	Replicate Weights	Description	Adjustment
PNTACT	12,213	102	P82SFWT	P82SF1-P82SF100	PA R82 Survey File Ever Enrolled	Fall non-proxy adjustment
PNTACT	12,062	102	PA82CWT	PA82C1-PA82C100	PA R82 Survey File Continuously Enrolled	Fall non-proxy adjustment
PNTACT	7,058	102	PA82EWT	PA82E1-PA82E100	PA R82 Cost Supplement	Fall non-proxy adjustment
MCREPLNQ, USCARE, ACCSSMED	11,184	102	W83SFWT	W83SF1-W83SF100	Winter R83 Survey File Ever Enrolled	Winter non-response adjustment

Segment Name	Record Count	Variable Count	Full-Sample Weight	Replicate Weights	Description	Adjustment
MCREPLNQ, USCARE, ACCSSMED	10,754	102	W83CWT	W83C1-W83C100	Winter R83 Survey File Continuously Enrolled	Winter non-response adjustment
MCREPLNQ, USCARE, ACCSSMED	6,786	102	W83EWT	W83E1-W83E100	Winter R83 Cost Supplement	Winter non-response adjustment
INCASSET, RXMED	8,815	102	S84SFWT	S84SF1-S84SF100	Summer R84 Survey File Ever Enrolled	Summer non-response adjustment
INCASSET, RXMED	8,552	102	S84CWT	S84C1-S84C100	Summer R84 Survey File Continuously Enrolled	Summer non-response adjustment
INCASSET, RXMED	5,154	102	S84EWT	S84E1-S84E100	Summer R84 Cost Supplement	Summer non-response adjustment
CHRNPAIN	7,884	102	C84SFWT	C84SF1-C84SF100	CPQ R84 Survey File Ever Enrolled	Summer non-response and non-proxy adjustments
CHRNPAIN	7,656	102	CP84CWT	CP84C1-CP84C100	CPQ R84 Survey File Continuously Enrolled	Summer non-response and non-proxy adjustments
CHRNPAIN	4,630	102	CP84EWT	CP84E1-CP84E100	CPQ R84 Cost Supplement	Summer non-response and non-proxy adjustments

Composition of Sample and Populations of Interest. The PAQ data were collected from beneficiaries selected in the 2015, 2016, 2017, and 2018 Panels who were alive, entitled, residing in the community, and completed the Community Questionnaire without use of a proxy in Fall

2018 (Round 82).

The winter Topical section data were collected from beneficiaries selected in the 2015, 2016, 2017, and 2018 Panels who were alive, entitled, residing in the community, and completed the Community Questionnaire in Winter 2019 (Round 83).

The summer Topical section data were collected from beneficiaries selected in the 2016, 2017, and 2018 Panels who were alive, entitled, residing in the community, and completed the community questionnaire in Summer 2019 (Round 84). Because the oldest panel does not receive the final summer interview, the summer round sections are limited to only three sample panels of beneficiaries rather than four.

The CPQ data were collected from beneficiaries selected in the 2016, 2017, and 2018 Panels who were alive, entitled, living in the community, and completed the Community Questionnaire without use of a proxy in Summer 2019 (Round 84).

The weights for the Topical section are all derived to represent a common population: beneficiaries who were alive, entitled, and in the community during the round of data collection. Some beneficiaries with populated winter section weights do not have ACQ data because they did not have any ER, IP, or OP events in the year leading up to interview and were not in an MA plan. For the release of ACQ data, CMS fills in information reflecting no such events for these cases. In addition, the IAQ was administered to proxy respondents for deceased and institutionalized beneficiaries, so some collected IAQ data is forfeited by the population definition. Imputed total income for all respondents, including Community and Facility interviews, will appear on the LDS file containing demographic information.

Derivation of Topical Section Weights

Each of the Topical section weights is based on a starting weight, which is a Round 82 nonresponse-adjusted weight derived during the process of creating the final 2018 Survey File ever enrolled, Survey File continuously enrolled, or Cost Supplement ever enrolled weights. The choice of starting weight determines the population that the derived Topical section weights represent, but the process for each topical weight is largely the same.

The weighting adjustments for each delivered weight are carried out in two steps. At each, the existing model-based adjustment cells that were developed for the 2018 Survey File and Cost Supplement weights were used, with collapsing of the cells where necessary to preserve adequate sample sizes.

The first adjustment distributes the weights for cases with unknown eligibility for the section to those with known eligibility. Beneficiaries may have unknown eligibility if they were unlocatable during the round or if they were nonrespondents during the round or earlier rounds and we have no indication of mortality or residential (Community or Facility) status. As expected, the number of cases with unknown eligibility was smaller in Round 83 because this round immediately followed the Fall 2018 Survey File interviews, whereas in Round 84 there was an intervening round in which some members of the sample became nonrespondents. For the PAQ section, which was fielded in Round 82, there is no unknown eligibility. In all cases, this first adjustment for unknown eligibility makes the implicit assumption that, if we were able to observe the eligibility for these cases, they would exhibit the same proportions of eligibility as the cases whose eligibility we are able to observe.

Prior to the second adjustment, we limit the set of beneficiaries to those who were eligible to receive the Topical sections. A beneficiary was considered ineligible if they had died, lost entitlement, or were living in a facility during the round. The nonresponse adjustment is then made, in which the weights for the eligible nonrespondents are distributed to the eligible respondents.

Finally, to account for the overlap between panels in accretion year, the weights of the different panels are then adjusted by compositing factors. These compositing factors were derived from the effective number of completes by accretion year and age group across the set of panels that were administered the seasonal section (the 2015-2018 Panels for PAQ and KNQ/ACQ/USQ, and the 2016-2018 Panels for IAQ/RXQ and CPQ).

8.3 MCBS Imputation Processes

8.3.1 Overview

As noted earlier, MCBS imputation falls under two umbrellas that focus on imputing monetary amounts: Income and Asset (IA) imputation, and Event, Payer, and Cost imputation, which consists of imputation for Prescription Medicine (PM) and Non Prescription Medicine (Non PM) events and costs. All three imputations focus on imputing a monetary amount. IA imputation completes income and asset information for the beneficiary and spouse, and PM and Non PM imputation complete medical event and cost data. For all three types, two groups of variables are imputed:

- Probes: Yes/no variables indicating whether the type of income, asset, or payer should have a nonzero amount.
- Amounts: The value of the income, asset, or cost paid for a medical event. For IA imputation, amounts are nonzero if the associated probe indicates the income or asset exists, and missing otherwise. For PM and Non PM imputation, amounts are nonzero if the associated probe indicates that the payer paid, and zero otherwise.

For both probes and amounts, single value imputation is performed sequentially from variables or records with the least to the most item nonresponse.

8.3.2 Income and Asset Imputation

Overview. The 2018 Income and Assets (IA) imputation imputes detailed information about income and assets of the beneficiary and spouse for Community Questionnaire respondents. For

Facility Instrument respondents, and Community Questionnaire and Facility Instrument non-respondents,[31] only total income is imputed due to the lack of detailed asset information.

Process. Respondents are asked about their prior year income and assets during the summer round. The income and asset data first go through data editing to ensure that respondent-reported values are appropriate. Data editing is performed to:

- Ensure consistency with questionnaire skip logic within the Income and Asset Questionnaire (IAQ)
- Set extreme outliers at the tails of the distributions of each IA variable to missing
- Set outliers based on joint distributions of highly-correlated IA variables to missing
- Correct inconsistent values that appear to be the result of data entry errors (for example, an extra "0" was entered)

Next, probe variables are imputed via a hot deck method. Probes had very low item nonresponse rates. The hot deck method is used because it can impute all of the missing values and is efficient. This method takes the non-missing IA value directly from another beneficiary with the same socio-economic characteristics to fill in the missing IA value of the recipient beneficiary. If the probe is imputed as "no", indicating that a beneficiary does not have a particular type of asset, the corresponding amount variable is set to missing.

Amount variables are imputed after probes. While most respondents report whether the beneficiary has an asset type, some respondents refuse to provide or do not know the amount of the asset. As a result, amount variables need more imputation. When respondents report value ranges, the hot deck method is used to impute an exact dollar amount using the given value range as a boundary. When value ranges are not provided but prior-year IA information exists, values are imputed using a prior-year carry-forward method with an inflation adjustment. This method uses the non-missing IA variable value for the same beneficiary from the prior year to impute the current-year missing value. This prior-year carry-forward method provides reasonable and consistent imputed values for these respondents. For the rest of the missing amount values, hot deck imputation is used.

Each variable imputed via hot deck imputation has a unique set of imputation cell variables. In the hot deck method, recipient and donor records are segregated into pools of records ("imputation cells") that have the same values on a set of auxiliary (or explanatory) variables. In general, the auxiliary variables that define imputation cells for probe variables include prior-year probe values, beneficiary's age, indicator of spouse/partner, and other related IA probes. Auxiliary variables that define imputation cells for amount variables include other related IA amounts, poverty indicators, beneficiary's age, and metropolitan status.

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[31] The Income and Assets questionnaire section (IAQ) is only administered once per year. Non-response to this section may be due to non-response in the round the questionnaire section is administered, or non-response to questions in the IAQ. For more information on IAQ, see Section 4.1.

8.3.3 Event, Payer, and Cost Imputation[32]

Overview. Event, Payer, and Cost imputation fills in missing payer and payment information for beneficiaries' medical events. Event, Payer, and Cost imputation is conducted through two separate processes to account for differing payment scenarios for some event types. Imputation for Prescription Medicine (PM) events is done separately from all other events because the rules associated with Medicaid payments for PM events are different. Imputation for all event types other than PM (Non PM) are conducted separately. Also, no PM imputation is conducted for beneficiaries residing in a facility as the Medicare Part D administrative claims data for this group are considered complete. The imputation procedures used for Prescription Medicine (PM) events versus all other event types (Non PM) are very similar but not identical.

Beginning in 2016, it was determined that payments made by the Veterans Administration (VA) could not be estimated with sufficient accuracy. Therefore, observed payments from the VA have been combined into the 'Other Sources' payer beginning with 2016.

Process. Both PM and Non PM imputation begin with the receipt of the survey-reported events matched against the Medicare claims. Three categories of records are returned: events found in the claims only (claims-only), events found in the survey-reported data only (survey-only), and survey-reported events that were successfully matched to a Medicare claim (survey-matched).

For the PM imputation, only unmatched survey-only events are processed through imputation. Claims-only and survey-matched events are considered complete. For the Non PM imputation, all three claims match statuses are processed through imputation.

First, data preprocessing and editing are performed to identify the total charge for the event and the most likely payers for the event. This procedure is described in detail in the *MCBS Data User's Guide: Cost Supplement File*. Imputation then proceeds in three steps.

For step one, imputed are events where the total charge is known and the payers and payment amounts are missing together (when a payer is missing, the amount is missing, and vice versa). Exhibit 8.3.1 gives an illustration of the type of record that would be imputed in this group, with a simplified potential payer vector. The donor record is required to be a complete record, and must have at least one of the recipient's missing payers as a payer with a positive payment amount, so that there is at least one amount value to which the difference between the total charge and the sum of the known payments can be allocated. In the example shown in Exhibit 8.3.1, a donor would need to have either "Employment-based private health insurance" or "Out of Pocket" as a payer with a nonzero amount. The payers and payment amounts are pulled from the same donor.

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[32] This section title was changed for the 2018 data year to be more descriptive. In prior years, the title was "Prescription Medicine and Non Prescription Medicine Imputation."

Exhibit 8.3.1: Payers and Payment Amounts Missing Together, Total Charge Known

Variable Type	Medicare Fee-for-Service	Medicaid	Employment-based private health insurance	Out of Pocket	Total Charge
Payer Indicator	Yes	No	(null)	(null)	--
Amount	50	0	(null)	(null)	200

In step two, imputed are events where the total charge is known and the payers and payment amounts have different missing patterns (i.e., there is at least one instance where the payer is known to have paid but the amount is missing). This is illustrated by Exhibit 8.3.2. The payers are imputed first. Donors are required to be complete records. There is no restriction that the donor is a payer for any of the recipient's missing payers because by definition of this group, there is at least one known payer already to which the missing payment amount can be allocated. Payment amounts are imputed next. If the payer is imputed not to have paid, the payment amount is set to zero. If there is only one missing payment amount after the payer imputation, that amount is completed by subtraction. If possible, payment amounts are all pulled from the same donor; if a donor with the required payer pattern does not exist[33], payment amounts are imputed individually from different donors.

Exhibit 8.3.2: Payers and Payment Amounts Missing Differentially, Total Charge Known

Variable Type	Medicare Fee-for-Service	Medicaid	Employment-based private health insurance	Out of Pocket	Total Charge
Payer Indicator	Yes	No	Yes	(null)	--
Amount	50	0	(null)	(null)	200

In the third and final step, events with the total charge unknown are imputed (illustrated by Exhibit 8.3.3). Payers are imputed first and are all taken from the same donor. Payment amounts are imputed next and are taken from the same donor when possible, or are imputed individually if

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[33] In this group, we impute a vector of missing payers together from the same donor, and have at least one additional payer who is known to have paid but the amount is unknown. Thus, a new payer pattern that did not exist in the original data may be created – the vector of imputed payers, plus the known payer with unknown amount.

a donor with the required payer pattern does not exist[34]. Total charge is set to the sum of the payment amounts.

Exhibit 8.3.3: Total Charge Unknown

Variable Type	Medicare Fee-for-Service	Medicaid	Employment-based private health insurance	Out of Pocket	Total Charge
Payer Indicator	Yes	No	Yes	(null)	--
Amount	50	0	(null)	(null)	(null)

In all PM and nearly all Non PM cases, the payment amount is not imputed directly from the donor; it is ratio-adjusted to fit with the recipient's known payment amounts.

The PM and Non PM imputation processes are very similar up to this point but then diverge.

PM Imputation

One final step is applied in PM imputation processing. After the general imputation procedure has been run, cases are reviewed and those found to be inconsistent or to have potential imputation issues are reviewed and edited. Records where the payers and payment amount vectors are complete but total charge is less than or more than the sum of the payment amounts, or records that are incomplete but have total charge less than the known payment amounts, are subjected to edits to make the record complete and consistent. Events where an imputed payment amount is less than a penny or a total charge is less than 50 cents are re-imputed from a new donor. The number of records requiring editing or re-imputation is very small (0.02% of records in 2018).

The PM imputation produces one file, an event-level dataset of survey-only events.

Non PM Imputation

For beneficiaries residing in a facility, all provided event data are claims-only. For these claims-only facility events, the total charge and Medicare payments are known. Medicare pays the full amount of the total charge for 15 to 20 percent of these events, and pays a partial amount for the remaining events. For these remaining events, the payers and payment amounts are imputed.

Beginning in 2015, current-year enrollee sample beneficiaries are included in the Non PM imputation. [35] The current-year enrollees have some portion of the year covered by claims data

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[34] Similar to when total charge is known, some records with total charge unknown will have payers and payment amounts missing at different rates (i.e., there is at least one instance where the payer is known to have paid but the amount is missing). After the payer imputation, a new payer pattern may be created that did not exist in the original data.

[35] See Section 3.4, "Current-Year Enrollee Sample", for more information on these beneficiaries.

only, and not by survey data. This may result in biased estimates as some medical events and costs, such as vision and dental health care services, are not covered by the Medicare claims and would be captured only by the survey data that were not collected. Please see the *MCBS Data User's Guide: Cost Supplement File* for a further discussion of gaps in survey data coverage. A new unit-level imputation procedure was added to address the issue of gaps in survey data coverage for the current-year enrollees. This procedure imputes survey-only events that may not be covered by the claims, adding new event records to the file that did not previously exist.

The time period within which survey-only events are to be imputed varies by individual, ranging from the beneficiary's enrollment date to the first of: the fall interview date (if there was a completed winter interview), the date of death, the date of lost entitlement, or December 31. First, this time period (the "Missing Period") is defined for each current-year enrollee. A donor is selected for each current-year enrollee, and the donor's survey-only records (excluding those with a Medicare and not Medicare Advantage payment, as these would be covered by claim data) that occur within the recipient's Missing Period are then created for the recipient. If the donor has no donation-eligible records of a given event type, no records are created.

All variables populated on the donor record are populated on the newly-created (recipient) record. Variables that relate to the event are pulled along from the donor record. Variables that relate to the beneficiary are retained from the recipient.

As described in the *MCBS Data User's Guide: Cost Supplement File*, the event types used in the survey differ from the event types in the Medicare claims. For the Non PM events, an administrative event type is imputed from the survey-reported event type. Event type imputation recipients are events found in the survey-only data, and donors are survey-matched events. Recipient records are matched to donors on survey-reported event type and cost, and the donor's administrative event type is assigned to the recipient.

Next, hospice event data are appended to the Non PM events. These data come directly from CMS and are not imputed. More information on hospice data is provided in the *MCBS Data User's Guide: Cost Supplement File*.

Finally, the Non PM data are aggregated to the service and person level. The Non PM imputation produces three files: at the event level (most disaggregate), at the person level (one record per beneficiary), and at the service level (one record per beneficiary and event type). Event-level records are first summed to the service level, and then adjustments are performed to annualize these amounts and adjust for days the beneficiary was eligible for Medicare but not covered by survey-reported data. This process is described in further detail in the *MCBS Data User's Guide: Cost Supplement File*. Then, unadjusted and adjusted service-level amounts are summed to the person level.

Hot Deck Imputation Procedure.

All PM and Non PM imputation is performed using a hot deck imputation procedure.

While hot deck has been used as a donor selection method for several years on the MCBS, the method to identify a compatible donor was updated, beginning with 2015.

Each imputation step has a unique set of qualification rules and key variables used to identify a similar donor record for a given recipient record. The donor pool for each set of recipients is first restricted to the group of potential donor records that meets the donor qualification rules, such as requiring that donors have complete data on the item to be imputed. Next, the similarity between a given recipient and each possible donor is measured via the Gower function using SAS/STAT® software's PROC DISTANCE:

$$s_1(x,y) = \frac{\sum_{j=1}^{v} w_j \delta_{x,y}^{j} d_{x,y}^{j}}{\sum_{j=1}^{v} w_j \delta_{x,y}^{j}}$$

where v is the number of variables, x_j is the data for observation x and the j^{th} variable, y_j is the data for observation y and the j^{th} variable, and w_j is the weight for the j^{th} variable. For ordinal, interval, and symmetric nominal variables, $\delta_{x,y}^{j} = 1$. For asymmetric nominal variables, $\delta_{x,y}^{j} = 1$ if either x_j or y_j is present and 0 if both are absent. For a nominal variable, $d_{x,y}^{j} = 1$ if $x_j = y_j$ and 0 otherwise. For an ordinal, interval, or ratio variable, $d_{x,y}^{j} = 1 - |x_j - y_j|$.[36,37,38]

The Gower function was selected because it can compute a similarity measure across several variable types (nominal, ordinal, and interval). For each recipient, we select donors whose similarity score is less than or equal to the 30th largest distance (with a score of 0 representing identical records and 1 representing divergent records). This may result in 30 potential donors or more if there are ties. Frequently, PM and Non PM donor pools are small, and this method allows us to relax some of the boundaries defining a suitable donor while continuing to find donors that are highly similar to a recipient. After computing donor pools by finding donor records that are similar to recipients, the new imputation procedure goes on to identify the donor record using the hot deck method in SAS/STAT® software's PROC SURVEYIMPUTE.

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[36] SAS Institute Inc. 2017. SAS/STAT® 14.3 User's Guide. Cary, NC: SAS Institute Inc.

[37] Podani, János. "Extending Gower's General Coefficient of Similarity to Ordinal Characters." *Taxon* 48, no. 2 (1999). 331-340.

[38] Gower, John C. "A General Coefficient of Similarity and Some of Its Properties." *Biometrics* 27, no. 4 (1971). 857-871.

9. RESPONSE RATES AND NONRESPONSE

This section presents the response rates and describes the derivation of those rates for the 2018 Cost Supplement and Survey File data releases.

9.1 Response Rates

This section details the definitions and calculations of Cost Supplement File response rates and Survey File response rates. Response rates presented in this report are unweighted.

In the sections that follow, both unconditional and conditional response rates are presented. The unconditional response rate is the percentage of sample that were released during the fall round of the selection year and responded to the survey in 2018. The unconditional response rates, also called cumulative response rates, use the original selected sample size as the baseline in their calculation. Conditional response rates are the percentage of sample that responded during 2017 and also responded during 2018. Conditional response rates use the sample who responded during 2017 as the baseline in their calculation. In other words, they are conditioned on response in year 2017.

9.1.1 2018 Cost Supplement File Response Rates

Unconditional Response Rates for the Annual Cost Supplement File.
The response rate for a given data year, t, in canonical form is simply

$$r_t = \frac{C_t}{E_t},$$

where C_t is the number of beneficiaries for whom the Cost Supplement File data are taken to be *complete*, and E_t is the number of beneficiaries who are considered *eligible* for the annual Cost Supplement File data release.

C_t is calculated as the number of beneficiaries with a non-missing, positive Cost Supplement File weight for the given year.

The number of eligible beneficiaries is calculated as

$$E_t = T_t - I_t ,$$

where T_t is the *total sample size* for the given year, and I_t is the number of beneficiaries who are considered *ineligible* for the given annual Cost Supplement File data release.

For the $t = 2018$ data year, T_t includes the following:

- All of the panel selected in year $t - 3$, called S_{t-3}.
- All of the panel selected in year $t - 2$, called S_{t-2}.
- All of the panel selected in year $t - 1$, called S_{t-1}.

- The subset of the panel selected in year t, called S_t, consisting of members of both the year $t-1$ and the year t cohorts of beneficiaries.
- The subset of the panel selected in year t + 1, called st + 1, consisting of members of the year t cohort of beneficiaries.

Conditional Response Rates for the Annual Cost Supplement File.

The conditional response rate for the year $t-3$ to $t-1$ panels in Cost Supplement File year t is:

$$\frac{C_t}{E_t - N_t},$$

where

$C_t = S_{t-3}$ to S_{t-1} panel beneficiaries with positive weights on the year t Cost Supplement File;

$E_t = S_{t-3}$ to S_{t-1} panel beneficiaries still entitled on January 1, year t;

$N_t =$ subset of E_t that were not released in the first round of year t.

The conditional response rate for the year t panel in Cost Supplement File year t is:

$$\frac{C_t}{E_t},$$

where

$C_t = S_t$ panel beneficiaries with positive weights on the Cost Supplement File;

$E_t = S_t$ panel beneficiaries enrolled between January 2, year $t-1$ to December 31, year $t-1$ and still entitled on January 1, year t.

The conditional response rate for the year $t+1$ panel in Cost Supplement File year t is:

$$\frac{C_t}{E_t},$$

where

$C_t = S_{t+1}$ panel beneficiaries with positive weights on the Cost Supplement File;

$E_t = S_{t+1}$ panel beneficiaries enrolled between January 1, year t and December 31, year t.

Exhibits 9.1.1 and 9.1.2 display the 2018 Cost Supplement File unconditional and conditional response rates by panel.

Exhibit 9.1.1: 2018 MCBS Annual Cost Supplement File Unconditional Response Rates

Panel	Released	Complete	Eligible	Ineligible	Unconditional Response Rate
2015	8,621	1,896	7,308	1,313	25.9%
2016	12,145	3,147	10,874	1,271	28.9%
2017	11,623	3,995	11,022	601	36.2%
2018	442	194	442	--*	43.9%
Total	32,831	9,232	29,646	3,185	31.1%

SOURCE: 2018 MCBS Internal Sample Control File

*Cell sizes suppressed that are less than 11.

Exhibit 9.1.2: 2018 MCBS Annual Cost Supplement File Conditional Response Rates

Panel	Complete	Eligible	Subset of Eligibles Not Released	Conditional Response Rate
2015	1,896	7,308	5,160	88.3%
2016	3,147	10,874	6,931	79.8%
2017	3,995	11,022	4,956	65.9%
2018	194	442	--	43.9%
Total	9,232	29,646	17,047	73.3%

SOURCE: 2018 MCBS Internal Sample Control File

9.1.2 2018 Survey File Response Rates

Unconditional Response Rates for the Annual Survey File: Ever Enrolled Beneficiaries. The response rate for a given data year, t, in canonical form is simply

$$r_t = \frac{C_t}{E_t},$$

where C_t is the number of beneficiaries for whom the Survey File data are taken to be *complete*, and E_t is the number of beneficiaries who are considered *eligible* for the annual Survey File data release.

C_t is calculated as the number of beneficiaries with a non-missing, positive Survey File ever enrolled weight for the given year.

The number of eligible beneficiaries is calculated as

$$E_t = T_t - I_t ,$$

where T_t is the *total sample size* for the given year and I_t is the number of beneficiaries who are considered *ineligible* for the given annual Survey File data release.

For year t, T_t includes the following:

- All of the panel selected in year $t-3$, called s_{t-3}.
- All of the panel selected in year $t-2$, called s_{t-2}.
- All of the panel selected in year $t-1$, called s_{t-1}.
- All of the panel selected in year t, called s_t .

I_t is calculated as the number of beneficiaries from panels $t-3$ to $t-1$ who died or lost entitlement prior to January 1st of year t, plus the number of ineligible or deceased beneficiaries from the year t panel in the fall round.

Conditional Response Rates for the Annual Survey File: Ever Enrolled Beneficiaries. The conditional response rate for the year $t-3$ to $t-1$ panels in Survey File year t is:

$$\frac{C_t}{E_t - N_t},$$

where

$C_t = s_{t-3}$ to s_{t-1} panel beneficiaries with positive weights on the year t Survey File;

$E_t = s_{t-3}$ to s_{t-1} panel beneficiaries still entitled and alive prior to fall round, year t and are not I_t.

$N_t = \text{subset of } E_t$ that were not released in the first round of year t.

The conditional response rate for the year t panel in Survey File year t is:

$$\frac{C_t}{E_t},$$

where

$C_t = s_t$ panel beneficiaries with positive weights on the Survey File;

$E_t = s_t$ panel beneficiaries still entitled and alive prior to fall round, year t and are not I_t.

Response Rates for the Annual Survey File: Continuously Enrolled Beneficiaries. The formulas for calculating the unconditional and conditional response rates for the continuously enrolled beneficiaries are identical to the corresponding formulas detailed above for the ever enrolled population. The only differences are in the definitions of C_t and I_t .

For the continuously enrolled response rate calculations, C_t is calculated as the number of beneficiaries completing an interview in the fall round of year t with a non-missing, positive Survey File continuously enrolled weight for the given year t.

Two subsets of ineligibles contribute to I_t for the continuously enrolled response rate calculations:

- The first subset includes beneficiaries who are found to be ineligible or deceased in any round up to and including the fall round of year t.
- The second subset includes beneficiaries who finished the fall round year t interview but are not Survey File completes, *or* beneficiaries who were non-respondents prior to the fall round of year t and thus were not fielded in the fall round, and had a final status with no further attempts to field in any previous round. (These are beneficiaries not included in the first subset of ineligibles described above.) For these cases, the date of death or lost entitlement date, if any, is compared to the average interview date in the fall round year t. If date of death or lost entitlement date is prior to the average interview date, the case is determined to be ineligible. Otherwise, it is determined to be an eligible non-respondent.

Exhibits 9.1.3 and 9.1.4 display the 2018 annual Survey File unconditional response rates by panel for ever enrolled and continuously enrolled beneficiaries.

Exhibit 9.1.3: 2018 MCBS Annual Survey File Unconditional Response Rates for Ever Enrolled Beneficiaries

Panel	Released	Ever Enrolled Complete	Ever Enrolled Eligible	Ever Enrolled Ineligible	Unconditional Response Rate of Ever Enrolled Beneficiaries
2015	8,621	1,904	8,299	322	22.9%
2016	12,145	3,165	11,852	293	26.7%
2017	11,623	4,014	11,586	37	34.6%
2018	11,523	6,155	11,039	484	55.8%
Total	43,912	15,238	42,776	1,136	35.6%

SOURCE: 2018 MCBS Internal Sample Control File

Exhibit 9.1.4: 2018 MCBS Annual Survey File Unconditional Response Rates for Continuously Enrolled Beneficiaries

Panel	Released	Continuously Enrolled Complete	Continuously Enrolled Eligible	Continuously Enrolled Ineligible	Unconditional Response Rate for Continuously Enrolled Beneficiaries
2015	8,621	1,723	7,738	883	22.3%
2016	12,145	2,866	11,041	1,104	26.0%
2017	11,623	3,653	10,827	796	33.7%
2018	11,523	5,988	11,039	484	54.2%
Total	43,912	14,230	40,645	3,267	35.0%

SOURCE: 2018 MCBS Internal Sample Control File

Exhibits 9.1.5 and 9.1.6 display the 2018 Survey File conditional response rates by panel for ever enrolled and continuously enrolled beneficiaries.

Exhibit 9.1.5: 2018 MCBS Annual Survey File Conditional Response Rates for Ever Enrolled Beneficiaries

Panel	Ever Enrolled Complete	Ever Enrolled Eligible	Subset of Ever Enrolled Eligibles That Were Not Released	Conditional Response Rate for Ever Enrolled Beneficiaries
2015	1,904	8,299	6,141	88.2%
2016	3,165	11,852	7,888	79.8%
2017	4,014	11,586	5,444	65.4%
2018	6,155	11,039	--	55.8%
Total	15,238	42,776	19,473	65.4%

SOURCE: 2018 MCBS Internal Sample Control File

Exhibit 9.1.6: 2018 MCBS Annual Survey File Conditional Response Rates for Continuously Enrolled Beneficiaries

Panel	Continuously Enrolled Complete	Continuously Enrolled Eligible	Subset of Continuously Enrolled Eligibles That Were Not Released	Conditional Response Rate for Continuously Enrolled Beneficiaries
2015	1,723	7,738	5,677	83.6%
2016	2,866	11,041	7,262	75.8%
2017	3,653	10,827	4,965	62.3%
2018	5,988	11,039	--	54.2%
Total	14,230	40,645	17,904	62.6%

SOURCE: 2018 MCBS Internal Sample Control File

9.2 Nonresponse Bias Analysis

A nonresponse bias analysis is conducted every three years for the MCBS in order to identify potential sources of bias in the estimates due to nonresponse as well as to determine the degree to which survey weight adjustments alleviate any potential bias. The goals for the analysis are: (1) to describe how the MCBS nonrespondents are different from the respondents on a variety of measures, including demographic characteristics, claims payments, chronic conditions, and some survey-reported health indicators; and (2) to describe how well the weighting adjustments performed in correcting for nonresponse.

The MCBS is unique among federal surveys in that a substantial amount of information about all sampled individuals is available. The CMS administrative enrollment data from which the MCBS sample is drawn include demographic information about all Medicare beneficiaries, such as sex, age, race, enrollment date, and geographic location. Also obtainable are data identifying whether a beneficiary met the claims criteria to be classified as having a particular chronic condition, such as diabetes, stroke, and breast cancer, among others. For beneficiaries in a fee-for-service (FFS) plan, information about claims payment amounts for various services is available. In stark contrast to most major surveys, which do not have access to these data sources for respondents and nonrespondents alike, this wealth and variety of information allows for the identification, with some precision, of the sources of potential nonresponse bias in the MCBS. The diversity and range of the analyses presented in this report also help to provide insight into targeted steps that may be taken to remedy that bias, including field-based strategies and further development of weighting adjustments.

Survey weights for the MCBS are adjusted for nonresponse by redistributing weights from nonrespondents to respondents after categorizing sample members by common characteristics related to their propensity to respond to the MCBS. The covariates included in such adjustments change over time as response patterns to the MCBS evolve, and the results of nonresponse bias analyses such as this one are used to respond comprehensively to emerging evidence of potential nonresponse bias.

This report discusses several analyses[39] that were conducted to evaluate whether and how much nonresponse bias is evident in the MCBS. It is presented in four parts:

1. **Description of Nonresponse Trends**: MCBS response rates across several rounds of data collection are presented to give a sense of the level of participation in the survey.
2. **Comparison of Respondents and Nonrespondents by Frame-Level Attributes**: Fall 2018 respondents are compared to nonrespondents based on a variety of frame-level attributes available for all beneficiaries sampled into the MCBS, including demographic characteristics, claims payment amounts, and chronic condition measures. A logistic regression model is also developed and analyzed as an additional means of evaluating non-response bias based on some of these measures.

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[39] Analyses presented in this report, unless otherwise noted, are unweighted.

3. **Analysis of Subsequent Round Nonresponse**: Fall 2018 respondents are followed into subsequent rounds, and respondents to those rounds are compared with nonrespondents using self-reported health characteristics from the Fall 2018 questionnaire.
4. **Effects of Weighting on Potential Nonresponse Bias:** Unweighted and weighted proportions of respondents across select frame-level attributes are displayed and compared to corresponding benchmarks.

The report concludes with a brief summary of findings.

9.2.1 Response Rates

Generally, longitudinal panels are expected to experience the lowest response in their first round of data collection, and response is not expected to decline for the panel over time[40]. This is the trend for MCBS as well, as evidenced in Exhibit 9.2.1, which includes response rates in the Fall of 2018 and the following four rounds.

Exhibit 9.2.1 displays MCBS panel response by round for beneficiaries in the 2018 Survey File. Note that in Winter 2019 (Round 83), 600 cases were intentionally not fielded as part of a strategic not-in-round (NIR) experiment.[41] To account for this, Exhibit 9.2.1 includes two rows that refer to cases that were deferred or released for fieldwork. The first row displays, for each panel, the number of cases deferred to the next round, or intentionally not fielded in the given round (zero for all rounds except Winter 2019), and the second row displays the number of cases released for fieldwork in the round (equal to the panel total in all rounds except Winter 2019). The calculation of the response rate is based on the number of cases released for fieldwork rather than the total for the round.

The figures in Exhibit 9.2.1 illustrate the trends a panel experiences over time. The Incoming (2018) Panel had approximately a 56 percent response rate in its first round in the field (Fall 2018), but the response of that panel increased to nearly 85 percent by Fall 2019. Other panels (referred to as Continuing Panels) had much higher response rates in Fall 2018, with rates increasing slightly over subsequent rounds. The decreased response in Winter 2020 for all panels is related to the disruption of in-person fieldwork, which occurred due to the impact of the COVID-19 pandemic on field operations.

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[40] Schoeni, Robert F et al, "Response Rates in National Panel Surveys." The Annals of the American Academy of Political and Social Science vol. 645,1 (2013): 60-87

[41] MCBS design does not allow a respondent to miss two consecutive interviews. However, in any given round, there are respondents who do not participate in that round, but continue participation in future rounds. Respondents who do not participate in a specific round are given a 'not-in-round' disposition. In 2018 and 2019, experiments were conducted to investigate the impact of intentional selection of a sample person for NIR in one round and releasing that person for interviewing in the subsequent round, akin to a simulated two-interview protocol. The experiment attempts to understand the tradeoffs associated with the implementation of an NIR selection mechanism to achieve a two-interview protocol.

Exhibit 9.2.1: Unweighted Response Rates[a] by Panel, Fall 2018 to Winter 2020, 2015-2018 Panels[b]

	Fall 2018 (Round 82)	Winter 2019 (Round 83)	Summer 2019 (Round 84)	Fall 2019 (Round 85)	Winter 2020 (Round 86)
2018 Panel					
Deferred	-	-	-	-	-
Released	11,523	6,156	5,044	4,458	3,937
Completes	6,156	4,939	4,144	3,776	2,947
Eligibles	10,526	6,107	5,044	4,458	3,937
Ineligibles	481	49	-	-	-
Unknown Elig.	516	-	-	-	-
Response Rate (%)	55.9	80.9	82.2	84.7	74.9
2017 Panel					
Deferred	-	322	-	-	-
Released	4,399	3,556	3,534	3,260	2,991
Completes	3,743	3,134	3,029	2,915	2,403
Eligibles	4,399	3,556	3,534	3,260	2,991
Ineligibles	-	-	-	-	-
Unknown Elig.	-	-	-	-	-
Response Rate (%)	85.1	88.1	85.7	89.4	80.3
2016 Panel					
Deferred	-	278	-	-	-
Released	3,324	2,768	2,849	2,691	2,565
Completes	2,929	2,515	2,542	2,509	2,344
Eligibles	3,324	2,768	2,849	2,691	2,565
Ineligibles	-	-	-	-	-
Unknown Elig.	-	-	-	-	-
Response Rate (%)	88.1	90.9	89.2	93.2	91.4
2015 Panel					
Deferred	-	-	-	-	-
Released	1,923	1,824	-	-	-
Completes	1,767	1,766	-	-	-
Eligibles	1,923	1,824	-	-	-
Ineligibles	-	-	-	-	-
Unknown Elig.	-	-	-	-	-
Response Rate (%)	91.9	96.8			

	Fall 2018 (Round 82)	Winter 2019 (Round 83)	Summer 2019 (Round 84)	Fall 2019 (Round 85)	Winter 2020 (Round 86)
Continuing Panels (2015-2017 Panels)					
Deferred	-	600	-	-	-
Released	9,646	8,148	6,383	5,951	5,556
Completes	8,439	7,415	5,571	5,424	4,747
Eligibles	9,646	8,148	6,383	5,951	5,556
Ineligibles	-	-	-	-	-
Unknown Elig.	-	-	-	-	-
Response Rate (%)	87.5	91.0	87.3	91.1	85.4

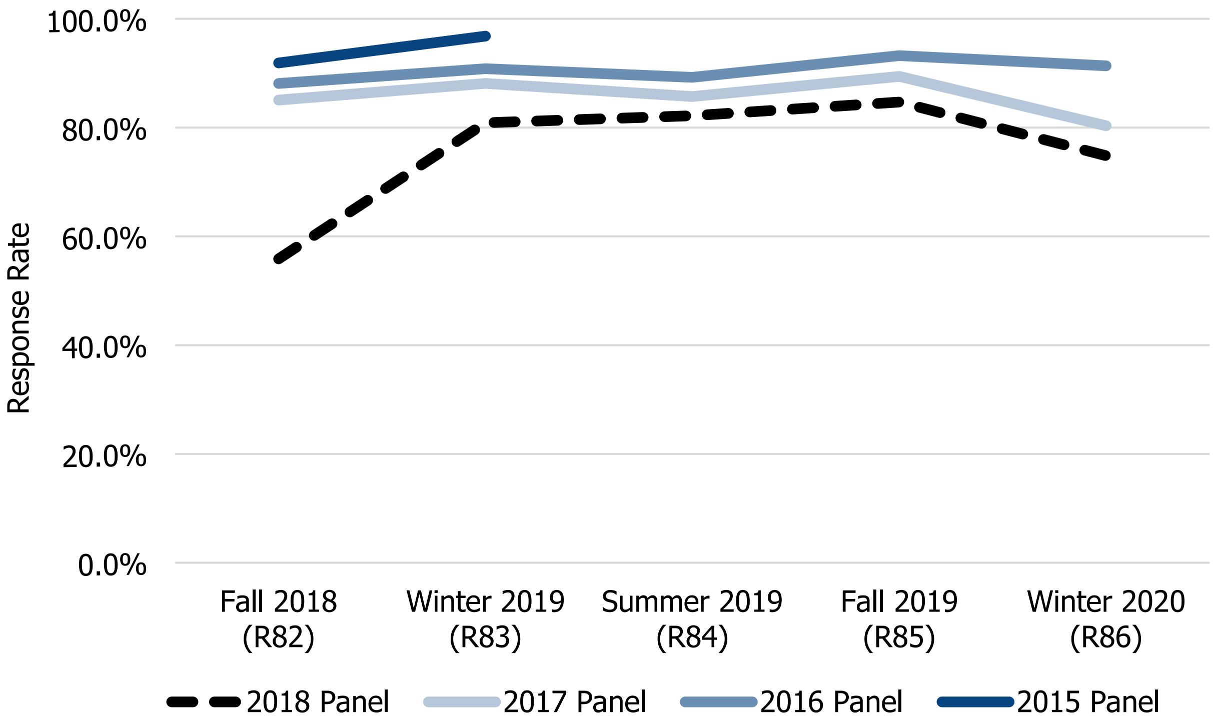
[a] The round-by-round response rate is the CASRO response rate, a three stage rate reflecting the product of the resolution rate, the screener completion rate, and the interview completion rate.

[b] Includes community- and facility-dwelling beneficiaries.

Source: Internal Sample Control File (MIF).

Exhibit 9.2.2 illustrates these rates over a five round period.

Exhibit 9.2.2: Unweighted Response Rates by Panel, Fall 2018 to Winter 2020



Source: Internal Sample Control File (MIF).

9.2.2 Comparison of Respondents and Nonrespondents: Frame-Level Attributes

Each year, the sampling frame for a new panel of MCBS beneficiaries begins with Medicare administrative enrollment data. To avoid duplication in the various panels of MCBS beneficiaries, a unique and disjoint 5-percent sample of the enrollment data is specified annually by CMS for the MCBS. Chapter 3 of the 2018 Methodology Report[42] contains a detailed discussion of MCBS sampling and should serve as a resource to readers of this report.

The enrollment data[43] contain demographic information for each beneficiary, including age, sex, race, enrollment date, and geographic location. Also available for most beneficiaries[44] is information about claims payment amounts from fee-for-service (FFS) claims during the year. Finally, data identifying whether a beneficiary met the claims criteria in a given year to be classified as having a particular chronic condition[45] are also available for analysis. Because this information is known at the time of sampling and available for all sampled beneficiaries, it is possible to compare respondents and nonrespondents based on these frame-level attributes. A comparison can help to detect noticeable differences between these two groups and perhaps identify areas of potential bias resulting from nonresponse.

The analyses in this section examine both the Incoming Panel and the Continuing Panels in Fall 2018 (Round 82) and, in some cases, beyond. The Fall 2018 (Incoming) Panel experienced its first time in the field in Fall 2018, while the 2015-2017 (Continuing) Panels had moved beyond their initial period of lower response and were in later, higher, and more stable phases of response in Fall 2018. (As displayed above, the response rate for the 2018 Panel in Fall 2018 was 55.9 percent, and the Continuing Panels' Fall 2018 response rates averaged around 87.5 percent.) Respondents and nonrespondents were compared across demographic characteristics, claims payment measures, and indicators of various chronic conditions. It is important to note that, for Continuing Panels, the demographic characteristics used in these exhibits are *as of the year of panel selection*, which may be up to three years prior to the year of analysis. Also note that the comparisons that follow include only beneficiaries who resided in the community; beneficiaries who resided in facilities are excluded by design. This will result in table counts that are smaller than the counts presented in Exhibit 9.2.1. Finally, all comparisons in this section are unweighted.

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[42] https://www.cms.gov/files/document/2018-mcbs-methodology-report.pdf

[43] For a detailed description of the Medicare administrative enrollment data, see Section 3.4.5 of the 2018 Methodology Report.

[44] Claims payment data are available for beneficiaries enrolled in traditional Fee-for-Service (FFS) Medicare plans, but not for beneficiaries enrolled in managed care plans, such as Medicare Advantage (MA).

[45] These conditions include chronic kidney disease, diabetes, depression, stroke, breast cancer, anemia, asthma, and benign prostatic hyperplasia.

9.2.3 Demographic Characteristics

Exhibit 9.2.3 provides comparisons of 2018 Panel respondents to nonrespondents in Fall 2018 (Round 82) using demographic characteristics such as sex, age, race/ethnicity, current-year enrollee status (i.e., whether the beneficiary became eligible and enrolled during their panel selection year), Census region, Health and Human Services (HHS) Region[46], and ACO status[47]. These characteristics describe respondents and nonrespondents from their respective panels as of the time of sampling. The Rao-Scott chi-square test was used to test differences between the two populations. This test adjusts the Pearson Chi-Square statistic, using a second-order design correction, by dividing it twice by the generalized design effect factor (GDEFF). The second-order correction adjusts not only the mean of the chi-square distribution but also the variance.[48]

Statistically significant differences between respondents and nonrespondents were detected for sex, age, race/ethnicity, current-year enrollee (CYE) status, and HHS region. However, the practical differences are quite small. Nonrespondents are more likely to be female, and are slightly more likely to fall into the 65 to 69 age group and the Missing or Other/Unknown race categories. For example, 56.6 percent of 2018 Panel nonrespondents are female, relative to 53.1 percent of respondents. This 3.5 percentage point difference, while statistically significant, is not particularly large in magnitude, and sex is included as a covariate in producing nonresponse adjustments as part of the weighting processes.

It is advisable to take caution when interpreting significant differences, as large sample sizes such as those in the MCBS can result in statistically significant differences being found even when little practical difference is observed. This is especially true when considering variables with a large number of levels such as HHS Region.

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[46] Regions defined for the purposes of program and outreach coordination for the U.S. Department of Health and Human Services.

[47] Indicates whether the beneficiary was enrolled in an Accountable Care Organization; ACO members were previously oversampled in the MCBS.

[48] Rao, J. N. K., and A. J. Scott, "On Simple Adjustments to Chi-Square Tests with Sample Survey Data." The Annals of Statistics, vol. 15, no. 1, 1987, pp. 385–397. JSTOR, www.jstor.org/stable/2241089.

Exhibit 9.2.3: 2018 Panel[a] Respondents vs. Nonrespondents in Fall 2018, by Demographic Characteristics

Frame Characteristic	Fall 2018 Non-respondents #	Fall 2018 Respondents #	Fall 2018 Non-respondents %	Fall 2018 Respondents %
Sex**				
Male	2,104	2,725	43.4	46.9
Female	2,739	3,080	56.6	53.1
Age**				
Under 45	486	617	10.0	10.6
45-64	347	474	7.2	8.2
65-69	1,035	1,137	21.4	19.6
70-74	708	850	14.6	14.6
75-79	744	930	15.4	16.0
80-84	750	926	15.5	16.0
85 and over	773	871	16.0	15.0
Race**				
Hispanic	556	667	11.5	11.5
Non-Hispanic White	3,385	4,123	69.9	71.0
Non-Hispanic Black	427	600	8.8	10.3
All Other	250	205	5.2	3.5
Missing/Unknown	225	210	4.6	3.6
Current-Year Enrollee**				
Not CYE	4,595	5,612	94.9	96.7
CYE	248	193	5.1	3.3
Census Region				
Northeast	881	1,039	18.2	17.9
Midwest	1,041	1,275	21.5	22.0
South	1,793	2,265	37.0	39.0
West	1,128	1,226	23.3	21.1
HHS Region*				
1 CT, MA, ME, NH, RI, VT	170	176	3.5	3.0
2 NJ, NY	510	611	10.5	10.5
3 DC, DE, MD, PA, VA, WV	387	467	8.0	8.0
4 AL, FL, GA, KY, MS, NC, SC, TN	1,127	1,449	23.3	25.0
5 IL, IN, MI, MN, OH, WI	828	1,010	17.1	17.4
6 AR, LA, NM, OK, TX	589	743	12.2	12.8
7 IA, KS, MO, NE	214	266	4.4	4.6

Frame Characteristic	Fall 2018 Non-respondents #	Fall 2018 Respondents #	Fall 2018 Non-respondents %	Fall 2018 Respondents %
8 CO, MT, ND, SD, UT, WY	61	94	1.3	1.6
9 AZ, CA, HI, NV	771	760	15.9	13.1
10 AK, ID, OR, WA	186	229	3.8	3.9
ACO Status				
Not ACO	3,586	4,328	74.0	74.6
ACO	1,257	1,477	26.0	25.4

[a] Beneficiaries living in the community only; beneficiaries living in facilities excluded by design.

*: Statistically significant at P<.05

**: Statistically significant at P<.01

Source: 2018 Survey File and Internal Sample Control File (MIF).

Exhibit 9.2.4 contains comparisons of the combined 2015 through 2017 (Continuing) Panel respondents to nonrespondents based on the same demographic characteristics. For the Continuing Panels, the distributions across the various demographic variables were mostly similar for respondents and nonrespondents. Statistically significant differences were detected in age and geography. Within the age categories, the nonrespondents skew younger than the respondents (though they are also more likely to be in the oldest age group than are respondents). Within Census regions, there are proportionately more nonrespondents in the West and more respondents in the Northeast. These geographical differences are also observable within HHS Region.

Exhibit 9.2.4: 2015-2017 Panel[a] Respondents vs. Nonrespondents in Fall 2018, by Demographic Characteristics

Frame Characteristic	Fall 2018 Non-respondents #	Fall 2018 Respondents #	Fall 2018 Non-respondents %	Fall 2018 Respondents %
Sex				
Male	541	3,543	46.8	45.9
Female	614	4,180	53.2	54.1
Age**				
Under 45	131	712	11.3	9.2
45-64	105	608	9.1	7.9
65-69	250	1,562	21.6	20.2
70-74	147	1,169	12.7	15.1
75-79	179	1,383	15.5	17.9
80-84	163	1,304	14.1	16.9
85 and over	180	985	15.6	12.8
Race				
Hispanic	119	622	10.3	8.1
Non-Hispanic White	830	5,750	71.9	74.5
Non-Hispanic Black	121	785	10.5	10.2
All Other	35	196	3.0	2.5
Missing/Unknown	50	370	4.3	4.8
Current-Year Enrollee				
Not CYE	1,102	7,361	95.4	95.3
CYE	53	362	4.6	4.7
Census Region**				
Northeast	141	1,315	12.2	17.0
Midwest	264	1,833	22.9	23.7
South	447	3,070	38.7	39.8
West	303	1,505	26.2	19.5
HHS Region**				
1 CT, MA, ME, NH, RI, VT	22	214	1.9	2.8
2 NJ, NY	71	763	6.1	9.9
3 DC, DE, MD, PA, VA, WV	81	635	7.0	8.2
4 AL, FL, GA, KY, MS, NC, SC, TN	272	2,038	23.5	26.4
5 IL, IN, MI, MN, OH, WI	205	1,444	17.7	18.7
6 AR, LA, NM, OK, TX	189	920	16.4	11.9
7 IA, KS, MO, NE	59	388	5.1	5.0

Frame Characteristic	Fall 2018 Non-respondents #	Fall 2018 Respondents #	Fall 2018 Non-respondents %	Fall 2018 Respondents %
8 CO, MT, ND, SD, UT, WY	20	126	1.7	1.6
9 AZ, CA, HI, NV	203	889	17.6	11.5
10 AK, ID, OR, WA	33	306	2.9	4.0
ACO Status				
Not ACO	922	6,210	79.8	80.4
ACO	233	1,513	20.2	19.6

[a] Beneficiaries living in the community only; beneficiaries living in facilities excluded by design.

*: Statistically significant at P<.05

**: Statistically significant at P<.01

Source: 2018 Survey File and Internal Sample Control File (MIF).

Multivariate analyses are also used to identify the characteristics of beneficiaries who are least likely to respond to an interview. For the MCBS, logistic regression modeling was used to identify case characteristics significantly related to unit nonresponse, with outcomes coded as either responding to or not responding to the Fall 2018 interview.

For the 2018 Panel, frame attributes were used as covariates to build a logistic regression model of Fall 2018 nonrespondents. The dependent variable is an indicator variable identifying whether the beneficiary is a nonrespondent. The independent variables include sex, race/ethnicity, age group, a flag related to current-year enrollee status, and four-level Census region. The stepwise option for model selection[49] was used to further refine the list of analytic variables. In this analysis, the stepwise selection method determined that Census region and age category variables were not significantly related to nonresponse after controlling for sex, race/ethnicity, and current-year enrollee status. Finally, since multiple tests were performed, in order to prevent falsely significant results, we used the Bonferroni adjustment to adjust p-values for multiplicity and test significant differences.

Exhibit 9.2.5 includes the results of the logistic regression analysis. Holding all other covariates constant, the odds of being a nonrespondent is 14 percent lower for males (0.86 odds ratio) than for females. Beneficiaries of other races[50] are nearly one and a half times as likely to be nonrespondents as Hispanic beneficiaries. And current-year enrollees are more than one and a half times as likely to be nonrespondents as non-current-year enrollees. Note that the finding related to current-year enrollee status can be partially explained by the length of the field period

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[49] Stepwise selection is a type of variable selection wherein variables are added to a model in a step-by-step manner and kept if they meet a specified significance level. After each addition, the full set of current model covariates is evaluated to verify whether the significance level associated with any of the existing coefficients has fallen below the specified significance level. Any variables for which that is the case are dropped from the model. In this way, stepwise variable selection alternates between variable entry and removal until the variable set is stable.

[50] Defined as beneficiaries not coded as Hispanic, Non-Hispanic White, or Non-Hispanic Black.

for some of these beneficiaries – for example, current-year enrollees who are sampled later in the round experience a shorter field period, sometimes by several months, than the beneficiaries who are sampled at the beginning of the round.[51]

Exhibit 9.2.5: Logistic Regression Model of 2018 Panel[a] Nonrespondents, Fall 2018

Effect	Estimate	Standard Error	Odds Ratio Estimate
Sex: Male vs Female**	-0.15	0.04	0.86
Race: Non-Hispanic White vs Hispanic	-0.03	0.06	0.97
Race: Non-Hispanic Black vs Hispanic	-0.17	0.09	0.84
Race: Other vs Hispanic*	0.36	0.11	1.43
Race: Missing or Unknown vs Hispanic	-0.01	0.14	0.99
Current-year Enrollee: No vs Yes**	-0.44	0.12	0.65

[a] Beneficiaries living in the community only; beneficiaries living in facilities excluded by design.
*: Statistically significant at P<.05
**: Statistically significant at P<.01
Source: 2018 Survey File and Internal Sample Control File (MIF).

9.2.4 Medicare Claims Payment Measures

For the next set of analyses, nonrespondents and respondents were compared using 2018 claims data to identify any differences in claims payment amounts between these groups. Claims data are downloaded from the RIF2018 library within the CMS Chronic Conditions Data Warehouse, which reflects fee-for-service claims for each month of 2018.

Two-sided *t*-tests were used to compare the differences in mean claim payment amounts between respondents and nonrespondents, with an assumption of unequal variances between the two groups.

We exclude from this analysis any beneficiaries who were enrolled in a managed care plan (e.g. Medicare Advantage) during 2018, as these beneficiaries' services are not reflected in claims data while they are enrolled in a managed care plan. Thus, these analyses are limited to beneficiaries enrolled in traditional fee-for-service plans. Beneficiaries enrolled in MA plans tend to be younger and healthier, with higher propensity to respond[52], so the underlying pool of FFS beneficiaries in these analyses may represent a different population compared to the other analyses in this report. The findings of this section should be considered as regarding the traits of FFS-enrolled beneficiaries only.

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[51] For more details about sample selection of current-year enrollees, see Section 3.4.1. of the 2018 Methodology Report.

[52] There is differential nonresponse between MA- and FFS-enrolled beneficiaries in the 2018 Panel, with 33 percent of Round 82 nonrespondents being enrolled in a Medicare Advantage plan, compared to 41 percent of respondents being enrolled in a Medicare Advantage plan.

Exhibit 9.2.6 shows a comparison of 2018 Panel nonrespondents and respondents in Fall 2018 (Round 82) across six claims payment amount categories. Mean payment amounts for each group are presented, and significant differences for the comparison are represented with asterisks in the first column. In Round 82, respondents have higher average claims payment amounts than nonrespondents across all categories, with significant differences identified within the Carrier, Durable Medical Equipment, Home Health Agency, Outpatient, and Total Payment Amount types.

Exhibit 9.2.6: 2018 Claims Payment Measures for 2018 Panel[a] Nonrespondents (NR) and Respondents (R): Fall 2018

Claims Payment Amount Measure	Mean of NR $	Mean of R $
Carrier**	2,332.45	2,655.93
Durable Medical Equipment**	150.01	288.32
Home Health Agency**	400.52	566.46
Inpatient	2,894.70	3,441.09
Outpatient**	1,509.75	2,195.19
Skilled Nursing Facility	425.34	503.97
All claims: Total Payment Amount**	7,712.78	9,650.97

[a] Beneficiaries living in the community only; beneficiaries living in facilities excluded by design.

*: Statistically significant at P<.05

**: Statistically significant at P<.01

Source: RIF2018 Chronic Conditions Data Warehouse library and Internal Sample Control File (MIF).

Exhibits 9.2.7 and 9.2.8 show similar comparisons of 2018 Panel nonrespondents and respondents in the subsequent Winter and Summer 2019 rounds, respectively, across the same claims payment measures. These beneficiaries responded in Fall 2018 and moved forward into the Winter and/or Summer rounds of 2018. In contrast to the findings for Fall 2018, nonrespondents in these rounds have higher payment amounts than respondents across several of the measures. The only significant differences were found in Winter 2019, where nonrespondents had significantly higher average claims payments than did respondents for inpatient and total claims payment types.

Exhibit 9.2.7: 2018 Claims Payment Measures for 2018 Panel[a] Nonrespondents (NR) and Respondents (R): Winter 2019

Claims Payment Amount Measure	Mean of NR $	Mean of R $
Carrier	2,910.89	2,566.95
Durable Medical Equipment	245.47	289.21
Home Health Agency	579.53	529.36
Inpatient*	4,369.06	3,047.87
Outpatient	2,243.20	2,150.73
Skilled Nursing Facility	685.07	438.84
All claims: Total Payment Amount*	11,033.22	9,022.96

[a] Beneficiaries living in the community only; beneficiaries living in facilities excluded by design.

*: Statistically significant at P<.05

**: Statistically significant at P<.01

Source: RIF2018 Chronic Conditions Data Warehouse library and Internal Sample Control File (MIF).

Exhibit 9.2.8: 2018 Claims Payment Measures for 2018 Panel[a] Nonrespondents (NR) and Respondents (R): Summer 2019

Claims Payment Amount Measure	Mean of NR $	Mean of R $
Carrier	2,348.01	2,600.06
Durable Medical Equipment	287.86	285.51
Home Health Agency	575.99	519.97
Inpatient	3,523.98	2,846.33
Outpatient	2,321.79	2,090.81
Skilled Nursing Facility	409.79	423.79
All claims: Total Payment Amount	9,467.41	8,766.47

[a] Beneficiaries living in the community only; beneficiaries living in facilities excluded by design.

*: Statistically significant at P<.05

**: Statistically significant at P<.01

Source: RIF2018 Chronic Conditions Data Warehouse library and Internal Sample Control File (MIF).

9.2.5 Chronic Condition Attributes

Another source of data used in this nonresponse bias analysis is obtained from the Chronic Condition segment of the 2018 Medicare Beneficiary Summary File, housed in the Chronic Conditions Data Warehouse. These data are available on an annual basis for all Medicare beneficiaries and identify whether a beneficiary met sufficient claims criteria during the year (i.e., indicating treatment for the condition) to be classified as having a particular chronic condition[53]. These conditions include chronic kidney disease, diabetes, depression, stroke, breast cancer, anemia, asthma, and benign prostatic hyperplasia.

For each round from Fall 2018 through Winter 2020, respondents are compared to nonrespondents across 2018 year-end Chronic Condition attributes. Exhibit 9.2.9 displays the percentage of 2018 Panel respondents and nonrespondents classified as having each particular chronic condition, based on meeting the claims criteria for each condition, and Exhibit 9.2.10 reflects the results of significance testing for the 2018 Panel. Exhibit 9.2.11 displays the same comparison for the 2015-2017 Continuing Panel respondents and nonrespondents, and Exhibit 9.2.12 reflects the results of significance testing for the Continuing Panels. The Rao-Scott chi-square test was used again to test the significance of differences between respondents and nonrespondents.

Exhibits 9.2.9 and 9.2.10 show significant differences between respondents and nonrespondents in the Fall 2018 Panel during its first round in the survey (Round 82) for three of the conditions. The proportion of respondents who met the 2018 year-end criteria to be classified as having either chronic kidney disease, diabetes, or depression is 1 to 2 percentage points higher than the proportion of nonrespondents classified with the same condition. While no significant differences were found in Round 83, in subsequent rounds, more differences were identified, and the previous pattern reverses in most instances. For example, in Rounds 84-86, the proportion of respondents who were classified as having depression is 3 to 4 percentage points lower than the proportion of nonrespondents classified as having depression. Respondents are also less likely to be associated with chronic kidney disease in Rounds 85-86, and asthma in Rounds 84-86, in comparison to nonrespondents in the same round.

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[53] Note that, because the indicators used in these analyses are defined to reflect the entire year of 2018, there could potentially be individuals classified with the chronic condition who experienced the condition after being interviewed in Round 82 (Fall 2018), but this group is likely small.

Exhibit 9.2.9: Percentages of 2018 Panel[a] Respondents (R) vs. Nonrespondents (N), by Round, Who Were Identified with Selected Chronic Conditions

Measurement of Interest	Round 82		Round 83		Round 84		Round 85		Round 86	
	N	R	N	R	N	R	N	R	N	R
Chronic Kidney Disease	14.0	15.7	15.8	15.5	14.8	15.2	18.9	14.4	17.0	13.3
Diabetes	15.3	17.0	15.7	17.2	15.3	17.4	19.8	16.7	17.8	16.3
Depression	10.5	11.5	12.7	11.0	14.1	10.5	13.2	10.2	12.7	9.5
Stroke/Transient Ischemic Attack	1.9	2.1	2.3	1.9	2.6	1.7	2.8	1.7	2.2	1.5
Breast Cancer	2.1	1.8	1.6	1.8	2.0	1.7	1.0	1.9	1.5	1.9
Anemia	12.6	12.5	11.4	12.5	12.8	12.2	13.1	11.9	11.9	11.8
Asthma	2.9	3.5	4.0	3.3	4.4	3.1	5.1	2.7	3.6	2.4
Benign Prostatic Hyperplasia	3.9	4.3	4.2	4.3	5.4	4.0	4.5	4.0	3.0	4.2

[a] Beneficiaries living in the community only; beneficiaries living in facilities excluded by design.

Source: 2018 MBSF data from the Chronic Conditions Data Warehouse and Internal Sample Control File (MIF).

Exhibit 9.2.10: Significance Summary for 2018 Panel Respondents (R) vs. Nonrespondents (N), by Round, Who Were Identified with Selected Chronic Conditions

Measurement of Interest	Round 82	Round 83	Round 84	Round 85	Round 86
Chronic Kidney Disease	**			**	**
Diabetes	**		*	*	
Depression	*		**	*	**
Stroke/Transient Ischemic Attack					
Breast Cancer				**	
Anemia				*	
Asthma			**	**	*
Benign Prostatic Hyperplasia			*		*

*Significant at $P<0.05$

** Significant at $P<0.01$

Source: 2018 MBSF data from the Chronic Conditions Data Warehouse and Internal Sample Control File (MIF).\

In Exhibits 9.2.11 and 9.2.12, it is generally the case that a higher proportion of nonrespondents in the Continuing Panels is classified with a given chronic condition compared to the respective proportion of respondents. For example, in Round 85, nearly 23 percent of nonrespondents are classified with diabetes, compared to just over 17 percent of respondents. This is the largest difference observed for the 2018 or Continuing Panels. Generally, though, the overall magnitude of differences found between respondents and nonrespondents across chronic conditions is not large.

Exhibit 9.2.11: Percentages of 2015-2017 Panel[a] Respondents (R) vs. Nonrespondents (N), by Round, Who Were Identified with Selected Chronic Conditions

Measurement of Interest	Round 82		Round 83		Round 84		Round 85		Round 86	
	N	R	N	R	N	R	N	R	N	R
Chronic Kidney Disease	19.0	16.8	17.3	16.4	17.1	16.0	20.9	15.6	18.6	15.4
Diabetes	17.3	18.4	19.4	18.0	19.9	17.5	22.9	17.2	20.8	17.0
Depression	12.1	10.5	11.2	10.2	11.7	10.3	13.6	9.9	12.2	9.6
Stroke/Transient Ischemic Attack	2.9	2.3	2.2	2.2	1.5	2.2	1.8	2.2	2.5	2.0
Breast Cancer	1.9	1.9	2.0	1.9	1.8	1.9	2.6	1.9	1.7	2.0
Anemia	16.3	14.0	17.0	13.4	14.6	13.3	15.2	13.1	16.6	12.6
Asthma	3.3	3.4	4.4	3.1	4.1	3.3	3.6	3.3	2.7	3.5
Benign Prostatic Hyperplasia	5.6	4.8	5.6	4.7	4.2	4.7	4.3	4.7	6.4	4.4

[a] Beneficiaries living in the community only; beneficiaries living in facilities excluded by design.

Source: 2018 MBSF data from the Chronic Conditions Data Warehouse and Internal Sample Control File (MIF).

Exhibit 9.2.12: Significance Summary for 2015-2017 Panel Respondents (R) vs. Nonrespondents (N), by Round, Who Were Identified with Selected Chronic Conditions

Measurement of Interest	Round 82	Round 83	Round 84	Round 85	Round 86
Chronic Kidney Disease	*			**	*
Diabetes				**	*
Depression	*			*	*
Stroke/Transient Ischemic Attack					
Breast Cancer					
Anemia	*	**			**
Asthma		*			
Benign Prostatic Hyperplasia					*

* Significant at P<0.05

** Significant at P<0.01

Source: 2018 MBSF data from the Chronic Conditions Data Warehouse and Internal Sample Control File (MIF).

9.2.6 Analysis of Subsequent Round Nonresponse

For the next set of analyses, *respondents* to the MCBS in Fall 2018 were analyzed and followed from Winter 2019 to Winter 2020. Because all of the Fall 2018 respondents provided self-reported health data in the Fall questionnaire, these data could be used to construct a variety of health characteristics for assessing differences between *subsequent round* respondents and nonrespondents within this population. The purpose of this set of analyses is to gain a better understanding of subsequent response propensity, which is higher than initial response propensity and may be influenced by different factors. We compare Fall 2018 respondents' subsequent round response behavior by selected health and wellbeing measures that were identified as possible correlates of nonresponse. Note that, as with most of the previous analyses, the following analyses include only community dwelling beneficiaries; residents of facilities were excluded by design because the questionnaire differs for this population.

Exhibit 9.2.13 summarizes the constructs used for comparison, the 2018 Survey File variables used to develop those constructs, and the values for each construct. They include, among others, measures indicating difficulties in accessing and managing health care, satisfaction with health care, and mobility and daily living obstacles. For each of the self-reported measurements of interest, the Rao-Scott chi-square test was used to identify statistically significant differences between respondents and nonrespondents.

Exhibit 9.2.13: Measurements of Interest: Self-Reported Health Characteristics from the 2018 Survey File[1]

Health Characteristic	**Description**	**Table and Fields**	**Values**
Difficulty accessing health care	Indicates whether beneficiary had difficulty getting desired/required health care	ACCS: HCTROUBL	1: Had difficulty 0: No difficulty
Satisfaction with health care	Indicates level of satisfaction with overall quality of health care received over the past year.	ACCS: MCQUALTY	1: Satisfied (Very Satisfied or Satisfied) 2: Dissatisfied (Very Dissatisfied or Dissatisfied) 3: Not Applicable
Satisfaction with ease of getting to doctor	Indicates level of satisfaction with ease of getting to doctor or other health professional from home	ACCS: MCEASE	1: Satisfied (Very Satisfied or Satisfied) 2: Dissatisfied (Very Dissatisfied or Dissatisfied) 3: Not Applicable
Satisfaction with availability of medical care during night/weekends	Indicates level of satisfaction with the availability of health care at night and on weekends	ACCS: MCAVAIL	1: Satisfied (Very Satisfied or Satisfied) 2: Dissatisfied (Very Dissatisfied or Dissatisfied) 3: Not Applicable
Worry more about health than others	Beneficiary reports that they worry about health more than other people their age	ACCS: MCWORRY	1: True 0: False

Health Characteristic	**Description**	**Table and Fields**	**Values**
Mobility difficulties	Indicates whether beneficiary has trouble getting places	MOBL: MTBLGTPL,	1: Had difficulty 0: No difficulty
Instrumental Activities of Daily Living (IADL) functions	Indicates whether beneficiary had difficulty with at least one of the following: managing money, doing heavy housework, doing light housework, making meals, shopping, or using the phone	IADL: PRBBILS, PRBHHWK, PRBLHWK, PRBMEAL, PRBSHOP, PRBTELE	1: Had difficulty 0: No difficulty
Activities of Daily Living (ADL) functions	Indicates whether beneficiary had difficulty with at least one of the following: bathing/showering, getting in/out of chairs, dressing, eating, using the toilet, or walking	ADLS: HPPDBATH, HPPDCHAR, HPPDDRES, HPPDEAT, HPPDTOIL, HPPDWALK	1: Had difficulty 0: No difficulty
Dwelling[2]	Description of beneficiary's home	HOUS: DWELLING	1: One-family, detached 2: Two-family or duplex 3: Apartment or condo building 4: Mobile home, trailer 5: Rowhouse, townhouse 6: All other

[1] Note that the variables used in 2018 vary slightly from the variables used in the 2015 analysis. This is due to the fact that some of the 2015 variables are no longer fielded in the Fall survey and thus are not available for this analysis. When possible, replacement variables that aligned as closely as possible with the original 2015 variables were selected for the 2018 analysis.

[2] DWELLING is asked of Continuing Panel beneficiaries in the current round in a limited set of circumstances, such as when the beneficiary reports having moved in the previous year. For beneficiaries not prompted for a new DWELLING value in the Round 82 questionnaire, the most recent value of DWELLING was pulled forward from a previous round for this analysis.

Source: 2018 Survey File documentation.

Comparisons of both 2018 Panel and 2015-2017 Panel respondents to nonrespondents in Winter 2019 through Winter 2020 were conducted across these self-reported health measures. Exhibit 9.2.14 includes the distributions of 2018 Panel respondents and nonrespondents, by round, across the various measures, and Exhibit 9.2.15 displays the measures and rounds in which significant differences were found between those respondents and nonrespondents. Across all rounds, a larger proportion of nonrespondents reported that they worried about their health than respondents, and in all rounds except Winter 2019, more nonrespondents reported having difficulties with mobility, IADL functions, and ADL functions. In Fall 2019 and Winter 2020, significant differences were identified across nearly all measures, with more nonrespondents reporting experiencing difficulties and being dissatisfied than respondents. Note that results in

Winter 2020 coincide with the shift to telephone data collection required due to the COVID-19 pandemic.

Exhibit 9.2.14: 2018 Panel[a] Respondents (R) vs. Nonrespondents (NR), by Round, Across Self-Reported Health Characteristics

Health Characteristic	Value in %	Winter 2019		Summer 2019		Fall 2019		Winter 2020	
		NR	R	NR	R	NR	R	NR	R
Difficulty accessing health care	% with difficulties	10.3	8.9	10.4	8.7	8.8	8.9	11.9	7.8
Satisfaction with health care	1: Satisfied	91.3	93.1	92.7	93.0	90.3	93.7	91.6	94.1
	2: Dissatisfied	7.1	5.4	5.5	5.5	7.3	4.9	7.1	4.5
	3: Not applicable	1.6	1.5	1.8	1.5	2.4	1.4	1.2	1.4
Satisfaction with ease of getting to doctor	1: Satisfied	91.8	92.9	92.5	93.0	92.4	93.2	90.2	94.0
	2: Dissatisfied	6.4	5.9	6.1	5.8	6.4	5.7	9.0	4.8
	3: Not applicable	1.7	1.2	1.5	1.1	1.2	1.1	0.8	1.1
Satisfaction with availability of medical care during night/weekends	1: Satisfied	60.3	58.8	57.6	59.0	61.4	58.4	59.5	57.8
	2: Dissatisfied	6.7	6.9	7.5	6.9	8.1	6.7	9.0	6.1
	3: Not applicable	33.0	34.3	34.9	34.1	30.5	34.9	31.4	36.0
Worry more about health than others	1: True	32.1	28.9	31.8	28.0	32.7	27.3	34.1	25.7
	2: False	67.9	71.1	68.2	72.0	67.3	72.7	65.9	74.3
Mobility difficulties	% SP with difficulties	21.8	19.9	21.7	19.1	21.8	18.5	23.1	17.2
IADL functions	% SP with difficulties	35.9	37.1	41.1	35.8	39.2	35.2	38.8	34.2
ADL functions	% SP with difficulties	32.4	32.8	34.2	32.0	36.0	31.3	35.9	29.7
Dwelling	1: One-family, detached	66.4	68.0	66.8	68.3	69.2	68.3	65.8	69.6
	2: Two-family, duplex	3.2	3.6	3.8	3.4	3.4	3.4	3.3	3.5
	3: Apartment, condo building	17.3	16.9	16.6	17.1	14.6	17.4	17.4	16.8
	4: Mobile home, trailer	9.2	7.8	9.2	7.4	9.1	7.2	10.1	6.3
	5: Rowhouse, townhouse	2.3	2.6	2.1	2.7	2.7	2.7	2.1	2.8
	6: All other	1.6	1.1	1.5	1.1	1.0	1.1	1.2	1.0

[a] Beneficiaries living in the community only; beneficiaries living in facilities excluded by design.
Source: 2018 Survey File and Internal Sample Control File (MIF).

Exhibit 9.2.15: Significance of Differences for 2018 Panel[a] Respondents vs. Nonrespondents, by Round, Across Self-Reported Health Characteristics

Health Characteristic	Winter 2019	Summer 2019	Fall 2019	Winter 2020
Difficulty accessing health care				**
Satisfaction with health care			**	*
Satisfaction with ease of getting to doctor				**
Satisfaction with availability of medical care during night/weekends			*	**
Worry more about health than others	*	*	**	**
Mobility difficulties	*		*	**
Instrumental Activities of Daily Living (IADL) functions		**	*	*
Activities of Daily Living (ADL) functions			**	**
Dwelling				**

[a] Beneficiaries living in the community only; beneficiaries living in facilities excluded by design

* Significant at P<0.05

** Significant at P<0.01

Source: 2018 Survey File and Internal Sample Control File (MIF).

Exhibit 9.2.16 displays the comparison of 2015-2017 (Continuing) Panel respondents to nonrespondents, by round, across the same self-reported health characteristics, and Exhibit 9.2.17 shows the corresponding significant differences that were found between respondents and nonrespondents. For these panels, significant differences were detected across most satisfaction measures in Winter 2019, and across most mobility and daily living measures in Fall 2019, with a larger proportion of nonrespondents reporting difficulties and lower satisfaction than respondents. In Fall 2019 in particular, proportions of nonrespondents reporting mobility, IADL, and ADL difficulties were 6 to 8 percentage points higher than the corresponding proportions of respondents reporting the same difficulties. No significant differences were found in Summer 2019, but a few differences were identified in Winter 2020, with more nonrespondents reporting being worried and having difficulty with mobility and ADL functions than respondents. It appears that, in these more established panels, the shift to telephone interviewing in this round did not have as great an impact as it did on the relatively younger 2018 Panel.

Exhibit 9.2.16: Continuing Panel[a] Respondents (R) vs. Nonrespondents (NR), by Round, Across Self-Reported Health Characteristics

Health Characteristic	Value in %	Winter 2019		Summer 2019		Fall 2019		Winter 2020	
		NR	R	NR	R	NR	R	NR	R
Difficulty accessing health care	% with difficulties	8.4	5.1	6.3	5.7	8.8	5.4	6.5	5.4
Satisfaction with health care	1: Satisfied	92.2	94.3	92.7	94.1	92.7	94.3	93.9	94.3
	2: Dissatisfied	5.9	4.0	5.5	4.1	6.0	3.9	4.4	3.9
	3: Not applicable	1.9	1.8	1.8	1.8	1.3	1.9	1.8	1.8
Satisfaction with ease of getting to doctor	1: Satisfied	93.3	94.4	93.3	94.4	93.4	94.5	93.7	94.7
	2: Dissatisfied	5.6	4.1	5.1	4.1	5.5	4.0	4.6	3.9
	3: Not applicable	1.2	1.5	1.6	1.5	1.1	1.5	1.6	1.4
Satisfaction with availability of medical care during night/weekends	1: Satisfied	63.3	61.0	58.5	61.5	59.7	61.3	60.8	61.2
	2: Dissatisfied	4.9	4.4	4.7	4.3	6.0	4.1	5.2	4.0
	3: Not applicable	31.8	34.6	36.8	34.2	34.3	34.6	34.0	34.8
Worry more about health than others	1: True	24.6	20.9	22.1	21.8	24.3	21.3	25.9	20.5
	2: False	75.4	79.1	77.9	78.2	75.7	78.7	74.1	79.5
Mobility difficulties	% SP with difficulties	16.5	13.6	15.9	13.3	20.5	12.4	17.3	11.8
IADL functions	% SP with difficulties	33.3	32.3	34.8	31.7	38.5	30.9	33.0	30.7
ADL functions	% SP with difficulties	30.1	28.1	29.2	27.6	32.4	26.5	32.6	25.4
Dwelling	1: One-family, detached	66.7	69.0	68.0	68.8	70.6	68.9	69.2	68.9
	2: Two-family, duplex	4.6	3.7	4.9	3.9	2.2	4.0	4.5	3.9
	3: Apartment, condo building	16.3	16.1	16.1	16.0	17.0	15.9	16.4	15.9
	4: Mobile home, trailer	8.9	7.9	8.0	7.9	8.2	7.6	7.0	7.8
	5: Rowhouse, townhouse	2.5	2.5	2.2	2.6	1.1	2.7	1.9	2.8
	6: All other	0.9	0.9	0.8	0.8	0.9	0.8	1.0	0.8

[a] Beneficiaries living in the community only; beneficiaries living in facilities excluded by design.

Source: 2018 Survey File and Internal Sample Control File (MIF).

Exhibit 9.2.17: Significance of Differences for Continuing Panel[a] Respondents vs. Nonrespondents, by Round, Across Self-Reported Health Characteristics

Health Characteristic	Winter 2019	Summer 2019	Fall 2019	Winter 2020
Difficulty accessing health care	**		*	
Satisfaction with health care	**		*	
Satisfaction with ease of getting to doctor	*			
Satisfaction with availability of medical care during night/weekends				
Worry more about health than others	**			**
Mobility difficulties	**		**	**
Instrumental Activities of Daily Living (IADL) functions			**	
Activities of Daily Living (ADL) functions			**	**
Dwelling			*	

[a] Beneficiaries living in the community only; beneficiaries living in facilities excluded by design

* Significant at P<0.05

** Significant at P<0.01

Source: 2018 Survey File and Internal Sample Control File (MIF).

9.2.7 Effects of Weighting on Potential Nonresponse Bias

MCBS estimation requires the use of survey weights, which are adjusted over time to account for nonresponse bias. During this process, respondents and nonrespondents are grouped together based on common characteristics, and the weights belonging to nonrespondents are redistributed to respondents who are similar. The characteristics used to match respondents and nonrespondents are those which are identified as being predictive of response propensity. In addition, many frame characteristics have known totals and are used to poststratify the weights such that the sum of the weights agree with national benchmarks. In these ways, the weights counteract potential nonresponse bias in the survey. The characteristics included in weighting adjustments and poststratification change over time to reflect changing patterns of response to the MCBS. To assess the extent to which application of the weights correct for nonresponse bias, this section compares unweighted and weighted distributions among survey respondents to known benchmarks for selected frame characteristics, chronic conditions indicators, and claims payment amounts.

Exhibit 9.2.18 re-examines the distribution of respondents across selected demographic characteristics where differences were seen in Exhibits 9.2.3 and 9.2.4. The first two columns display proportions of respondents included in the 2018 Survey File, which include respondents from the 2015 through 2018 Panels, across the various measures. In the first, proportions are unweighted; in the second, we apply the 2018 ever-enrolled Survey File weights. The third column provides the breakdown of the same variables in the 2018 Medicare population, as represented by control totals drawn from the 2018 Medicare administrative enrollment data. This analysis shows that our weighting process brings respondent distributions closer to population benchmarks, potentially correcting for observed patterns of differential nonresponse in unweighted distributions. Though we can only conduct these comparisons among variables that are known for both respondents and nonrespondents and have available benchmarks, the MCBS enjoys a wide variety of such variables for analysis, and improvement in bias among these factors likely indicates a reduction in bias even among factors we cannot observe for nonrespondents (e.g., survey items) or for which do not have benchmarks.

Exhibit 9.2.18: Comparison of Selected Characteristics Using 2018 Survey File Ever-Enrolled Weights and 2018 Population External Benchmarks

Frame Characteristic	2018 Survey File (Unweighted) %	2018 Survey File (Weighted) %	2018 Benchmarks %
Sex			
Male	45.4	45.8	45.7
Female	54.6	54.2	54.3
Age			
Under 45	9.6	3.1	2.9
45-64	7.7	12.0	11.4
65-69	18.5	31.3	26.9
70-74	14.0	20.4	22.1
75-79	16.5	14.2	15.3
80-84	16.6	9.6	10.2
85 and over	17.0	9.2	11.2
Race			
Hispanic	9.4	6.4	7.1
Non-Hispanic White	73.6	72.6	72.8
Non-Hispanic Black	10.0	9.7	10.2
All Other	3.0	3.9	4.9
Missing/Unknown	4.0	7.4	5.0
Race - Recode			
Black	10.6	10.6	10.7
All Others and Unknown	89.5	89.4	89.3
Census Region			
Northeast	17.4	18.4	18.4
Midwest	23.4	22.0	22.0
South	38.8	37.7	38.0
West	20.4	21.9	21.6

Frame Characteristic	2018 Survey File (Unweighted) %	2018 Survey File (Weighted) %	2018 Benchmarks %
Accretion Year			
Enrolled before 1/1/2014	82.3	70.9	70.9
Enrolled 1/1/2014 - 12/31/2014	4.8	5.8	5.8
Enrolled 1/1/2015 - 12/31/2015	5.0	5.8	5.8
Enrolled 1/1/2016 - 12/31/2016	4.1	6.0	6.0
Enrolled 1/1/2017 - 12/31/2017	2.6	5.7	5.7
Enrolled 1/1/2018 - 12/31/2018	1.3	5.8	5.8

Source: 2018 Survey File and Internal Sample Control File (MIF).

Exhibit 9.2.19 extends this weighted analysis by applying 2018 ever-enrolled Survey File weights to the chronic conditions attributes associated with members of the 2018 Survey File population. The 2018 benchmarks in Exhibit 9.2.20 are derived from the full Chronic Condition segment of the 2018 Medicare Beneficiary Summary File, as this file represents the population of Medicare beneficiaries in 2018. The application of ever-enrolled weights brings the respondent distribution of chronic conditions closer to the 2018 benchmarks for all but one of the chronic conditions being considered. As chronic conditions indicators are currently not employed in nonresponse adjustments during weighting, these findings support the assumption that adjusting for nonresponse bias using an inexhaustive selection of characteristics can translate into a reduction in bias among other characteristics as well. We are assessing the utility of including chronic conditions information in future weighting processes.

Exhibit 9.2.19: Comparison of Chronic Conditions Indicators Using 2018 Survey File Ever-Enrolled Weights and 2018 Population External Benchmarks

Chronic Condition Indicator	2018 Survey File, Unweighted (%)	2018 Survey File, Weighted (%)	2018 Benchmarks (%)
Chronic Kidney Disease	18.0	15.9	14.9
Diabetes	18.8	18.1	16.9
Depression	13.2	11.6	10.9
Stroke/Transient Ischemic Attack	2.6	2.3	2.2
Breast Cancer	1.9	2.0	1.8
Anemia	15.4	13.2	12.8
Asthma	3.4	3.2	2.9
Benign Prostatic Hyperplasia	4.8	4.5	4.3

Source: 2018 MBSF data from the Chronic Conditions Data Warehouse and 2018 Survey File.

Exhibit 9.2.20 reflects the application of ever-enrolled weights to the average claims payment amounts associated with members of the 2018 Survey File who are not associated with a Medicare Advantage plan[54]. The 2018 benchmarks reflect average claims payment amounts in the RIF2018 library, as this dataset should reflect all beneficiaries enrolled in traditional Medicare plans. In this instance, the ever-enrolled weights bring the respondent distribution closer to the population benchmarks for the Durable Medical Equipment, Home Health Agency, and Outpatient settings.

Exhibit 9.2.20: Comparison of Average Claims Payment Amounts Using 2018 Survey File Ever-Enrolled Weights and 2018 Population External Benchmarks

Setting	2018 Survey File, Unweighted ($)	2018 Survey File, Weighted ($)	2018 Benchmarks ($)
Carrier	2,800.9	2,507.7	2,701.8
Durable Medical Equipment	279.6	239.6	215.5
Home Health Agency	595.2	424.1	479.3
Inpatient	3,477.4	2,913.6	3,520.1
Outpatient	2,202.8	1,971.4	2,062.7
Skilled Nursing Facility	886.3	578.1	733.6
All claims: Total Payment Amount	10,242.3	8,634.5	9,713.0

Source: RIF2018 Chronic Conditions Data Warehouse library and 2018 Survey File.

9.2.8 Summary and Implications

Response rates in the MCBS follow patterns typical of longitudinal studies, with the lowest response occurring at the first time in sample and response rates increasing over subsequent rounds. The response rate for the 2018 Panel was just under 56 percent in Fall 2018 and increased to nearly 85 percent by Fall 2019. A decrease was seen in Winter 2020, but this is likely related to the disruption of in-person fieldwork, which occurred due to the impact of the COVID-19 pandemic on field operations.

Respondents and nonrespondents from the 2018 Panel and the 2015 to 2017 Continuing Panels were compared on various frame attributes, including demographic characteristics, Medicare claims payments, and chronic conditions, in order to identify areas of potential bias. Small but statistically significant differences were found across many of these measures.

Among the demographic characteristics, statistically significant differences between respondents and nonrespondents from the 2018 Panel in Fall 2018 were detected for sex, age, race/ethnicity, current-year enrollee (CYE) status, and HHS region. While nonrespondents appeared more likely to be female and older, and slightly more likely to fall into Missing or Other/Unknown race

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[54] Using available administrative enrollment data for 2018, beneficiaries were classified as being associated with an MA plan if they were enrolled in such a plan for at least one month in 2018. For Continuing Panels, 2017 administrative data is referenced.

categories, the differences were not large. For the 2015 to 2017 Continuing Panels, the only statistically significant differences detected between respondents and nonrespondents were across age and geography: nonrespondents generally tended to skew younger than the respondents, and there were proportionately more nonrespondents in the West and more respondents in the Northeast.

Significant differences were also found across various claims payment measures[55]. Within the Carrier, Durable Medical Equipment, Home Health Agency, Outpatient, and Total Payment Amount types, 2018 Panel Fall 2018 respondents had higher average claims payment amounts than nonrespondents. Conversely, in Winter 2019, nonrespondents had significantly higher average claims payments than did respondents for inpatient and total claims payment types. No significant differences were found in Summer 2019.

Further, the proportions of 2018 Panel Fall 2018 respondents classified as having chronic kidney disease, diabetes, and depression were 1 to 2 percentage points higher than the proportions of nonrespondents classified with the same conditions. In later rounds, however, just as for the claims payments, most of the significant differences reflect a reversal of results, with proportions of nonrespondents classified with many of the chronic conditions being 3 to 4 percentage points higher than the proportions of nonrespondents classified with the same conditions. For the Continuing Panels, it is generally the case that a higher proportion of nonrespondents in the Continuing Panels is classified with a given chronic condition compared to the respective proportion of respondents.

Respondents to the MCBS in Fall 2018 were also analyzed further. Potential bias was examined by comparing nonrespondents to respondents in subsequent rounds based on their self-reported health data in the Fall 2018 questionnaire. Generally, more nonrespondents reported that they worried about their health and had difficulties with mobility, IADL functions, and ADL functions than respondents. Most of the significant differences were found in Fall 2019 and Winter 2020, where more nonrespondents also had difficulties accessing health care and lower satisfaction with health care and health care access than respondents. Similar patterns were found in most rounds for Continuing Panels.

In a final set of analyses, unweighted and weighted distributions among survey respondents were compared to known benchmarks for selected frame characteristics, chronic conditions indicators, and claims payment amounts in order to assess the extent to which the application of the weights correct for nonresponse bias. Across most of these measures, weighted respondent distributions were closer to benchmarks than unweighted respondent distributions. As noted above, improvement in bias among these factors likely indicates a reduction in bias even among factors we cannot observe for nonrespondents (e.g., survey items) or for which we do not have benchmarks.

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[55] Claims payment data are only available for traditional fee-for-service beneficiaries; thus, beneficiaries in managed care plans, such as Medicare Advantage (MA), were excluded from these analyses.

To further address some of the differences found among the various measures, we can employ a variety of fielding, reporting, sampling, and weighting approaches. First, we will continue to use the R-Indicator reports that we developed for the MCBS. These reports display metrics that provide a quantitative assessment of which segments of the sample are over- or under-producing and causing the achieved sample to be imbalanced in terms of sample representativeness. (Note that the 2018 R-Indicators did not indicate a need to take any field interventions to improve representativity.) Special outreach strategies may also be used in the field on particular underrepresented groups identified here, such as those with chronic conditions or with mobility, IADL, or ADL difficulties. Further, indicators identifying these groups could also be used to develop additional nonresponse weighting adjustments. Another strategy sometimes used to address disproportionate nonresponse is the subsampling of nonrespondents in the field. At a predetermined point before the end of data collection, fielding can be halted for all but a subsample of the nonrespondents at that point, allowing all effort to be exerted on a smaller set of cases, potentially helping to balance the overall sample distribution. Weights then adjust for the subsampling. In response to patterns of differential nonresponse discovered through these analyses, we have the opportunity to formulate corrective actions such as those described above, as appropriate.

Finally, as described earlier, it is advisable to use caution when interpreting the significant differences identified in these analyses, as large sample sizes such as those in the MCBS can result in statistically significant differences being found even when little practical difference is observed. Thus, it is important to observe the actual differences in percentages between respondents and nonrespondents within variable categories to identify practical differences between the two groups. Also, significant differences in characteristics do not necessarily translate to bias in the MCBS estimates. For example, we may have an overrepresentation of males, but this would only result in bias in, say, expenditures or access to care, if males and females were widely different on these measures. Finally, many of the frame attributes analyzed here are either explicitly used in MCBS weighting adjustments, or the weighting adjustments have been shown to bring respondent distributions across the attributes closer to population benchmarks. As a result, the differences we observe may not be sufficiently consequential to cause concern for analysts deriving estimates from these data.

A nonresponse bias analysis for a survey like the MCBS would be expected to identify some differences between respondents and nonrespondents. Nonresponse affects all surveys to varying degrees and the MCBS is no exception. This 2018 MCBS nonresponse bias analysis provides users a better understanding of differences found between respondents and non-respondents which should be helpful when interpreting data. Efforts are ongoing to continue improving response rates and to learn more about nonresponse as a potential source of bias. An updated non response bias analysis will be released in 2023, based on 2021 MCBS respondents.

9.2.9 References

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Schoeni, Robert F et al, "Response Rates in National Panel Surveys." *The Annals of the American Academy of Political and Social Science* vol. 645,1 (2013): 60-87.

10. USING MCBS DATA FILES

10.1 MCBS Data User's Guides

The MCBS Data User's Guides offer a publicly available, easily searchable resource for data users. The Guides are updated for each new data year to ensure that users have current documentation on the survey design, questionnaires, and estimation as well as detailed notes on the structure and contents of the MCBS data releases.

For each MCBS data year, two stand-alone Data User's Guides are released. For 2018, the first is entitled *2018 MCBS Data User's Guide: Survey File*. This Guide documents the key features of the study and MCBS data products overall. It also provides technical information on the Survey File LDS including the derivation of variables and any significant changes in the variables and/or file structure. The second is entitled *2018 MCBS Data User's Guide: Cost Supplement File*. This Guide provides technical information on the Cost Supplement File LDS and also describes the derivation of variables and any significant changes in the variables and/or file structure. In addition, the *Data User's Guide: Cost Supplement* contains detailed information about matching survey and administrative data as well as imputation.

10.2 MCBS Public Use Data File

Beginning with data collected in the 2013 MCBS, a public use file (PUF) and accompanying documentation are available free for download under the MCBS PUF link at https://www.cms.gov/Research-Statistics-Data-and-Systems/Downloadable-Public-Use-Files/MCBS-Public-Use-File/index. The MCBS PUF is an easy to use data file with select data items that allow researchers to conduct analysis on health disparities, access to and satisfaction with healthcare, and medical conditions for Medicare beneficiaries living in the community. The MCBS PUF is not intended to replace the more detailed LDS files. Rather, it provides a publically available alternative for those researchers interested in the health, health care use, access to and satisfaction with Medicare of beneficiaries. Given that the MCBS PUF meets all necessary requirements regarding de-identification of the data and mitigation of disclosure risk, it provides the very highest degree of protection to the Medicare beneficiaries' protected health information.

10.3 MCBS Limited Data Set (LDS) Files

There are two MCBS LDS's available to data users. In order to access these data files, data users must submit a Data Use Agreement (DUA) and complete an LDS Worksheet, which provides CMS with information about the research project, the particular files needed, and payment information for administrative fees associated with the data request. Note that new data users and repeat data users complete distinct forms. Data users should visit CMS' LDS website at https://www.cms.gov/Research-Statistics-Data-and-Systems/Files-for-Order/Data-Disclosures-Data-Agreements/DUA_-_NewLDS for a full description of available LDS files, further details about the request process, and downloadable forms.

11. GLOSSARY

Activities of daily living (ADLs): Activities of daily living are activities related to personal care. They include bathing or showering, dressing, getting in and out of bed or a chair, walking, using the toilet, and eating.

Baseline interview: The initial questionnaire administered to new respondents to the study; administered in the fall of the year they are selected into the sample (interview #1).

Beneficiary: Beneficiary refers to a person receiving Medicare services who may or may not be participating in the MCBS. Beneficiary may also refer to an individual selected from the MCBS sample about whom the MCBS collects information. Beneficiaries must meet at least one of three criteria for Medicare eligibility (is aged 65 years or older, is under age 65 with certain disabilities, or is of any age with End-Stage Renal Disease) and is entitled to health insurance benefits. (Source: https://www.cms.gov/Medicare/Medicare-General-Information/MedicareGenInfo/index.html).

Claim-only event: A claim-only event is a medical service or event known only through the presence of a Medicare Fee-for-Service claim from administrative data. This means that the event represented in the data could not be reconciled with a corresponding survey-reported event.

Community component: Survey of beneficiaries living in the community (i.e., not in a long-term care facility such as a nursing home) during the reference period covered by the MCBS interview.

Continuing interview: The questionnaire administered to repeat respondents as they progress through the study (interviews #2-11).

Continuously enrolled (aka always enrolled): A Medicare beneficiary who was enrolled in Medicare from the first day of the calendar year until the fall interview and did not die prior to the fall round. This population excludes beneficiaries who enrolled during the calendar year 2015, those who dis-enrolled or died prior to their fall interview, residents of foreign countries, and residents of U.S. possessions and territories.

Core sections: These sections of the MCBS Questionnaire are of critical purpose and policy relevancy to the MCBS. They may be fielded every round or on a seasonal basis.

Crossover: A respondent who enters a long-term care facility setting (e.g., nursing homes) or who alternates between a community and a facility setting.

Current-year enrollee: Beneficiaries who were eligible and enrolled in Medicare (Parts A or B) anytime from January 1 to December 31 of the year the sample was selected.

Doctor: This includes both medical doctors (M.D.) and doctors of osteopathy (D.O.). It does not include chiropractors, nurses, technicians, optometrists, podiatrists, physician's assistants, physical therapists, psychologists, mental health counselors or social workers. Generic specialties shown in parentheses following one of the specialties were coded as the specialty. For example, if the respondent mentioned a "heart" doctor, cardiology was coded. Generic answers not listed were not converted to specialties.

Doctor's office or group practice: This refers to an office maintained by a doctor or a group of doctors practicing together; generally the patient makes an appointment to see a particular physician.

Ever enrolled: A Medicare beneficiary who was enrolled at any time during the calendar year including people who dis-enrolled or died prior to their fall interview. Excluded from this population are residents of foreign countries and of U.S. possessions and territories.

Exit interview: Conducted in the winter round, this interview completes the respondent's participation in the MCBS (interview #11). The exit interview is a special case of the Continuing interview.

Facility component: Survey of respondents living in facilities, such as long-term care nursing homes or other institutions, during the reference period covered by the MCBS interview. Interviewers conduct the Facility component with staff members located at the facility (i.e., facility respondents); beneficiaries are not interviewed if they reside at a facility.

Fee-for-Service (FFS) payment: Fee-for-Service is a method of paying for medical services in which each service delivered by a provider bears a charge. This charge is paid by the patient receiving the service or by an insurer on behalf of the patient.

Field interviewer: The principal contact for collecting and securing respondent data.

Field manager: A supervisor who motivates and manages a group of field interviewers to meet the goals of high quality data collection on time and within budget limits.

Home: This includes situations where the doctor comes to the beneficiary, rather than the beneficiary going to the doctor. Here, "home" refers to anywhere the beneficiary was usually staying at the time of the medical provider's visit. It may be his/her home, the home of a friend, a hotel room, etc.

Hospital emergency room: This means the emergency room of a hospital. "Urgent care" centers are not included. (NOTE: All hospital emergency room visits were included, even if the respondent went there for a "non-emergency" condition such as a cold, flu or intestinal disorder.) A physician, nurse, paramedic, physician extender, or other medical provider may administer the health care.

Hospital outpatient department: A unit of a hospital, or a facility connected with a hospital, providing health and medical services, health education, health maintenance, preventive services, diagnosis, treatment, surgery, and rehabilitation to individuals who receive services from the hospital but do not require hospitalization or institutionalization. Outpatient clinics can include obesity clinics; eye, ear, nose and throat clinics; alcohol and drug abuse clinics; physical therapy clinics; kidney dialysis clinics, and radiation therapy clinics. The outpatient department may or may not be physically attached to a hospital, but it must be associated with a hospital.

Incoming Panel Sample (formerly known as Supplemental Panel): A statistically sampled group of beneficiaries that enter the MCBS in the fall of a data collection year. One panel is retired at the conclusion of each winter round, and a new panel is selected to replace it each fall round. Panels are identified by the data collection year (e.g., 2015 panel) in which they were selected.

Internal Sample Control File: A data file that contains every beneficiary sampled back through the beginning of MCBS. The file contains sampling information, year of selection, primary sampling unit, secondary sampling unit, contact information, and other sampling demographic information as well as final disposition codes to indicate completion status per round, component fielded per round, dates of death, and lost entitlement information.

Instrumental activities of daily living (IADLs): Instrumental activities of daily living are activities related to independent living. They include preparing meals, managing money, shopping for groceries or personal items, performing light or heavy housework, and using a telephone. If a beneficiary had any difficulty performing an activity by himself/herself, or did not perform the activity at all, because of health problems, the person was deemed to have a limitation in that activity. The limitation may have been temporary or chronic at the time of the survey. Facility interviewers did not ask about the beneficiary's ability to prepare meals or perform light or heavy housework, since they are not applicable to the beneficiary's situation; however, interviewers did question proxies about the beneficiary's ability to manage money, shop for groceries or personal items, or use a telephone.

Long-term care facility: A facility that provides rehabilitative, restorative, and/or ongoing skilled nursing care to patients or residents in need of assistance with activities of daily living.

Medicare: Medicare is the federal health insurance program for people who are 65 or older, certain younger people with disabilities, and people with End-Stage Renal Disease (permanent kidney failure requiring dialysis or a transplant, sometimes called ESRD). The different parts of Medicare help cover specific services:

Hospital Insurance (Part A): covers inpatient hospital stays, care in a skilled nursing facility, hospice care, and some home health care.

Medical Insurance (Part B): covers certain doctors' services, outpatient care, medical supplies, and preventive services.

Medicare Advantage (Part C): an alternative to coverage under traditional Medicare (Parts A and B), a health plan option similar to a Health Maintenance Organization (HMO) or Preferred Provider Organization (PPO) administered by private companies.

Prescription Drug Coverage (Part D): additional, optional coverage for prescription drugs administered by private companies.

For more information, please visit the Medicare.gov website at https://www.medicare.gov/sign-up-change-plans/decide-how-to-get-medicare/whats-medicare/what-is-medicare.html.

Medicare Advantage (MA): Medicare Advantage Plans, sometimes called "Part C" or "MA Plans," are offered by private companies approved by Medicare. An MA provides, or arranges for the provision of, a comprehensive package of health care services to enrolled persons for a fixed capitation payment. The term "Medicare Advantage" includes all types of MAs that contract with Medicare, encompassing risk MAs, cost MAs, and health care prepayment plans (HCPPs).

Medicare beneficiary: See Beneficiary.

Medicare Managed Care Organization (MCO)/Health Maintenance Organization (HMO): This is an organization that provides a full range of health care coverage in exchange for a fixed fee/co-pay. Some managed care plans require that plan members receive all medical services from one central building or location. Formerly referenced only as HMOs, these organizations are now referred to with terms such as Medicare MCOs/HMOs/Medicare Advantage/Part C.

Minimum Data Set (MDS): The Minimum Data Set (MDS) is part of the federally mandated process for clinical assessment of all residents in Medicare and Medicaid certified nursing homes. For more information, please visit https://www.cms.gov/Research-Statistics-Data-and-Systems/Computer-Data-and-Systems/Minimum-Data-Set-3-0-Public-Reports/index.

Outcome and Assessment Information Set (OASIS): The instrument/data collection tool used by CMS to collect and report performance data by Medicare-certified home health agencies. For more information, please visit https://www.cms.gov/Medicare/Quality-Initiatives-Patient-Assessment-Instruments/HomeHealthQualityInits.

Panel: See Incoming Panel sample.

Prescription drugs: The basic unit measuring use of prescription drugs is a single purchase of a single drug in a single container. Prescription drug data are included for beneficiaries living in the community and in a facility; Prescription drugs administered during an inpatient hospital stay are not included.

Primary Sampling Unit (PSU): Primary sampling unit refers to sampling units that are selected in the first (primary) stage of a multi-stage sample ultimately aimed at selecting individual elements (Medicare beneficiaries in the case of MCBS). PSUs are made up of major geographic areas consisting of metropolitan areas or groups of rural counties.

Proxy: Beneficiaries who were too ill, or who could not complete the Community interview for other reasons, were asked to designate a proxy, someone very knowledgeable about the beneficiary's health and living habits. In most cases, the proxy was a close relative such as the spouse, a son or daughter. In a few cases, the proxy was a non-relative like a close friend or caregiver. In addition, a proxy was utilized if a beneficiary had been reported as deceased during the current round's reference period or if a beneficiary who was residing in the community in the previous round had since entered into a long-term care facility. Proxy interviews are only used for the Community interview, as the Facility interview is conducted with a staff member located at the facility (see definition of "Facility component").

Race/ethnicity: Responses to race and ethnicity questions are self-reported by the respondent. Respondents who reported they were white and not of Hispanic origin were coded as white non-Hispanic; those who reported they were black/African-American and not of Hispanic origin were coded as black non-Hispanic; persons who reported they were Hispanic, Latino/Latina, or of Spanish origin, regardless of their race, were coded as Hispanic; persons who reported they were American Indian or Alaska Native, Asian, Native Hawaiian or other Pacific Islander, or two or more races and not of Hispanic origin were coded as other race/ethnicity.

Reference Period: The timeframe to which a questionnaire item refers.

Residence status: Medicare beneficiaries who only completed Community interviews during the calendar year are categorized as residing only in the community. Medicare beneficiaries for whom only Facility interviews were completed during the calendar year are categorized as residing only in facilities. Beneficiaries who completed at least one Community interview and for whom at least one Facility interview was conducted during the year are classified as residing in both community and facility

Respondent: The person who answers questions for the MCBS; this person can be the beneficiary, a proxy, or a staff member located at a facility where the beneficiary resides.

Round: The MCBS data collection period. There are three distinct rounds each year; winter (January through April); summer (May through August); and fall (September through December).

Sample person: An individual beneficiary selected from MCBS' Incoming Panel sample to participate in the MCBS survey.

Survey-reported event: A survey-reported event is a medical service or event reported by a respondent during an interview. The event may have been matched to a Medicare Fee-for-Service claim from administrative data, or it may be a survey-only event, in which case it was not matched to a Medicare claim and is only known through the survey.

Secondary Sampling Unit (SSU): SSUs are made up of census tracts or groups of tracts within the selected PSUs.

Skilled nursing facility (SNF): A facility (which meets specific regulatory certification requirements) which primarily provides inpatient skilled nursing care and related services to patients who require medical, nursing, or rehabilitative services but does not provide the level of care or treatment available in a hospital. (Source: https://www.cms.gov/apps/glossary/default.asp?Letter=S&Language=English)

Topical sections: Sections of the MCBS Questionnaire that collect information on special interest topics. They may be fielded every round or on a seasonal basis. Specific topics may include housing characteristics, drug coverage, and knowledge about Medicare.

Ultimate Sampling Unit (USU): USUs are Medicare beneficiaries selected from within the selected SSUs.