

Reference Guide

CE Data Quality Profile

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Program Report Series, the Consumer Expenditure Surveys



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Overview

This Reference Guide accompanies the annual and midyear Data Quality Profiles (DQP) for the Consumer Expenditure Surveys (CE). It contains supplemental material describing and documenting each metric that CE data users can reference when reading the DQP. The metrics produced for the DQP are outlined in table 1, as well as the error dimensions that each metric is intended to monitor, whether the metric applies to the CE Interview Survey or Diary Survey, and the time period for which the metric is available.

Table 1. Metrics by error dimensions, survey, and DQP production years

Metrics	Total Survey Error Dimensions associated with the metric				Survey		Availability
	Measurement	Nonresponse	Processing	Cost	Interview	Diary	
1. Final disposition rates of eligible units		✓			✓	✓	2010 – present
2. Records use	✓				✓ *		2016 – present
3. Expenditure edit rates	✓	✓	✓		✓	✓	2010 – present
4. Income imputation rates	✓	✓	✓		✓	✓	2010 – present
5. Respondent burden	✓	✓	✓		✓		2017 – present
6. Information book use	✓				✓ *	✓	2016 – present
7. Survey mode	✓				✓ *		2016 – present
8. Survey time	✓			✓	✓ *	✓	2016 – present

* These Interview Survey metrics are conditioned by wave.

Summary of changes to data collection and impact on DQP metrics

This section provides a brief overview of the changes in data collection since 2015 that impact the universe of eligible sample units included in the production of Bureau of Labor Statistics' (BLS) official published tables and response rate computations.

1. CE Sample Redesign

The CE sample is updated after every Decennial Census to ensure that it reflects the U.S. population. The 2010 Decennial Census geographic boundaries were implemented for the CE in 2015 and are henceforth referenced as the 2010 Sample Redesign. January 2015 is the first month of expenditures eligible under the 2010 Sample Redesign.

- Interview Survey: The Interview Survey has a three-month retrospective reference period prior to the month of data collection (sample month). February 2015 is the first sample month for Interview Survey cases under the 2010 Sample Redesign for producing the official published tables for 2015 (since the February 2015 sample month has a reference period of November 2014, December 2014, and January 2015).
- Diary Survey: Unlike the Interview Survey, the Diary Survey has a prospective 2-week reference period after the diary is placed. January 2015 is the first sample month for Diary Survey cases under the 2010 Sample Redesign for producing the official published tables for 2015.

2. Bounding Interview dropped in the Interview Survey

Prior to 2015, the first wave of the Interview Survey was a bounding interview, with the subsequent four waves of data collected were used to produce official BLS estimates. The initial bounding interview was used to remind respondents in the subsequent interview of expenditures they had already reported. The bounding interview had a 1-month recall, and its data had not been used to produce estimates for the official BLS tables. Beginning in 2015, the bounding interview is no longer collected. Cases are now comprised of four interview waves. The two survey designs coexisted throughout 2015 as cases collected prior to February 2015 continued under the 5-wave design.

3. COVID-19 Pandemic

The Coronavirus (COVID-19) Pandemic placed new challenges on the Census Bureau's data collection efforts. In mid-March 2020, the Census Bureau began collecting data entirely by telephone for the safety of both interviewers and respondents. At that time the Census Bureau had to stop mailing out the advance letters that inform a potential respondent they have been selected for the survey because the regional offices where these letters are processed were closed and staff were working remotely. Between mid-March and June 2020 Diary Survey

interviewers transcribed diaries over the phone, but beginning in June, the Census Bureau provided respondents with the option to use an online diary. Beginning in July 2020, interviewers were allowed to resume in-person interviews for the Interview Survey in certain locations. Table 2 shows the summary of protocol changes during the reference period.

Table 2: Protocol changes due to COVID-19 Pandemic

	Protocol Changes	
	Interview	Diary
March 2020	<ul style="list-style-type: none"> Discontinued use of hard copy of information book—Instructed to use the online version of information book Start of maximum telephone interviewing 	<ul style="list-style-type: none"> Discontinued use of hard copy of information book—Instructed to use the online version of information book Start of maximum telephone interviewing Census National Processing Center closed¹
April-May 2020	<ul style="list-style-type: none"> Interviewers were instructed to read the advance letters to respondents 	<ul style="list-style-type: none"> Interviewers were instructed to read the advance letters to respondents
June 2020	<ul style="list-style-type: none"> Began collecting stimulus payment information 	<ul style="list-style-type: none"> Introduced online diary in production
July 2020	<ul style="list-style-type: none"> Allowed option to conduct In-person interview for certain geographic areas Provided Disposable information book 	<ul style="list-style-type: none"> Allowed option to conduct In-person interview for certain geographic areas
September 2020	<ul style="list-style-type: none"> Allowed option to conduct in-person interview nationally with some restriction in certain areas 	<ul style="list-style-type: none"> Allowed option to conduct in-person interview nationally with some restriction in certain areas

4. Impact on DQP metrics

Because of the CE Sample Redesign, Interview Surveys collected in January 2015 are not used in calculating response rates. With the dropping of the bounding interview, income questions, which had been collected previously in the waves 2 and 5, are now collected in waves 1 and 4 (See table 3 for an examination of the differences). Consumer units² (CUs) whose wave 1 interview began prior to 2015 quarter 1 (2015q1) continued under the previous 5-wave survey design through 2015q4. These continuing CUs are not comparable with respect to their records use, information book use, collection mode, and total survey time to those collected under the current 4-wave design.

¹ Census National Processing Center mails out survey materials (e.g. information booklet, Diary) to interviewers, and performs keying, coding, and imaging the diary once we collect them from respondents.

² Consumer units include families, single persons living alone or sharing a household with others but who are financially independent, or two or more unrelated persons living together who pool their income to make joint expenditure decisions.

The Interview Survey collects housing characteristics, demographics, income, assets, and liabilities data in addition to expenditures. However, not every topic is collected in every wave or to the same detail in each wave. Consequently, some metrics are conditioned by wave (final disposition rates, records use, information book use, survey mode, and survey time). Since waves 2 and 3 collect only expenditure information in the new post-2015 design, waves 2 and 3 are typically grouped together while wave 1 and wave 4 are treated as two separate groups. The only exception to this is final disposition rates where wave 1 is separated from waves 2 through 4.

Table 3. Summary of design changes to the Interview Survey in 2015

Wave	Topics Collected	
	From February 2015 (Interview Survey 4-wave design without bounding interview)	Prior to February 2015 (Interview 5-wave design with bounding interview)
1	Housing characteristics, demographics, expenditures, and income	Housing characteristics, demographics, and bounding expenditures
2	Expenditures	Expenditures and income
3	Expenditures	Expenditures
4	Expenditures, income, and assets/liabilities	Expenditures
5	(not applicable)	Expenditures, income, and assets/liabilities

The COVID-19 pandemic forced interviewers to collect all CE data over the phone or with the online diary put into production in July 2020. This impacted both the mode of collection as well as response rates. While the DQP does not currently calculate metrics on the mode by which Diary Surveys are collected, the reader can refer to the Interview Survey mode metric to see this impact on our collection. Response rates were negatively impacted by the COVID-19 pandemic collection restrictions because in many cases interviewers were unable to contact potential respondents. BLS treats most of these cases where a potential respondent could not be reached because of the COVID-19 pandemic as an eligible non-interview (AAPOR 2.36 in table 4). As part of their COVID-19 pandemic guidelines, the Census Bureau encouraged interviewers to direct respondents to use the online information book and disposable copies of the information books were provided to respondents in the beginning of July 2020. Nevertheless, information book use declined dramatically and large numbers of interviewers reported that respondents did not have access to the information book.

Final disposition rates of eligible units (Interview and Diary Surveys)

The unit of observation for the CE is the CU, so response and nonresponse rates are computed at the CU level. While BLS has its own response classification codes, for the purpose of this reference guide we use the final disposition codes in the American Association for Public Opinion Research’s (AAPOR) Standard Definitions (2016). In the DQP, BLS categorizes nonresponse rates by their reason for nonresponse. Noncontact refers to cases where the interviewer is unable to contact an eligible member of the CU (AAPOR 2.20); Refusal covers cases when the contacted CU member refuses to participate in the survey (AAPOR 2.10); and Other Nonresponse captures other miscellaneous reasons for nonresponse. The Other nonresponse category also includes cases that BLS analysts reclassified from a completed interview to a non-respondent during processing as well as cases reclassified from ineligible to eligible non-respondent. These reclassification processes will be described in more detail later in this Reference Guide. A mapping of the BLS to AAPOR’s final disposition codes for in-person, household surveys is presented in table 4 below.

Response and nonresponse rates are measures of cooperation levels in a survey. Since not all eligible sample units will be available or agree to participate in the survey, there will be some nonresponse to the survey request. Characteristics of non-respondents may differ from respondents, and if these characteristics correlate with their expenditures, their omission from the survey may result in biased estimates. While weighting adjustments may reduce bias, the effectiveness of this approach depends on the availability and quality of variables used in the weighting, so concerns about bias persist. A single, survey-level measure, such as a survey response rate, in itself is an inadequate measure of nonresponse error. Nevertheless, higher response rates are preferred in the absence of other indicators of nonresponse bias.

During data processing, CUs may be converted from respondents to non-respondents. Nonresponse reclassifications occur in both the Interview and Diary Surveys and the number of these reclassifications can serve as an indicator of potential nonresponse bias if cases that are reclassified are systematically different from respondents in their spending patterns. All else equal, lower reclassification rates are desired.

Response rates can be reported unweighted or weighted. Unweighted response rates provide an indication of the proportion of the sample that resulted in useable information to produce estimates. They also serve as a means of monitoring the progress of fieldwork and for identifying problems with nonresponse that can be addressed during fieldwork operations. Weighted response rates provide an indication of the proportion of the survey population for which useable information is available, since the weights allow for inference of the sample to the population. The weights typically used are base weights (the inverse probability of selecting the sample units). Weighted and unweighted response rates for the Interview and Diary Surveys do not meaningfully differ, so only unweighted rates are presented in the DQP.

Each survey wave is treated independently (that is, as an independent CU) in the computation of the Interview Survey response rates, and each diary week is treated independently for the Diary Survey response

rates. In the metric tables for Final Disposition, the number of eligible CUs is the count of CU addresses eligible for the interview in the collection period, not the count of unique CUs.

Response and nonresponse rates

Table 4 shows the mapping of the BLS final disposition codes to the AAPOR final disposition codes for in-person household survey (AAPOR, 2016).

Table 4. Mapping of BLS final disposition codes with AAPOR codes

AAPOR final disposition codes for in-person, household survey	Interview Survey Final Disposition Codes	Diary Survey Final Disposition Codes
1.0 Interview		
1.1 Complete (I)	201 Completed interview	201 Completed interview
1.2 Partial (P)	203 Sufficient partial (through Section 20, no further follow-up)	217 Interview- Temporarily Absent ³
2.0 Eligible, Non-Interview		
2.10 Refusal and break-offs (R)		
2.11 Refusals	321 Refused, hostile 322 Refused, time 323 Refused, language 324 Refused, other	321 Refused, hostile 322 Refused, time 323 Refused, language 324 Refused, other - specify
2.12 Break-off	215 Insufficient partial	n/a
2.20 Noncontact (NC)		
2.24 No one at residence	216 No one home	216 No one home
2.25 Respondent away/unavailable	217 Temporarily absent	n/a
2.30 Other (O)		
2.23 Unable to enter building/reach housing unit	219 Other	219 Other
2.31 Dead	219 Other	219 Other
2.32 Physically or mentally unable/incompetent	219 Other	219 Other
2.33 Language (did not refuse)	219 Other	219 Other
2.36 Miscellaneous	219 Other	219 Other 320 Second week diary picked up too early 325 Diary placed too late 326 Blank diary, majority of items recalled w/o receipts

³ Diary Survey: code “217 – temporarily absent” is treated as a completed interview by CE. The Diary Survey is designed to collect data for respondents when they are at home, and the Interview Survey is designed to collect data for respondents when they are both at home and away on trips. When everyone is away on a trip in a Diary household during the Diary placement or pickup window, they are counted as completed interviews with \$0 of expenditures at home. This includes respondents away at a secondary residence. Since Diary Survey and Interview Survey data are merged or “integrated” during estimation, this practice is designed to capture the right amount of expenditures.

AAPOR final disposition codes for in-person, household survey	Interview Survey Final Disposition Codes	Diary Survey Final Disposition Codes
3.0 Unknown eligibility, non-interview⁴		
3.10 Unknown if housing unit occupied	n/a	n/a
3.11 Not attempted or worked	n/a	n/a
3.17 Unable to reach/unsafe area	n/a	n/a
3.18 Unable to locate address	258 Unlocated sample address: Treated as ineligible for BLS	258 Unlocated sample address: Treated as ineligible for BLS
3.20 Housing unit/Unknown if eligible respondent	n/a	n/a
3.21 No screener completed	n/a	n/a
3.90 Other		
4.0 Not Eligible		
4.10 Out of sample	252 Located on military base or post 341 CU moved 342 CU merged with another CU within the same address	252 Located on military base or post 341 CU moved 342 CU merged with another CU within the same address
4.50 Not a housing unit	228 Unfit, to be demolished 229 Under construction, not ready 232 Permit granted, construction not started 240 Demolished	228 Unfit, to be demolished 229 Under construction, not ready 232 Permit granted, construction not started 240 Demolished
4.51 Business, government office, other organization	243 Converted to permanent nonresidential	243 Converted to permanent nonresidential
4.52 Institution	n/a	n/a
4.53 Group quarters ⁵		
4.60 Vacant housing unit		
4.61 Regular, Vacant residences	226 Vacant for rent 231 Unoccupied tent/trailer site 241 House/trailer moved 331 Vacant for sale 332 Vacant other	226 Vacant for rent 231 Unoccupied tent/trailer site 241 House/trailer moved 331 Vacant for sale 332 Vacant other
4.62 Seasonal/Vacation/Temporary residence	225 Occupied by persons with URE	225 Occupied by persons with URE
4.63 Other	233 Other 244 Merged units within same structure 245 Condemned	233 Other 244 Merged units within same structure 245 Condemned

⁴ BLS does not have an “Unknown eligibility” classification because the Census Bureau trains interviewers to treat any case of unknown eligibility as eligible.

⁵ BLS does not have any final disposition codes specifically related to group quarters because BLS considers some group quarters situations to be eligible for the Interview and Diary Surveys. For example, while persons living on a military base are ineligible, persons living in a college dormitory are eligible.

AAPOR final disposition codes for in-person, household survey	Interview Survey Final Disposition Codes	Diary Survey Final Disposition Codes
	247 Unused serial number or listing sheet 248 Other 259 Unit does not exist or is out of scope 290 Spawned in error	247 Unused serial number or listing sheet 248 Other 259 Unit does not exist or is out of scope
4.70 No eligible respondent	224 All persons under 16	224 All persons under 16
4.80 Quota filled	n/a	n/a

In the following definitions for eligible sample, response rate, refusal rate, noncontact rate, and other nonresponse rate, the formula contain the variables I , P , R , NC , and O which refer to groupings of final disposition codes that are defined in table 4 above.

Eligible Sample (denominator for response, refusal, noncontact, and other nonresponse rates)

$$\text{Eligible Sample} = I + P + R + NC + O$$

The total number of eligible units - those who completed interviews (I and P), plus nonresponse due to refusals, noncontact, or other reasons (R , NC , and O). This excludes any address that was sampled and ineligible (for example, an abolished household at a sampled address or a commercial business at a sampled address).

Response Rate (AAPOR definition RR2)

$$\text{Response Rate} = \frac{I + P}{\text{Eligible Sample}}$$

Defined as the total number of completed (I) and partial interviews (P), divided by the eligible sample. For the BLS, unknown eligible housing units are coded as eligible non-interview.

Refusal Rate (AAPOR definition REF3)

$$\text{Refusal Rate} = \frac{R}{\text{Eligible Sample}}$$

Defined as total number of eligible nonresponses that were refused, or started but not completed (R), divided by the eligible sample. Refused interviews includes refusals due to time, language problems, and other types of refusals.

Noncontact Rate (1 - AAPOR definition CON3)

$$\text{Noncontact Rate} = \frac{NC}{\text{Eligible Sample}}$$

Defined as total number of eligible nonresponses due to inability to make contact with an eligible sample unit member (NC), divided by the eligible sample.

Other Nonresponse Rate

$$\text{Other Nonresponse Rate} = \frac{O}{\text{Eligible Sample}}$$

Defined as total number of eligible nonresponses due to reasons other than refusal and noncontact with an eligible sample unit member (*O*), divided by the eligible sample.

The sum of Response Rate, Refusal Rate, Noncontact Rate, and Other Nonresponse Rate is 100 percent of the universe of eligible sample units. In addition to these four rates, the DQP also reports the number of cases whose final dispositions were reclassified during processing from either a good interview to a nonresponse or from an ineligible to an eligible nonresponse.

Nonresponse reclassification

Defined as the total number of interviews changed from one response category to another. Reclassifications fall under two headings: (1) CUs converted from a completed interview (AAPOR 1.1) to an eligible nonresponse (AAPOR 2.36) and (2) CUs converted from ineligible (AAPOR 4.63) to an eligible nonresponse (AAPOR 2.36).

Reclassification from a completed interview to an eligible nonresponse

In the Diary Survey, reclassifications from a completed interview to an eligible nonresponse are done automatically, while in the Interview Survey, BLS analysts convert completed interviews to eligible nonresponse based on reviews of the respondent's expenditures and other information about the CU. Decisions to reclassify an Interview Survey response are based on analysts' expert judgment that what was reported does not accurately represent the CU's spending. These reviews are described below:

For the Interview Survey

Cases where the CU reports fewer than \$100 in total expenditures or fewer than \$300 in total expenditures and a total interview time of less than 15 minutes are output for review. Review of these cases is done holistically, and the requirement for the nonresponse reclassification review offers the following guidance: low expenditure totals and low interview time contribute to reclassification. Phone interviews, converted refusal cases, hostile respondents in previous interviews, proxy respondents, and refused or unknown demographic information should also contribute towards reclassifying a case to an eligible nonresponse. Additionally, analysts review all interviewer notes made during the interview and these notes occasionally provide details about the case that suggest the respondent was uncooperative or that otherwise call the integrity of the response into question.

For the Diary Survey

Prior to the onset of the COVID-19 pandemic, the procedure for the Diary Survey was rule-driven and required no analyst judgement. Diary Survey cases meeting one of the following conditions will be automatically reclassified from a completed interview to an eligible nonresponse:

- **Zero items in both weeks:** Diaries with zero items reported in both weeks of the survey, or Diaries with zero items reported in one week and the diary from the other week is a nonresponse of any kind.
- **Zero items in one week:** Diaries with zero items reported in one week and the diary from the other week has more than 10 food at home items reported with the total cost of these items being less than or equal to \$50, or Diaries with zero items reported in one week and the diary from the other week has 10 or fewer food at home items reported with the total cost of these items being less than or equal to \$50 and the CU does not live in a rural area or a college dormitory, and no members of the CU were away during the reference period.
- **Single member CUs:** Diaries where there is one person in the CU and the total amount spent on food (at home and away from home) is less than or equal to \$5 in the current week and less than or equal to \$15 in the other week, and there are less than 4 non-food items reported in the current week, or the total cost of items reported for non-food items in the current week is less than \$30. With the onset of the COVID-19 pandemic, the majority of cases meeting this criteria were left as completed interviews rather than reclassified to eligible nonresponses.
- **Two or Three member CUs:** Diaries where there are 2 or 3 members in the CU and the total amount spent on food (at home and away from home) is less than or equal to \$10 in the current week and less than or equal to \$20 in the other week and there are fewer than 4 non-food items reported in the current week, or the total cost of non-food items reported in the current week is less than \$30. With the onset of the COVID-19 pandemic, the majority of cases meeting this criteria were left as completed interviews rather than reclassified to eligible nonresponses.
- **Four or more members:** Diaries where there are four or more CU members and the total amount spent on food (at home and away from home) is less than or equal to \$20 in the current week and less than or equal to \$30 in the other week and there are fewer than 4 non-food items reported in the current week, or the total cost of non-food items reported in the current week is less than \$30.

With the onset of the COVID-19 pandemic, the majority of cases meeting this criteria were left as completed interviews rather than reclassified to eligible nonresponses.

Reclassification from ineligible to an eligible nonresponse

From mid-March to June 30, 2020, new guidelines limited the collection of in-person interviews to keep interviewers and respondents safe. As a consequence, interviews were primarily conducted over the phone. In many cases, interviewers have respondents' contact information either from previous contacts or from Census records. However, many sampled addresses were unreachable. Interviewers were instructed to classify these cases as ineligible non-respondents (AAPOR 4.63). Since in all likelihood, many of these cases were actually eligible, CE elected to make the following reclassification rules for the Interview and Diary Surveys:

- If the interviewer attached a COVID-19 note to the case, and the CU was eligible in a previous interview, that CU was reclassified as an eligible nonresponse (AAPOR 2.36).
- When the interviewer attached a COVID-19 note to the case, but we did not have information on the CU's prior eligibility, we randomly reclassified them based on historic rates of eligibility.

Records use (Interview Survey)

Responses to survey questions about spending that are based on expenditure records result in higher reporting accuracy and lower measurement error, so a higher prevalence of records use is desirable. Using records is optional for respondents, so it is likely that respondents who do choose to use any records at all – even if only for occasional reference on an as needed basis – are more engaged than those respondents who choose not to consult records. In addition, it is plausible that “no or very few records were used” would be more salient in an interviewer’s recollection of the interview than the varying extent of records used in the other response options. Note that respondents’ use of records is reported by interviewers based on their subjective judgement at the end of the interview. For interviews conducted by telephone, determining whether a respondent used records can be even more subjective. In addition, interviewers need not respond to the question to close out the case, hence the high incidence of item nonresponse for the records use question.

This metric is based on the overall *records used* question asked of the interviewer at the end of the Interview Survey, and its response options are mapped into metric subgroups as shown in table 5.

Interview Survey records use question: ***“In the interview, how often did the respondent consult records?”***

Table 5: Records use mapping

Interview Survey records use response options	Mapping to metric subgroups
1. Almost always	Records used
2. Most of the time	
3. Occasionally or used at least 1 record	
4. Never, no records used	None
(nonresponse)	Missing

The metric tabulation is conditioned on wave; the wave subgroups are wave 1, waves 2 and 3, and wave 4.

Expenditure edit rates (Interview and Diary Surveys)

At the completion of an interview, data from the interviewer’s laptop are transmitted to the Census Master Control System. The Census Bureau’s Demographics Surveys Division performs some preliminary processing and reformatting of the data before transmitting the data to BLS on a monthly basis. At BLS, a series of automated and manual edits are applied to the data in order to ensure consistency, fill in missing information, and to correct errors in the collected data. For more description about the data collection and processing for the CE, see the Handbook of Methods (2018).

Edits are defined as any changes in the data made during processing, with the exception of calculations (e.g. conversion of weekly value to quarterly value) and top-coding/suppression. Calculations are not considered edits as they do not require BLS to make any assumptions about a response. Top-coding and suppression are not considered edits as they only apply to the public-use microdata (PUMD) and not to the internal research files or the published tables. Imputation and allocation are the two major types of data edits performed on the Interview and Diary Surveys:

- *Imputation* replaces missing or invalid entries with a valid response
- *Allocation* edits are applied when respondents provide insufficient detail to meet tabulation requirements. For example, if a respondent provides a non-itemized overall expenditure report for the category of fuels and utilities, that overall amount will be allocated to the target items mentioned by the respondent (such as natural gas and electricity).

In addition to allocation and imputation, data are reviewed, and certain cases are manually edited by BLS analysts based on research and expert judgment. When making manual edits, BLS analysts are able to use previously reported data from the respondent, descriptions of the items reported, and interviewer notes attached to the case. It is possible for multiple edits to be applied to a single expenditure, and for the purposes of calculating expenditure edit rates this is counted as a single edited record. Non-expenditure variables may also be edited, and these edits are not currently captured in the expenditure edit rates.

The need for data imputation results from missing data (item or expense nonresponse). Thus, lower imputation rates are desirable. The need for data allocation is a consequence of responses that did not contain the required details of the item asked by the survey. Likewise, lower allocation rates are also preferred, and in general, lower data editing rates are preferred since that lowers the risk of processing error. However, imputation based on sound methodology can improve the completeness of the data and improve the overall quality of survey estimates.

Ideally, the computation of edit rates are based on the edit flag values of the expenditure variables that correspond directly to the survey questions about the expenditures. This is how edit rates are computed for the Diary Survey. However, the Interview Survey has hundreds of expenditure variables spread across more than 40

data tables. To overcome this challenge, Interview Survey edit rates are calculated from a modified version of the interview monthly tabulation file – MTBI.

Reported expenditures

For the calculation of expenditure edit rates, a distinction is made between the set of expenditure records based on respondent reports (*reported expenditure records*) and the set of post-processing expenditure records used to produce official tables and released as PUMD (*processed expenditure records*). The set of reported expenditure records is smaller than the set of processed expenditure records. During BLS data editing, a single *reported* expenditure may be split into multiple *processed* expenditures if it was allocated from a single combined expense to multiple individual expenses. Calculating expenditure edit rates based on processed expenditures leads to double counting of edited expenditures since it treats any allocated record as multiple edits rather than multiple instances of a single edited expenditure. Overall, processed expenditures lead to misleadingly higher allocation rates. Additionally, *reported* quarterly or annual amounts can be split into multiple monthly *processed* records. This has the effect of counting both unedited and edited expenditures multiple times. Using reported expenditures answers how much of the collected data were edited. We provide expenditure edit rates based on reported expenditure records because we believe that this more closely matches what users have in mind when they ask “how much of the data are edited.”

Expenditure edit flags: Interview Survey

The expenditure edit rates presented in the Data Quality Profile were calculated using reported expenditures from the internal data, however we refer exclusively to data files and variables that are available in the PUMD files for the convenience of data users in this Reference Guide. Interview Survey expenditure edits are calculated using a subset of records that were unique by the combination of three variables on the MTBI file: NEWID (the CU identifier), SEQNO (the expenditure sequence number), and EXPNAME (the source variable name). Then, the cost flag variable, COST_, is used to identify if an expenditure was edited and what type of edit was made (imputation, allocation, combination, or manual). The different types of edits (or non-edits) were identified by the flag values for the Interview Survey, shown in table 6.

Users attempting to calculate their own edit rates based on table 6 below should be aware that PUMD flags are less detailed than what is available internally. Thus, PUMD users will not be able to separate manually edited records from imputed or allocated records because the PUMD flags for imputation and allocation include manual edits done during these processes. Because manual updates represent a small fraction of the overall number of edits performed, this should not significantly impair users’ ability to calculate edit rates in the PUMD.

Table 6: Expenditure flag values Interview Survey

Interview Survey Flag value (internal/PUMD)	Flag Description	Metric edit group
0/D	The expenditure was not flagged by Census, and not changed by BLS. Expenditures with this flag may have been reviewed by BLS, but were not changed.	Unedited
1/D	The expenditure was flagged by Census, but was not changed by Census or BLS.	Unedited
2/F	Manually updated by BLS.	Manual edit
3/F	Imputed by BLS.	Imputed
4/E	Allocated by BLS.	Allocated
5/G	Imputed and then allocated by BLS.	Imputed and allocated
6/D	Computed by BLS from respondent provided information.	Unedited
7/F	Computed by BLS from imputed data.	Imputed
8/E	Allocated by BLS and then computed from allocated data.	Allocated
9/G	Imputed by BLS, then allocated, and computed from allocated data.	Imputed and allocated
Q/F	Imputed manually by BLS analyst due to there being insufficient source data for automatic imputation.	Manual edit
R/E	Allocated manually by BLS analyst due to there being insufficient source data for automatic allocation.	Manual edit
S/E	Allocated by BLS based on fixed proportions rather than on source data.	Allocated

Expenditure edit flags: Diary Survey

Users of the PUMD will not be able to calculate their own edit rates from the microdata because the Diary Survey microdata do not contain all of the necessary variables. We subset the four EXPN files to records that were unique by the combination of two variables on the internal EXPN files: NEWID (the CU identifier) and SEQNO (the sequence number). Then, the allocation number (ALCNO) was used to determine whether a record had been allocated or not, and the cost flag variable (COST_), was used to determine if another type of edit was performed. Users of the PUMD will be able to determine whether a Diary Survey expenditure is the result of allocation using the ALLOC variable in the EXPD file, but they will not be able to identify the set of reported expenditures from the set of processed expenditures. For the difference between processed and reported expenditures see the discussion above. In addition, PUMD users are unable to identify the small number of expenditures that had edits other than allocation.

Income imputation rates (Interview and Diary Surveys)

Income data are collected twice in the Interview Survey – in the first and fourth waves, and once in the Diary Survey – either with the initial placement or with the diary pickup at the end of the second week. The BLS performs three types of imputations for income in the Interview and Diary Surveys. The first is “*Model-based*” imputation: when the respondent indicates an income source but fails to report an amount of income received. The second is “*Bracket response*” imputation: when the respondent indicates the receipt of an income source, fails to report the exact amount of income but does provide a bracket range estimate of the amount of income received. The third type of income imputation is referred to as “*All valid blank conversion*”: when the respondent reports no receipt of income from any source but the BLS imputes receipt from at least one source. Flag indicators for income imputation are described in the table below. Since the need for imputation reflects item nonresponse or that insufficient item detail was provided, lower imputation rates are desirable for lowering measurement error. However, imputation based on sound methodology can improve the completeness of the data.

Methods - Income imputation

The BLS implemented multiple imputations of income data, starting with the publication of 2004 data. Prior to that, only income data collected from complete income reporters were published. However, even complete income reporters may not have provided information on all sources of income for which they reported receipt. With the collection of bracketed income data starting in 2001, this problem was reduced but not eliminated. One limitation was that bracketed data only provided a range in which income falls, rather than a precise value for that income. In contrast, imputation allows income values to be estimated when they are not reported. In multiple imputations, several estimates are made for the same CU, and the average of these estimates is published. Note that income data from the Diary Survey are processed in the same way as in the Interview Survey.

Imputation rates for income are calculated based on the internal BLS data. Each survey wave is treated independently for the Interview Survey, and each weekly diary is treated independently for the Diary Survey. This means that if a respondent fails to provide income data, then every wave will have its own imputed values. Imputation rates are calculated using final income before taxes. The income is considered to be imputed if any of its summed components were imputed during processing. For example, if a respondent reports receipt of both a salary and royalties, their income will be considered imputed if either the salary or the royalties were imputed. In addition, if two household members both report having salaries, their income will be considered imputed if either member’s salary is imputed. These cases are identified using the imputation indicator flag (FINCBTXI), applicable to both the Interview and Diary Surveys, and available in the PUMD. Any value of the flag not equal to ‘100’ is considered imputed.

Table 7: Income Imputation flag values for Interview and Diary Surveys

Income Imputation Flag Value	Description	Edit classification
100	No imputation. This would be the case only if none of the variables that are summed to get the summary variables is imputed.	Unedited
2nn	Imputation due to invalid blanks only. This would be the case if there are no bracketed responses, and at least one value is imputed because of invalid blanks.	Model
3nn	Imputation due to brackets only. This would be the case if there are no invalid blanks, and there is at least 1 bracketed response	Bracket
4nn	Imputation due to invalid blanks and bracketing	Bracket and model
5nn	Imputation due to conversion of valid blanks to invalid blanks. (Occurs only when initial values for all sources of income for the CU and each member are valid blanks.)	All valid blank conversion (AVB)

All Valid Blank (AVB) conversion rate

This measure quantifies the instances when all valid nonresponses (i.e., the respondent replied that the CU did not receive income from any source) are converted to invalid nonresponses, which were subsequently imputed during processing. This will be based on the indicator flag with a value of '500' or above.

Respondent burden (Interview Survey)

The Interview Survey began continuously tracking perceived respondent burden beginning in 2017q2.⁶ Interviewers only ask this question to respondents in the final wave (wave 4) of the Interview Survey, and results likely underestimate survey burden due to survivorship bias. It is also possible that the respondent answering this question did not participate in prior interview waves. For example, the respondent who participated in the first three survey waves might move out of the sampled address prior to the final interview. If someone else moves into the sampled address in time for the final wave, then they would be asked these questions.

This metric is based on the question asked of the respondent at the end the interview. This question, its five response options, and the collapsing of these response options into three categories for the metric tabulation are shown in table 8.

Interview Survey respondent burden question: ***“How burdensome was this survey to you?”***

Table 8: Respondent burden values mapping

Interview Survey 2017q2 – current response options	Mapping to metric subgroups
1. Not at all burdensome	Not burdensome
2. A little burdensome	Some burden
3. Somewhat burdensome	
4. Very burdensome	Very burdensome
5. Extremely burdensome	
(nonresponse)	Missing

⁶ Previously, the Interview Survey had intermittently collected information on respondent burden for research purposes, but these data are not available to the public.

Information book use (Interview and Diary Surveys)

Both the Interview and Diary Surveys respondents are supplied with an information book to assist them when they are participating in one of the surveys. Both provide response options for demographic questions and the bracket response options. The Interview Survey information book provides examples that can clarify the kinds of expenditures that each section/item code is intended to collect along with the response options for demographic questions and income brackets.

There is evidence that respondents who consult the information book more frequently provide higher quality data in the form of fewer misclassified expenditures, less item nonresponse, and more accurate income reports (Safir and Goldenberg, 2008) as they are more engaged in the interview process. Thus, a higher level of information book use is preferred. At the end of both surveys, the interviewer is asked a question about information book use (as shown below). Similar to the records use metric, an interviewer’s judgement on how often a respondent used the information book is subjective. When the interview is conducted over the phone, this judgement can become even more subjective. The information book use metric is based on mapping the response options to this question as follows:

Diary Survey information book use question: ***“Was the information book used during the interview?”***

Table 9: Information book use values mapping - Diary Survey

Diary Survey information book use response options	Mapping to metric subgroups
1. Yes	Yes
2. No	No
(nonresponse)	Missing

Interview Survey information book use question: ***“In the interview, how often did the respondent consult the information book?”***

Table 10: Information book use values mapping - Interview Survey

Interview Survey information book use response options	Mapping to metric subgroups
1. Almost always (90% of the time)	Used
2. Most of the time (50% to 89% of the time)	
3. Occasionally (10% to 49% of the time)	
4. Never or almost never (less than 10% of the time)	Did not use
5. The respondent did not have access to the information book	No information book
(nonresponse)	Missing

The metric tabulation is conditioned by wave; the wave subgroups are wave 1, waves 2 and 3, and wave 4.

Survey mode (Interview Survey)

Survey mode refers to the medium or method of administering the survey to the sample unit. The Interview Survey is designed to be an in-person interview, but data collection by phone is also permitted. This metric is based on the interviewer’s report on how the interview was administered, and is used to assess the prevalence of each mode. There is evidence that in-person interviews yield superior results (Safir and Goldenberg, 2008), and BLS has agreements with the Census Bureau that no more than 24 percent of first interviews or 48 percent of subsequent interviews can be collected over the phone. BLS monitors this metric so that action can be taken if these targets are not met.

At the end of the survey, the interviewer is asked about the mode used to collect the data. This metric is based on mapping the response options to this question as shown in table 11. To make this metric consistent with our agreement with the Census Bureau, BLS defines an in-person interview as any interview in which at least half of the interview was done in-person. If less than 50 percent of the interview was done in-person, we consider it to be a telephone interview, and if the interviewer did not answer this mode question, we assign the interview to the missing category.

Interview Survey mode question: ***“How did you collect the data for this (first/second/third/fourth) interview for this household?”***

Table 11: Survey mode values mapping

Interview survey mode Response options	Mapping to metric subgroup
1. Personal visit for all sections	In-person
2. Personal visit for all sections, but telephone follow up for some questions	
3. Personal visit for more than half the sections, the rest by telephone	
4. Equally split between personal visit and telephone	
5. Telephone for more than half the sections, the rest by personal visit	Telephone
6. Telephone for all sections	
(nonresponse)	Missing

The metric tabulation is conditioned on wave; the wave subgroups are wave 1, waves 2 and 3, and wave 4.

Survey time (Interview and Diary Surveys)

The length of the interview is often used as an indicator for respondent burden. Surveys that take a longer time to complete are often seen as more burdensome than shorter surveys. This is a concern because respondent burden negatively impacts both response rates and data quality. However, survey response time could also reflect how engaged a respondent is with the survey. An engaged respondent may take longer to complete the survey because they look up records or because they more thoroughly report expenses. While it is difficult to interpret survey response time by itself, tracking the median survey response time over many years helps us evaluate the impact of changes to the survey on respondents.

For the Interview Survey, survey time measures the median number of minutes it takes respondents to complete the computer-assisted interview. Because different waves consist of different sets of questions, Interview Survey time is conditioned by wave into three groups: wave 1, waves 2 and 3, and wave 4. While Diary Survey expenditures are collected primarily through the paper diary, the Diary Survey also contains a personal interview component to collect information about the Consumer Unit's income and demographics. Survey time for Diary Survey measures the median number of minutes it takes respondents to complete this personal interview component. This metric is not broken down by Diary Week because the survey time collected in the instrument combines both weeks.

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