

Calculating and Reporting Survey Response Rates

Note: *This guidance is designed to ensure that GAO policies on evidence and generally accepted government auditing standards are met. The guidance conforms to the generally accepted principles and practices of the appropriate disciplines. Statements that particular actions “should” be taken are practices that are expected to be followed, unless there are good reasons for not doing so. Before deviating from a practice expressed as a “should” statement, staff members must consult with an appropriate staff member in Applied Research and Methods (ARM) or a team specialist and must document the consultation.*

Abstract: This document addresses how GAO analysts may deal with internal or external studies for which data are not collected from every item surveyed. The paper discusses how to calculate survey unit response rates, strategies for dealing with low response rates, assessing their acceptability, and reporting and documenting response rates. Examples are provided for Tables that can be included in reports, as well as a standard mathematical definition of a response rate.

Principles

Information on response rates should be reported for all surveys. The primary problem with low response rates is that they can lead to biased estimates if survey respondents and nonrespondents differ on the variables being studied. This paper covers:

- calculating response rates,
- identifying out-of-scope elements, and,
- reporting response rates.

To avoid serious problems at the reporting stage, it is strongly recommended that job teams work with staff from Applied Research and Methods (ARM) or other specialists to consider potential response rate issues and to develop a plan for dealing with them before data collection begins.

Calculating Response Rates

A response rate is defined as the percentage of the eligible sampled elements of a survey population who provide usable data for the analysis. The response rate for a sample survey should be calculated as follows:

response rate = usable responses/eligible sampled elements

where

usable responses = total number of eligible respondents who provide usable data for the analysis, and

eligible sampled elements = all elements drawn into the initial sample who were not later identified as out of scope (i.e., outside the survey population). This is the sum of the survey respondents and nonrespondents after out-of-scope elements have been deleted.

This calculation is consistent with [response rate definition RR3](#) of the American Association of Public Opinion Research.

A “usable response” may mean different things in different survey applications. For example, “information not available” (lack of records, lack of documentation) may be a usable response to some survey questions. At the questionnaire level, survey designers should work with job team analysts to define what constitutes a “usable response” to allow classification of returned but only partially completed questionnaires. For example, criteria might be: more than half of all items answered, all 10 key items answered, etc.

In some situations, the number of “eligible sampled elements” is not known and must be estimated.

In the event of significantly different levels of **item** nonresponse, response rates for individual survey items may differ to such an extent that individual item response rates should be reported along with overall questionnaire-level response rates.

For many GAO surveys, a **weighted** response rate may be preferable. When our survey samples incorporate strata with different probabilities of selection or multiple stages of selection, weighted rates may be appropriate. The most appropriate weighted response rate may be the quantity response rate or the total quantity response rate for surveys that primarily estimate dollar or other quantities. In general, weighted response rates often provide the most appropriate measure because they take sample design and probabilities of selection into account.

See the Appendix for a more complete description of response rate calculations.

Strategies for Anticipating and Increasing Response Rates

GAO strives to obtain the highest possible response rates within resource constraints. Issues concerning the anticipated response rate should be discussed before data collection begins, and resources for ensuring an adequate response rate should be appropriately prioritized. If a low response rate is anticipated, the job team generally plans for a higher level of effort in data collection, including an intensive follow-up program and plans to collect some data for a detailed exploration of the differences between respondents and nonrespondents. If the team anticipates difficulty in conducting a large follow-up program, it typically considers the possibility of starting with a more manageable initial sample size.

See the ARM guidance paper “[Addressing Nonresponse and Nonresponse Bias Issues In Surveys](#)” for more information on planning for, improving, and adjusting for nonresponse.

Identifying Out-of-Scope Elements

It is highly recommended that the team try to identify out-of-scope elements to more accurately estimate the response rate and the size of the survey population.¹ Job team analysts and staff from ARM typically consider the options and their implications and jointly decide how to define and identify out-of-scope elements. Steps such as the following are typically taken to identify the out-of-scope sample elements:

- Begin the survey with an eligibility question and emphasize that ineligible members of the sample should return the questionnaire regardless.
- Plan a follow-up program for nonrespondents—all nonrespondents, if feasible, or a random sample of nonrespondents, if not feasible.
- Consult auxiliary information sources, such as automated databases and archival records, for information on eligibility.

The survey process itself can also help identify out-of-scope elements. For example, we may learn that certain businesses have merged or closed or that certain former employees were never eligible for the survey. If such elements are excluded from the definition of the survey population, they should also be excluded from the denominator of the response rate. In another example, if membership in the survey population depends on the operation of a business at a specified location, then an “undeliverable” may indicate that the element is ineligible and should be dropped from the denominator. Generally, however, in the absence of objective and survey-specific reasons for ruling an element out of scope, the designation undeliverable by itself is insufficient for excluding an element from the response rate and the survey population.

¹ On the basis of such information, the estimate of the population size and nonresponse may then be adjusted downward, with the response rate adjusted correspondingly upward. See the appendix for details.

Reporting Response Rates

The GAO report should summarize the final disposition of all sample elements into categories that enable calculation of the unweighted RR1 or RR3 and/or weighted response rates as defined in the Appendix. If response rates in different strata or different subgroups of the population differ in important ways, then response rates should be reported separately for those subgroups.

Various formats and approaches can be used to report the disposition of sample elements. The choice depends on the complexity of the survey and the requirements of the particular type of report. The sample characteristics can be described in a technical appendix, although in some cases this information might be included in the report's objectives, scope, and methodology section.

Table 1 gives a format for presenting the final disposition of sampled elements for a mail survey, table 2 for a web survey, and table 3 for a telephone survey. While the specific format and content of such tables can vary according to the report's needs, the information reported should be sufficiently complete to provide readers with a good understanding of response problems. For example, response rates could be reported by strata in separate columns if they differ considerably from one another. In table 1, the response rate is much higher for stratum I (90 percent) than for stratum II (58 percent). It is important to note that while these unweighted numbers are satisfactory for describing the sample disposition, they would not be satisfactory for reporting the actual survey findings in the report text.

Table 1: Mail Survey: Stratified Sample with Important Subgroup Differences

Disposition of sampled elements	Number in strata		
	I	II	Total
Initially sampled elements	573	271	844
Outside the survey population: ineligible			
Located outside the United States	10	5	15
Never participated in the program	7	3	10
Participation in program ended before sample period	13	7	20
Subtotal of ineligible elements	30	15	45
Eligibility Unknown			
No contact information of any kind available	28	42	70
No attempted contact (no address, other contact info not used)	2	3	5
Returned as "undeliverable" by postal service	11	29	40
Subtotal of eligibility unknown	41	74	115
Eligible Non-respondents			
Unable to respond (e.g., illness, temporary absence)	1	2	3
Refused	7	23	30
Returned after cut-off date	4	6	10
Returned unusable questionnaire	1	3	4
Subtotal of eligible Non-respondents	13	34	47
Eligible Respondents			
Respondents (returned usable questionnaire)	489	148	637
Subtotal of eligible respondents	489	148	637
Subtotal of eligible elements²	543	256	799
Survey response rate: respondents/ subtotal of eligible elements²	90%	58%	80%

² Based on RR1 definition in the Appendix, which includes sampled elements of unknown eligibility.

Table 2: Web Survey: Stratified Sample with Important Subgroup Differences

Disposition of sampled elements	Number in strata		
	I	II	Total
Initially sampled elements	573	271	844
Outside the survey population: ineligible			
Located outside the United States	10	5	15
Never participated in the program	7	3	10
Participation in program ended before sample period	13	7	20
Subtotal of ineligible elements	30	15	45
Eligibility Unknown			
No contact information available	28	42	70
No attempted contact (no email address, other contact info not used)	2	3	5
Undeliverable - email “bounceback”	11	29	40
Subtotal of eligibility unknown	41	74	115
Eligible Non-respondents			
Unable to respond (e.g., illness, temporary absence)	1	2	3
Refused	7	23	30
Returned after cut-off date	4	6	10
Returned unusable questionnaire	1	3	4
Subtotal of eligible Non-respondents	13	34	47
Eligible Respondents			
Respondents (returned usable questionnaire)	489	148	637
Subtotal of eligible respondents	489	148	637
Subtotal of eligible elements³	543	256	799
Survey response rate: respondents/ subtotal of eligible elements³	90%	58%	80%

³ Based on RR1 definition in the Appendix, which includes sampled elements of unknown eligibility.

Table 3: Telephone Survey: Simple Random Sample or Stratified Sample with No Important Subgroup Differences

Disposition of sampled elements	Number
Initially sampled elements	814
Outside the survey population: ineligible	
Located outside the United States	15
Never participated in the program	10
Participation in program ended before sample period	20
Not a working telephone number	17
Subtotal of ineligible elements	62
Eligibility Unknown	
No attempted contact (no telephone number in records)	5
No answer (5 attempts)	25
Busy (10 attempts)	30
Moved (cannot be traced)	7
Subtotal of eligibility unknown	67
Eligible Non-respondents	
Not at home when called (5 attempts)	11
Unable to respond (e.g., illness, deafness, temporary absence)	3
Refused	30
Incomplete interview (break-off, too many missing items)	4
Subtotal of eligible Non-respondents	48
Eligible Respondents	
Respondents (usable interview)	637
Subtotal of eligible respondents	637
Subtotal of eligible elements⁴	752
Survey response rate: respondents/ subtotal of eligible elements⁴	85%

Reports should identify and acknowledge potential or actual limitations to the findings. The report typically specifies the efforts that were made, discloses their results, and explains the implications of the results. Conclusions that are threatened or weakened by response rate problems should be identified, and the implications of response rate problems should be discussed—both questionnaire-level and item nonresponse problems. It is appropriate to cite problems briefly in the body of the report and to give additional details in a technical appendix.

The report should describe the steps that were taken to evaluate the response rate and the risk of nonresponse bias, and any caveats on the acceptable use of survey estimates, based on the outcome of those evaluations.

See the ARM guidance paper [Addressing Nonresponse and Nonresponse Bias Issues in Surveys](#)⁷ for more information on how to report the results of nonresponse bias analyses and their implications for survey quality and the usability of survey results.

⁴ Based on RR1 definition in the Appendix, which includes sampled elements of unknown eligibility.

For example:

“The overall unweighted response rate for this survey was only 55 percent. Response rates to specific questions varied from 55 percent to as low as 32 percent. The results of the survey, however, are being used only as background. Further, an analysis of the distribution of several demographic variables for the respondents thought to be related to the outcome variables was compared to the distribution of these variables in the entire population, and no important distributional differences were found. In addition, results similar to ours were obtained by several independent research groups during the past 3 years. Therefore, we chose to include the survey results in our report.”

APPENDIX Calculating Response Rates

GAO’s unweighted survey response rates may be calculated with the American Association for Public Opinion Research (AAPOR) definition of either RR1 or RR3.⁵ We include responses to GAO self-administered questionnaires in the term “interviews.”

For calculating survey response rates, survey cases can be divided into four main groups:

1. interviews (e.g., all successful respondents),
2. eligible cases that are not interviewed (nonrespondents),
3. cases of unknown eligibility, and
4. cases that are not eligible.

Symbols for different types of survey outcomes that are used to create response rates include

RR = response rate

I = complete interview

P = partial interview

R = refusal and break-off (known to be eligible)

NC = noncontact (known to be eligible)

O = other (known to be eligible)

UH = unknown whether household is occupied HU or the selected unit exists

UO = unknown, other (unknown eligibility)

E = estimated proportion of cases of unknown eligibility that are eligible

AAPOR’s definitions of response rates RR1 and RR3 are acceptable for GAO surveys:

$$RR1 = I / [(I + P) + (R + NC + O) + (UH + UO)]$$

Response Rate 1 (RR1), or the minimum response rate, is the number of complete interviews divided by the number of interviews (complete plus partial) plus the number of noninterviews (refusal and break-off plus noncontacts plus others) plus all cases of unknown eligibility (unknown if housing unit, plus unknown, other).

$$RR3 = I / [(I + P) + (R + NC + O) + E(UH + UO)]$$

Response Rate 3 (RR3) estimates the proportion of cases of unknown eligibility that are actually eligible. In estimating E, one should be guided by the best available scientific information on the share of eligible cases that make up the unknown cases, and one should not select a proportion in order to boost the response rate. For example, an intensive follow-up of a random sample of noncontacts may provide a satisfactory estimate of the percentage of out-of-scope elements. Alternatively, experience with or knowledge of the sampling frame may indicate the percentage

⁵ American Association for Public Opinion Research, Standard Definitions Report, <http://www.aapor.org/Communications/AAPOR-Journals/Standard-Definitions.aspx> (2016).

of elements that can be expected to be out of scope. The basis for the estimate should be explicitly stated and detailed. It may consist of either separate estimates for the subcomponents of unknowns or a range of estimators based on differing procedures or both.⁶ In each case, the basis of all estimates should be indicated.

Weighted response rates

Basically, these rates weight the contribution to a response rate of a responding or nonresponding sample element in proportion to how “important” that element’s value is or would have been to the estimates the survey makes.⁷ For example, if the survey is to estimate the total dollar amount of loans made to a certain kind of borrower in the last calendar year, and that information is only available from lenders responding to a survey, nonresponse from lenders who make a large dollar volume of such loans is more important to the quality of the estimate than nonresponse from smaller lenders. Such a response rate might be calculated using known proxies for the specific kind of lending, such as overall loan volume.

A **Quantity Response Rate (QRR)** for a survey item **t** reflects the proportion of the estimated (weighted) total (**T**) of that item **t** that is being reported by sample members, expressed as a percentage. (Note: Because the value of economic data items can be negative (e.g., income), the absolute value must be used in the numerators and denominators in all calculations.)

$$QRR = \left[\frac{\sum_{i=1}^{N(T)} w(i) \times r(ti) \times |t(i)|}{T} \right] \times 100$$

Where:

$w(i)$ = weight for the sample member i

$r(ti)$ = a 1- or 0-value indicator whether sample member i provided an answer to variable t . 1 if there was a response, 0 if no response

$t(i)$ = the value of survey variable t for the sample member i . $t(i)$ may be from a survey answer, an imputed value, or equivalent-quality-to-reported data.

⁶ One approach is to assume that the proportion of eligible and ineligible cases among the cases whose eligibility status is known would also apply to the cases of indeterminate eligibility. A second approach uses special studies that follow-up the unknown cases to estimate eligibility status in similar studies. A third approach considers what is known about some or all of the individual cases and estimates eligibility on the basis of what is known from attempts to contact and interview them.

⁷ Further descriptions and explanation of these definitions can be found in the U.S. Bureau of the Census’ “Supporting Document B: Variables, rates, and formulae for Calculating Response Rates and Reporting Requirements: Economic Surveys and Censuses,” December 2008, Report S18-2.

A **Total Quantity Response Rate (TQRR)** for a survey item *t* also reflects the proportion of the estimated (weighted) total (*T*) of that item *t* that is being reported by a sample member *or* is being obtained from another source for that sample member in a form that is close enough in quality to an actual survey report to be usable. That is, TQRR is a rate that reflects the availability of auxiliary data being used in place of an actual survey report by a respondent. Other sources could include: a) previously reported data from an earlier survey, b) administrative data from records, c) some other acceptable estimate.

$$TQRR = \left[\frac{\sum_{i=1}^{N(T)} w(i) \times [r(ti) + q(ti)] \times |t(i)|}{T} \right] \times 100$$

Where:

In addition to the variables described for QRR,
q(ti) = a 1- or 0-value indicator whether another acceptable value for sample member *i* is available, in the event that a respondent did not provide a report, and *r(ti)* was zero.