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4 Selecting a Sample, Conducting Your CAHPS Survey, and Analyzing Your Data

Introduction

This chapter considers the five major tasks involved in conducting a CAHPS survey:

- Selecting the sample;
- Assembling the questionnaire;
- Collecting the data;
- Preparing the data for analysis; and
- Analyzing the data.

During the design phase, described in Chapter 2, your project team will have made some preliminary decisions about the issues involved in these five tasks. The first half of this chapter discusses in greater detail the issues related to selecting a sample and collecting the data and presents CAHPS recommendations. In some cases, we also explain how these recommendations differ from or are consistent with NCQA requirements. Specific instructions and explanations and all the materials necessary to carry out these tasks can be found in ***CAHPS 2.0 Surveys*** appendix on ***CD-ROM 3***. The second half of this chapter focuses on the data preparation issues needed to produce reports for any CAHPS audiences and on the analytic issues that are relevant to producing the consumer and other reports. Specific instructions and explanations and all the materials necessary to carry out these tasks can be found in ***CAHPS 2.0 Analysis*** appendix on ***CD-ROM 3***.

CAHPS and NCQA: Similarities and Differences

In Chapter 1, we described the process by which the CAHPS 1.0 questionnaire and the NCQA Member Satisfaction Survey were converged to create the CAHPS 2.0 questionnaire. A version of this questionnaire, the CAHPS 2.0H questionnaire, must be used by sponsors to meet NCQA accreditation and HEDIS reporting requirements[1] criteria. The CAHPS 2.0 questionnaires consisting of the core and HEDIS supplemental set when used by the health plans for HEDIS reporting or NCQA accreditation is referred to as CAHPS 2.0H. The same questionnaires may be used by any sponsor following the CAHPS protocol. When it is not used for reporting to NCQA, it is called CAHPS 2.0. Although the surveys are largely the same, there are some differences between 2.0 and 2.0H, and the chart below summarizes these differences.

	CAHPS 2.0	CAHPS 2.0H
Questions	Core and selected supplemental questions.	Core plus HEDIS supplemental set, plus claims processing supplemental set.
Data collection mode	Mixed mode is best; mail or phone only is acceptable if adequate response rates are obtained.	Must use mixed mode.[2]
Sample size	Should be large enough to yield 300 completed questionnaires.	Must be large enough to yield 411 completed questionnaires; if including questions related to smoking, must be large enough to yield 784 completed questionnaires.
Purposes to which data are put	Consumer health plan choice decisionmaking; purchaser decisionmaking; health plan quality improvement efforts.	Accreditation; purchaser decisionmaking; health plan quality improvement efforts reporting to consumers.
Age range for children	1-17	1-12
Minimum response rate	60% for commercial and Medicare; 50% for Medicaid.	60% for commercial and Medicare; 50% for Medicaid.
Calculations for response rate	Subtract from denominator only those who are deceased or no longer enrolled.	Subtract from denominator those who are deceased, no longer enrolled, can't be tracked down because of bad addresses.
Case-mix adjustment	Adjust for age and health status routinely; adjust for other factors as appropriate.	Do not case-mix adjust.

[1] For more details, refer to HEDIS 2000, vol. 3 for HEDIS protocol for administering CAHPS 2.0H surveys.
[2] Consult with NCQA if you plan to use any other method of data collection.

As you discuss issues and plan your sampling, data collection, and data analysis procedures, contact SUN. SUN can help answer your questions and provide helpful information about the experiences of other sponsors. Also, make sure to include quality control procedures throughout the data collection, preparation, and analysis phases. Specific information about quality control can be found in the sample RFP in the ***Hiring and Managing Your CAHPS Vendor*** appendix located on ***CD-ROM 1***. If you intend to participate in the NCBD, be sure to incorporate the data delivery specification in your RFP and eventual contract. The RFP outline includes instructions for including this information.

Select a Sample

The sample selected depends on the decisions made during the planning phase about your target population and what you want to report about them. Selecting a sample can be broken down into several activities:

- Determine the population from which you will select or "draw" your sample;
- Construct a sample frame (a list of individuals from which you will select your sample); and
- Determine the size of the sample; this will be based primarily on the CAHPS protocol you choose, any additional comparisons you wish to make in your report, the expected response rate, and the quality of the sample frame.

Types of Sampling Methods

Many types of sampling methods exist, including simple random sample, stratified random sample, and many more complex methods. We assume that your vendor will use a probability sampling method such as simple random sampling for this CAHPS project. For more information on this issue,[1] contact the ***SUN Help Line*** at **(800) 492-9261**. Also make sure that your vendor has a qualified statistician on staff to work on these sampling and other statistical issues.

[1] You can refer to Sudman, S. (1976). *Applied Sampling.* New York: Academic Press; Kalton, G. (1983). *Introduction to Survey Sampling.* Sage.

Be consistent in the way you survey across all plans and populations. For example, use comparable sampling methods for each population you survey, apply the same eligibility requirements to all populations, and aim for comparable numbers of usable responses for all core questionnaire items across plans. In making decisions about the populations to be included in the survey, the following actions should be taken.

Determine which population to survey. In your project design and planning phase you already considered this issue and determined which of the three major populations you would include in your survey:

- Commercial health plan members (adults and children) typically in fee-for-service health plans, HMOs, POS plans, and PPOs; most of these members get their insurance through an employer or union, but some individuals enroll independently and pay their premiums directly to the plan;

- Medicaid recipients (adults and children) who are enrolled in either regular fee-for-service Medicaid or Medicaid HMOs; or

- Medicare beneficiaries (contact SUN first to determine whether HCFA is already conducting any surveys with the Medicare population in your area. These results are publicly available, and it is important not to duplicate efforts).

Each of these populations may have subpopulations that you want to survey. For example, you may be interested in surveying commercially insured individuals with chronic conditions or Medicaid Social Security Insurance recipients.

Decide on the plans you will sample. CAHPS questionnaires are designed for use with health plans of all types, although individual health plans of the same type can vary tremendously in the nature and number of benefits they offer.

Decide whether to sample plans individually or bundled together. Because consumer assessment is often linked to benefits (i.e., the more generous the benefits, the more satisfied the respondent is likely to be), consider sampling each different benefit level and health plan product as a separate health insurance plan. In carrying out this recommendation, be aware of the complexities of how health plans are defined for purposes of a CAHPS survey. In many communities, the distinctions among types of managed care plans (HMO, POS, PPO) are not clear-cut. Health insurance companies may offer a variety of health plan products with different names that are actually quite similar in plan design. There also may be some big differences in the plan design of health plan products offered under the same name. The project team may need to gather enough information from the health plans themselves and consult with experts to be able to sort out the local offerings of health plan products into groups that make sense for purposes of the survey.

Determine whether to include all covered lives or only policyholders. Sample frames, or the list of individuals from which you draw your sample, may be available through health plans or from your own administrative records, such as enrollment files. In some cases, the sample frame will include only policyholders. In other cases, the sample frame will include all covered lives, that is, policyholders as well as their family members who are covered by the policy.

If you can obtain them, include all covered lives in your sample frame because it most accurately represents all those who got their care from the plan, as opposed to just those holding the policy. Typically, however, CAHPS sponsors have used samples that correspond to the data files they are easily able to obtain (commercially insured populations generally include policyholders only, whereas Medicare and Medicaid samples reflect all individuals covered).

Of utmost importance is the similarity of the sample frames. If you are including more than one health plan in your survey, you may have to alter one or more sample frames to make them all consistent. That is, if you have a sample frame of all covered lives for Plan A, you will want a sample frame of all covered lives for Plan B. If one plan has a sample frame of only policyholders, you must limit the other sample frames to policyholders even when other plans have enough information to sample all covered lives. ***CAHPS Sampling Guidelines*** in ***CAHPS 2.0 Surveys*** appendix on ***CD-ROM 3*** provides further guidance on this issue.

Determine your sample size goal. If you plan to include adults and children, you should have a sample large enough to obtain at least 300 completed surveys from each group. CAHPS field tests have demonstrated that 300 completed surveys will usually yield a minimum of 100 usable responses for all core questionnaire items. One hundred responses per health plan per reportable item provides enough statistical power to detect some differences between plans.

If you plan to include adults only, you still need a *minimum* of 300 completed surveys. Because of this, you cannot send out surveys to only 300 individuals. You will be selecting enough individuals to obtain *completed* questionnaires from 300. The number of names you will have to sample to receive 300 completed surveys depends on the percentage of people who *complete* and *return* the survey. This number is your "response rate." (Response rates are discussed in more detail later in this chapter.) The CAHPS sample size recommendation differs from the sample sizes required by NCQA for health plans seeking accreditation (see the box at the beginning of the chapter).

If it is in your budget and feasible, a larger sample is better because it will reduce your margin of error and increase your ability to analyze particular subgroups of interest. However, larger samples will increase the cost of fielding your survey, and you will have to balance these costs against your desire for more accurate results and greater analytic capability.

Margin of Error

By sending a questionnaire to a sample of the entire population, you are approximating the results you would get if you surveyed everyone. As a result, there will always be some measure of error. "Margin of error" is a way of quantifying this sampling error so that you can take it into account when you analyze your results. Margin of error is closely linked to sample size; the larger the number of returned questionnaires, the smaller the error. And the smaller the margin of error, the more confidence you can have that your results reflect those you would get if your surveyed the entire population.

When you are constructing your sample frame, you need to ensure that, to the extent possible, the information (e.g., names, addresses, enrollment information) in the data files you have is complete, up to date, and accurate. This will make your initial contact more effective and will help to maximize your response rates later on.

Determine whether you will gather information about particular subgroups. You may wish to survey adults or children only or particular groups, such as adults or children with chronic conditions, or pregnant women. Only a subset of items in the core questionnaire will apply to them. As with all the other questions, you need to have a minimum of 100 responses for these items to be able to get meaningful data for your analysis, so it is best to oversample for these groups.

Some sponsors are particularly interested in the health care experiences of teenagers, and if you have sufficient data, we encourage you to look at this group separately. Members of the CAHPS development team are now studying the issue of collecting data on adolescent health care. Currently in the survey, parents report for their teens up to age 17 and experience suggests that these data may be different from those obtained directly from the teen.

Some sponsors also may want to include teenage mothers and their children in their samples; this presents a particular challenge because it is not always clear whether the teen mother can provide information on her child as an adult or whether the sponsor must obtain the data from her parent or legal guardian. Laws about surveying teens vary by state, though most institutional review boards require parental permission, especially for children under 16. In general, if the teen mother is living on her own, she is considered an “emancipated minor” and can be surveyed directly. If she is living with her parents or legal guardian, she is not considered emancipated, and the legal guardian should provide the information.

However, keep in mind that the person most knowledgeable about the child's care should complete the survey. If this is the mother and her parent or legal guardian gives permission, the mother may complete the questionnaire for her child. Be sure to check applicable state laws and requirements of your institutional review board (IRB).

Fine-tune the Sample

If you are surveying both adults and children, your sample should include only one child or adult per household. Therefore, once you have drawn your sample, you will need to fine-tune the sample to remove any duplicate names from the lists. CAHPS recommends you use the following procedure to sample only one person per household:

- Separate the sample into two groups: (A) adults and (B) children;
- Randomly select adults (from Group A) until you have a sample large enough to obtain 300 completed surveys;
- Check the adult sample to ensure that there is only one adult per household;
- Remove children (from Group B) who are in the same household as a selected adult;
- Randomly select children from Group B until you have a sample large enough to obtain 300 completed surveys; and
- Check the children's sample to ensure that there is only one child per household.

This approach has the advantage of most closely approximating a self-weighting sample in which every person has an equal probability of being selected. This is because there are typically two adults in a household, but the number of children can be much larger (and the median number of adults is less than the median number of children per household).

Assemble Your Questionnaire

As discussed in Chapter 2, one of the first decisions to be made during the project design phase is defining the target population. This task entails thinking about which questions to ask in the survey. The CAHPS body of survey items is comprised of core items and supplemental items. The core items are those that are applicable across populations and care delivery systems. Supplemental items are those that can be added to the core to address specific issues of interest for a specific population (e.g., Medicaid recipients or persons with chronic conditions). ***CAHPS 2.0 Surveys*** appendix on ***CD-ROM 3*** contains the pre-assembled questionnaires, sampling guidelines, and data collection protocols for the two

main target populations of CAHPS sponsors: commercially insured individuals and Medicaid recipients.[2] The wording and placement of items in the CAHPS core questionnaire have been determined through careful testing. Therefore, sponsors must use the CAHPS core questionnaire as is and must follow the instructions for assembling the questionnaire.

The supplemental question topic areas were chosen based on wide experience from field tests and other development work and include the following:

- Interpreter services for the hearing impaired and for foreign language speakers;
- Dental care;
- Mental health care;
- Chronic conditions;
- Pregnancy care;
- Prescription medicine;
- Transportation;
- Claims processing;
- Medicaid enrollment;
- Cost sharing;
- Coverage by multiple plans;
- Relationships between policyholder and others enrolled in the plan;
- Well-child care; and
- HEDIS questions.

In addition, you may add supplemental questions of your own creation but recognize that this will increase the burden on respondents and possibly lower the response rate as a result. If you have a series of items that can stand alone as a separate section in your questionnaire, place this section just after the 0 to 10 rating questions. If you have items that address topics covered in existing sections, place them at the end of the relevant section so that they are the last items in the section. If you are considering adding your own questions, we encourage you to call SUN at **(800) 492-9261** to share them. SUN can tell you about other sponsors with similar policy interests and how they have handled the addition of extra questions.

[2] The appendix also includes the Medicare core questionnaire but not its sampling guidelines or data collection protocol. Sponsors interested in surveying a Medicare population should first contact SUN.

Assembling Your CAHPS Questionnaire in CAHPS 2.0 Surveys appendix on ***CD-ROM 3*** contains more information on adding supplemental questions and assembling the questionnaires.

Collect the Data

Once the respondents have been selected, the samples drawn, and the questionnaires assembled, your survey vendor will begin the 8- to 12-week data collection phase. The length of this phase varies depending on whether you use a mail only, telephone only, or mixed data collection mode. Telephone surveys typically require fewer weeks to reach desired response rates. During this phase, respondents receive, complete, and return questionnaires in the mail or answer the questionnaire items over the telephone with an interviewer. This phase also includes time needed to follow up with nonrespondents. ***Data Collection Protocol*** in ***CAHPS 2.0 Surveys*** appendix on ***CD-ROM 3*** provides detailed guidance on all the steps involved in collecting your data by mail, telephone, or mixed mode (mail and telephone). This section discusses some of the key issues in ensuring a successful data collection phase.

Set Your Response Rate Goal

Your response rate, or the percentage of respondents who complete the survey questionnaire, is an important factor in the accuracy of survey results. The higher the response rate achieved, the more representative completed cases will be. Some sponsors send out very large numbers of questionnaires to get the desired number of completed surveys and to minimize costs of following up with nonrespondents. This is not a good idea because getting a robust response rate from the sample is as important as the final number of completed questionnaires. For example, if you send out 2,500 questionnaires and receive 500 responses, your response rate would be only 20 percent. Your results would not reflect the experience and opinions of 80 percent of your sample population. A much stronger procedure would be to mail 850 questionnaires and diligently follow up with nonrespondents after about 2 weeks. If you ultimately receive 510 completed, usable responses, you would have achieved a response rate of 60 percent—a much more representative reflection of the population. To this end, the CAHPS minimum response rate goal is 60 percent for commercial and 50 percent for Medicaid populations.

Calculate the Response Rate

The response rate is the total number of completed questionnaires divided by the total number of respondents selected. This “raw response rate” is shown here:

$$\frac{\text{number of completed returned questionnaires}}{\text{total number of respondents selected}}$$

However, both parts of this calculation usually need to be adjusted to arrive at a truly accurate response rate. The adjustment will be based on determinations of what constitutes a “completed questionnaire” and who is included in the denominator.

The CAHPS development team recommends that sponsors consider a questionnaire to be complete if 10 or more of a select list of key CAHPS items are filled in. For more information on these key items and why they were chosen, see ***Determining a Complete Questionnaire*** in ***CAHPS 2.0 Surveys*** appendix on ***CD-ROM 3***.

With regard to the second issue, CAHPS recommends that sponsors subtract from the denominator only those who are deceased or ineligible because they are no longer enrolled in the plan or system. There are very few reasons why members might be truly ineligible to participate in a CAHPS survey—out-of-date addresses and being out of town on vacation are not among them—and sponsors and vendors should make every effort to obtain completed surveys from all eligible respondents. This recommendation differs somewhat from the NCQA protocol.

These recommendations will yield the following adjusted response rate:

$$\frac{\text{number of completed returned questionnaires}}{\text{total number respondents selected} - (\text{deceased and ineligible})}$$

For a detailed discussion of response rate calculations, see ***CAHPS 2.0 Surveys*** appendix on ***CD-ROM 3***.

Maximize Your Response Rate

Out-of-date addresses, inaccurate telephone numbers, answering machines, and frequent travel by respondents are common problems. Once these have been overcome and the vendor does reach the respondent, other challenges await, including the need to communicate effectively to the individual the reasons why he or she would want to fill out a questionnaire or participate in a telephone interview. Sponsors and vendors have a number of methods available to them to maximize response rates:

- Improving initial contact rates by making sure that addresses and phone numbers are current and accurate (e.g., identify sources of up-to-date sample information, run a sample file through a national change-of-address database, send a sample to a phone number look-up vendor);

- Using all available tracking methods (e.g., directory assistance, CD-ROM directories, Internet database services);

- Improving contact rates after data collection has begun (e.g., increase maximum number of calls, ensure that calls take place at different day and evening times over a period of days, mail second reminders, switch to mixed-mode data collection, use experienced and well-trained interviewers).

These methods will add to the costs of conducting a survey, but sponsors need to weigh these extra costs against the potential for obtaining low response rates and, consequently, less representative data.

Determine Data Collection Protocols

The ***CAHPS 2.0 Survey and Reporting Kit*** includes all the necessary materials to conduct the survey using either a mail or telephone protocol (see ***CAHPS 2.0 Surveys*** appendix on ***CD-ROM 3***), though a mixed-mode protocol involving both mail and telephone data collection procedures is more likely to achieve a desired response rate than will either mode alone. Research conducted by the CAHPS development team shows that there is minimal difference in the types of responses collected between a telephone interview and a self-completed questionnaire (these differences are called "mode effects"), so telephone and mail can be used together with confidence.

However, in some settings with some populations, a mail or telephone protocol alone can achieve a sufficiently high response rate. Determine the best protocol to achieve your desired response rate and use it. If you are conducting a CAHPS survey for NCQA accreditation or HEDIS reporting purposes, note that NCQA differs from CAHPS in that NCQA requires a mixed mail-telephone protocol. Health plans must get NCQA approval if a different protocol is to be used.

Notes From the Field

In 1997, a midwest state conducted three different CAHPS surveys, with mail as the primary data collection mode. One survey was a survey of state government employees, one of Medicaid recipients, and a third of Medicare beneficiaries. In the survey of state government employees, the sponsor obtained an overall response rate of 61.3 percent. It obtained a 53.3 percent response rate in the survey of Medicaid recipients and 63.3 percent in its survey of Medicare beneficiaries. What is remarkable about these response rates? They achieved these response rates in a mail survey. They did, however, make a telephone call to sample members who did not respond within a few weeks of the questionnaire mailing to remind them to complete and return the survey.

Since that time, other organizations have conducted CAHPS with some of these same populations. On some of these surveys, the mode of data collection was a mail survey followed by telephone followup with nonrespondents, where an attempt was made to complete the interview by telephone. The response rates obtained on some of these surveys were not as high as the response rates this sponsor obtained, even with attempts to complete the interview by telephone.

Determine How to Collect Data from Non-English-Speaking Populations

CAHPS currently produces all survey materials (e.g., questionnaires, cover letters) in English and Spanish. Translations into other languages, including Russian and Vietnamese, are underway. When a significant percentage of the survey population speaks a language other than English, you and your vendor can choose one of two options:

- Send materials and questionnaire in English and the other language. This will be costly, but the payoff is good because it can result in a robust response rate.

- Send preliminary materials, such as the advance letter, in English and the other language. The letter states that the questionnaire is available in the foreign language upon request. If the respondent requests the questionnaire in the foreign language, the questionnaire and any subsequent communications should then be conducted in that preferred language. This option frequently results in a lower response rate than the first option.

Prepare Data Files for Analysis

Your survey vendor will need to carry out several tasks to prepare the data received from completed questionnaires. Many interim files will be created along the way. During this process, it is very important that your vendor preserves the original data file created when the raw survey responses were entered. Any changes and corrections made during the cleaning and data preparation phase should be made on duplicate files. There are three reasons for this action:

- The original data file is an important component of the complete record of the project;

- Having an original file allows vendors to correct data errors that were made during the cleaning process; and

- The existence of an original file is critical if you want to go back later and conduct other analyses or tests, such as extent of error tests or tests of skip patterns.

[3] Optical scan forms are answer sheets in which respondents fill in the circle that corresponds to their answer choice. These forms are fed through an optical scanning machine, and the data are automatically captured by a computer. Standardized education tests, such as the Scholastic Aptitude Test, generally use optical scan forms.

The number and scope of these data preparation tasks and the way they are carried out will depend on your data collection protocol and the way in which the data were recorded (i.e., If you collected data with a self-administered mail questionnaire, did respondents record answers on optical scan forms[3] or record data directly on the CAHPS formatted questionnaires? If you collected data through telephone interviews, did the interviewer use computer-assisted telephone interviewing (CATI) or paper-and-pencil forms?)

Your vendor's data preparation tasks are described in the following sections.

Determine and Exclude Ineligible Cases

Several situations render a case ineligible for analysis. One of the most important situations is when the respondent is not actually enrolled in a health plan or product included in the survey. This might be indicated by a "no" response to Question 1 ("Our records show that you are now in {health plan name}. Is that right?"). However, vendors need to be alert to the fact that a respondent could, in fact, be a member but still answer no. For example, a respondent might be confused between the name of a plan (e.g., Blue Cross/Blue Shield) and a product offered by that plan (e.g., Blue Cross/Blue Shield's Health Choice) and answer "no" erroneously. Or, a respondent could answer "no" and furnish a provider's or clinic's name in answer to Question 2 (What is the name of your health plan?). If it is clear that the name provided refers to the same plan as that named in Question 1, or if there is sufficient confidence in the accuracy of the information in the sample file, the data processing staff should change the answer to "yes." If not, staff should code the questionnaire as ineligible and exclude it from the analysis.

Another common reason to code a questionnaire as ineligible and exclude it from the denominator is that a respondent has been enrolled in the plan less than 12 months (for commercially insured) or less than 6 months (Medicaid). Other questionnaires may be considered incomplete but are not excluded from the denominator. For example:

- If the respondent used a proxy to actually answers the questions for him or her, or
- If 10 or more of the key items on the questionnaire were not filled in.

The Use of Proxy Respondents

If your samples include large numbers of individuals with limited English or with conditions that would make completing the questionnaire difficult (e.g., deafness, blindness), you may need to make decisions about the use of proxy respondents. Because CAHPS is designed to capture a person's own experiences, the questions are not intended to be answered by another. Proxies are, therefore, acceptable only if they facilitate a person's response (i.e., "read questions to me and recorded my answers" is acceptable, but "answered for me" is not).

Code and Enter the Data

Coding is used to prepare survey responses to be entered into a computer. The exact level of coding required will depend on the type of data capture method (i.e., questionnaires that require data entry versus questionnaires that are scanned by a computer). A coding specialist will review each questionnaire to see whether the responses are legible and whether any responses need to be coded. After coding is completed, the data are entered into a computer file. To ensure quality, answers from each questionnaire should be key-entered by two separate data entry specialists, or key-entered twice by the same person. The results from the two are compared to identify and correct data entry errors.

Clean the Data

Your vendor will take several steps to fix data problems before any results are reported:

- Check for out-of-range values;
- Check for skip pattern problems (if there are inconsistencies between the response to the screener question and the following question's response, the vendor should assume the screener response is correct);
- Check again for ineligible cases; and
- Check for duplicates (the number of records in the data file should match the number of completes and partials in the sample file; duplicates can occur if the vendor conducts a followup phone interview and the mail questionnaire arrives at the same time or soon after and the case slips through the receipt control system or through errors in data entry; your vendor should keep the first questionnaire that comes in).

Conduct an Audit

A small random sample of the entered data should be audited by comparing hard-copy forms with the results of data entry. This is used to catch systematic errors, such as an error in the optical scanning program. Systematic errors will show up consistently across all questionnaires. Auditing a sample of 75 questionnaires across the entire sample would likely be sufficient if your vendor wanted to see whether fewer than 5 percent of the questionnaires had serious errors.

Analyze Your CAHPS Results

This section focuses on the data preparation issues that are relevant to producing reports for any CAHPS audiences and on the analytic issues that are relevant to producing the consumer reports. However, you may also be planning to produce reports for other audiences and other purposes, and this chapter also discusses some analytic issues that pertain to these situations.

CAHPS Analysis Methods

A fundamental principle followed by the CAHPS development team was to create survey questionnaires and reporting products in tandem in order to maximize the reporting of results and ensure that results would be consistent within and between surveys. Part of this effort involved designing a computer program in SAS for vendors to use in analyzing the results. ***CAHPS 2.0 Analysis*** appendix on ***CD-ROM 3*** includes the program and provides specific instructions for your vendor to use in analyzing the survey data and using the templates to report results.

The CAHPS analysis program provides two types of results. The first is global ratings, which use a scale of 0 to 10 to measure respondents' assessment of their health plan and the quality of care received in the last 12 months. The second is composites, which present results of similar items that have been grouped together. Composites are used because they keep reports comprehensive yet of reasonable length, and psychometric analyses indicate that they are reliable and valid measures of member experiences.[4] The composites measure respondents' experience with the following:

- Getting needed care (4 questions);
- Getting care quickly (4 questions);
- How well doctors communicate (4 questions);
- Courtesy, respect, and helpfulness of office staff (2 questions); and
- Health plan customer service, information, and paperwork (3 questions).

In the consumer reports, these results are presented as two types of statistics in two formats: bar graphs and comparison star charts. Bar graphs present the distribution of responses for each plan for composites. Stars are assigned to show each plan's performance in relation to other plans.

[4] Hoy, et al. (1999). Consumer Assessment of Health Plans Study (CAHP™). Medical Care, 37(3), Supplement.

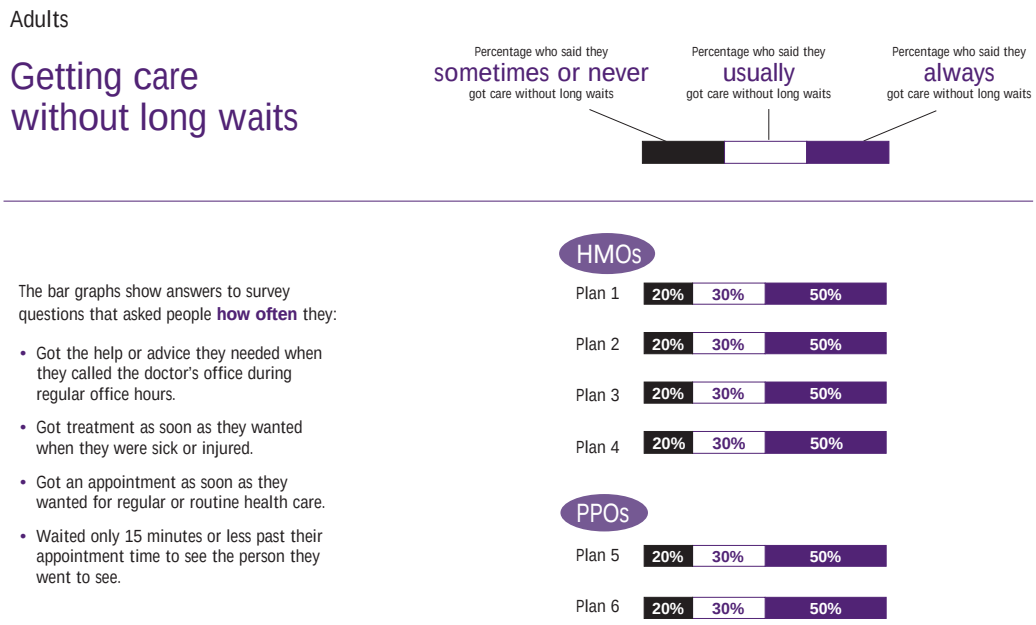
Bar Graphs

The divisions in the bar graphs correspond to the response options offered by questionnaire items. As shown in Figure 4-1, the bar has divisions corresponding to (1) "never" plus "sometimes," (2) "usually," and (3) "always." The categories "never" and "sometimes" are combined for the reports because percentages for negative responses tend to be low. Moreover, it is easier for report readers to view and interpret bar graphs with no more than three categories of responses.

Figure 4-1 shows the bar graph for the composite "Getting the care without long waits." The following questionnaire items are included in this composite:

- Got help or advise they needed when they called the doctor's office during regular office hours;
- Got treatment as soon as they wanted when they were sick or injured;
- Got an appointment as soon as they wanted for regular or routine health care; and
- Waited only 15 minutes or less past their appointment time to see the person they went to see.

Figure 4-1. Comparison bar graph



Comparison Star Charts

These charts reflect statistically significant differences among plans. The stars are derived by assigning a numeric value to answers given by respondents and then calculating a weighted average for each plan. The program then tests whether the plan is significantly different from other plans. Figure 4-2 shows an example of a comparison star chart. The stars are used to compare individual plans against the average of all the plans; they are not to be used to compare individual plans against each other. Two stars indicate that the plan had an average rating that was not significantly different from the average of all plan means on this item or this composite. One star indicates that the plan had a rating that was significantly worse, and three stars indicate that the plan had an average rating that was significantly better than the average across plans.

Figure 4-2. Comparison star chart

How plans compare on care for adults

	Getting care that is needed More information on page 7	Getting care without long waits More information on page 8	How well doctors communicate More information on page 9	How people rated their health care More information on page 10	Courtesy, respect, and helpfulness of office staff More information on page 11	Health plan customer service More information on page 12	How people rated their health plan More information on page 13
HMOs page 14 tells more about HMOs							
Plan 1	★★	★★★	★★★	★★★	★★★	★★★	★
Plan 2	★★	★	★★	★★	★★	★★★	★★★
Plan 3	★★★	★★★	★★★	★★★	★★★	★★★	★★★
Plan 4	★★★	★★	★	★★★	★★	★★★	★★
PPOs page 14 tells more about PPOs							
Plan 5	★★	★	★★★	★★★	★★★	★	★★★
Plan 6	★★★	★★★	★★★	★★	★★★	★★★	★★★

Make Decisions on Analytic Issues

During the project design phase, as you considered issues on reporting your results, your project team and vendor made decisions that affect several data analysis issues. Once the data are collected and prepared for analysis, you may need to revisit these issues. For example, although you may have initially decided to analyze plans by region, you may decide that such an analysis is no longer feasible or desirable. Here are other decisions you may want to revisit:

The reporting unit for plans (i.e., plan altogether or plan by region, by state, or by individual purchaser). The most common reporting unit will be for the plan altogether. If you have collected data that reflect different reporting units, decide whether to analyze the units together, separately by other units, or both. If the data are all to be analyzed together, they can be combined into a single file. If the data are to be analyzed separately, the survey vendor needs to group the units into separate data files.

Whether to conduct analyses of frequent and infrequent users of health care services together or separately for the 0 to 10 global ratings. Previous studies have shown differences in satisfaction between frequent and infrequent users of health care services. Frequent users are defined as respondents with three or more visits to a doctor's office or clinic (not including emergency room visits) in the last 12 months (Question 21 in the adult core questionnaire). You can present the data for all respondents (frequent and infrequent). However, if you have a sufficient number of responses, results for several items (overall ratings of personal doctor or nurse, specialists, health care in the last 12 months, and health plan) should be reported for frequent users of health care services and for all respondents. Even if you do not have enough responses to include in your reports, examine these data to see if there are any differences.

The CAHPS SAS program also will require you to make decisions beyond these just described. Before preparing to run the program you, your survey vendor or programmer, and your reporting team need to discuss them.

The level of substantive (practical) significance to use to compare health plan performance. Substantive significance refers to an absolute difference between health plans that must be achieved before a change is considered meaningful. There are two options in the CAHPS analysis program that allow the user to specify a difference that is substantive. Both of these options can be used simultaneously or they can be specified individually. The criterion for determining practical significance can only be used with the *p*-value criterion.

The first method requires the team to decide on a percentage difference from the minimum absolute theoretical difference from the overall mean that is meaningful. A second and much simpler method is to specify an absolute difference that must exist between the plan mean and the mean for all plans in the analysis for a difference to be considered significant. For this method, the user only needs to specify the absolute difference considered to be meaningful. ***CAHPS 2.0 Analysis*** appendix on ***CD-ROM 3*** explains these two methods in greater detail.

Ways to analyze and present data on small samples. As discussed earlier, collect at least 300 usable questionnaires per plan. This will ensure that your reporting on individual questionnaire items is meaningful and sufficiently accurate. CAHPS field tests have demonstrated that 300 completed surveys will yield a minimum of 100 usable responses for all core questionnaire items. With 100 responses per health plan per reportable item, there is adequate power to detect an effect size of 0.29 (15 plans) to 0.40 (2 plans). If you have fewer than 100 usable responses for a question, you still have several options for analysis and reporting:

- Compare the plan with the small sample and all other plans to a weighted mean so that it has very little effect on the mean; if you compare to a weighted mean, you can present star charts as well as bar graphs;
- Present only the bar graphs but not the star charts; or
- Not report results and include a note stating that "there were not enough data to report on Plan X."

When weighing these options, keep several things in mind:

- Sample size has an important bearing on how many ways you can look at the data; you will need to make trade-offs between number of analyses you can make and your sample size—the larger the sample, the more analyses you can conduct.
- One hundred responses is not an absolute threshold. See how far away from 100 you are to determine whether you can conduct a meaningful analysis (i.e., 97 responses is very different from 23 responses).
- How many other plans there are in the comparison.
- If you use weighted data, tests of statistical significance will not be exact. You should consult a statistician to determine how big a problem this will be and how to correct it.

When and why to consider including case-mix adjustments in the analysis. Case-mix refers to average characteristics of respondents, such as health status, level of functioning, age, and educational level. Because differences in case-mix can result in differences in ratings between plans that are not due to differences in quality, analysts frequently adjust the data to account for these differences. This is particularly true for CAHPS while comparing plans against each other. Though this type of adjustment typically does not make a big difference, it does provide some protection for those plans whose populations are very different from others, such as plans that have a large proportion of very ill members. However, some sponsors may have offsetting policy reasons for choosing not to case-mix adjust. The CAHPS 2.0 analysis program allows them to adjust or not.

Case-Mix Adjustments

Case-mix adjustments for age and self-reported health status were built into the CAHPS 1.0 program; case-mix adjustment is optional in CAHPS 2.0, as sponsors can choose which case-mix variables to use if they do adjust.

CAHPS and NCQA differ in their recommendations with respect to case-mix adjustment. CAHPS recommends adjusting for age and health status routinely and other factors if appropriate for the analysis. NCQA does not case-mix adjust plan scores.

The analysis methods for adult and child surveys. If questionnaires for both adult and children's care are collected, decide whether to analyze these questionnaires separately or together. Questionnaires should be analyzed separately if you have enough of each—at least 300. However, if you are forced to combine adult and children's data to obtain the required number of questionnaires, take into account interaction effects. Interaction effects are important to consider because the necessary adjustments in the analysis depend on whether the questionnaire is a child or adult version. ***CAHPS 2.0 Analysis*** appendix on ***CD-ROM 3*** contains more information on interaction effects and instructions on how to customize the CAHPS SAS program to account for interaction effects.

Whether and how to account for differences in response rates. You may find that response rates differ among your survey populations and that these differences are the result of particular respondent characteristics, such as gender, age, health status, or health plan membership. The CAHPS 2.0 statistical analysis program includes a post-stratification adjustment option that allows you to compensate for these characteristics and minimize any bias that has been introduced as a result of the differential response rates. This adjustment is the equivalent of assigning weights to respondents so that the weighted distribution of respondents reflects the original sample distribution. Using this option is helpful when you are combining data from several plans, adjusting for nonresponse, or oversampling. However, remember that this type of weighting affects statistical tests.

Notes From the Field

The response rates for the Oregon CAHPS Project varied significantly with respect to gender (females higher than males), age (older persons higher than young), and type of plan (health maintenance organizations higher than preferred provider organizations). As a result, the respondent distribution was composed of too many older females and too few young males when compared to the population distribution. The CAHPS development team evaluated the potential bias that these differential response rates may have introduced into the Oregon CAHPS survey results by rerunning the CAHPS Analysis Program. They ran the CAHPS Analysis Program using the stratification options to control the weighted proportions by age and sex to those of each plan's population and then compared the results with the (non-post-stratified) results reported in the brochure. This effectively assigned large weights to young male respondents and small weights to older female respondents. The weighted respondent distribution was now proportional to the population distribution.

The team found negligible differences between the originally reported plan means and the weighted plan means. Despite this, the weighted analysis caused changes to the star charts for six of the seven topics. The changes in the number of stars occurred in plan means that were either close to the boundary between one and two stars, or close to the boundary between two and three stars.

This analysis led the team to conclude that differential nonresponse attributable to gender, age, and/or type of plan did not introduce significant bias into either the reported overall survey means or the individual plan means. However, the team did caution that some of the star assignments appeared to be sensitive to differential nonresponse and may, in fact, be one star higher or lower than reported.

Apply Analysis Results to the Reports Mock-up

Once you have the final output from the analysis program, pour the results into your report mock-ups. This "test-run" will reveal whether the original decisions about formatting and length work well and what changes, if any, need to be made.

Special Group Analyses for Purchasers and Other Internal Audiences

In addition to conducting analyses for the CAHPS consumer reports, you may wish to conduct additional analyses for other audiences, such as health plans or policymakers, or for other purposes, such as quality monitoring and improvement. In light of these other audiences and purposes, there are various ways you can look at the data to examine how the experience of your population differs, for example, by age, race, use (number of visits to a doctor's office or clinic), and gender.

You also may have chosen to include supplemental questions in addition to the core questions in your questionnaire in order to gain insight into particular groups or issues not covered in the core (e.g., chronic conditions questions). In such cases you can use the program to analyze the supplemental questions of interest to you.