



NCHS Rapid Surveys System (RSS)

Round 1 Survey Description

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1. Introduction

In 2022, the National Center for Health Statistics (NCHS) launched the Rapid Surveys System (RSS) with three main goals:

1. to provide the Centers for Disease Control and Prevention (CDC) and partners with time-sensitive data of known quality about emerging and priority health concerns,
2. to use these data collections to increase NCHS's expertise and to evaluate the quality of public health estimates generated from commercially available probability-based online panels (hereafter referred to as online panels), and
3. to improve methods to appropriately communicate the fitness for use of public health estimates generated from online panels.

The RSS platform is designed to approximate national representation of the adult population of the United States in ways that many data collection approaches cannot. Specifically, the platform is designed to collect self-reported health data using two online panels, combining and weighting the resulting data. Online panels generally consist of persons who are recruited using statistical sampling and agree to participate in multiple surveys, typically in exchange for payment or prizes. These survey panels are designed to take advantage of the efficiencies in using online surveys, although other modes such as telephone can be used to improve data accuracy. The RSS incorporates multiple mechanisms to carefully evaluate the resulting survey data for their appropriateness for use in public health surveillance and research (e.g., hypothesis generating).

RSS will be used multiple times per year to gather data about issues of importance to CDC and U.S. Department of Health and Human Services (HHS). In the first year (2023), the RSS is collecting two rounds of data. In future years, four rounds of data collection per year are anticipated. Each round of data will be shared with the public through dashboards, tables, infographics, and data files with accompanying codebooks. For the initial rounds, the data will be released approximately 6 months after the data collection period. Faster releases are expected in future cycles.

1.1 Motivation

Typically, NCHS data systems generate robust nationally representative statistics using methods that maximize relevance, accuracy, and reliability. For example, surveys such as the National Health Interview Survey (NHIS) allow for description of health outcomes among the U.S. population across time and for many demographic groups; however, such efforts require longer periods of time for data collection and processing. Although NCHS's gold standard sampling, interviewing, and post-processing strategies are pivotal for examining national annual trends in disease and behavioral risk factors and differences across demographic and geographic groups, they are less useful for responding to more immediate or "real-time" public health issues that may arise with little warning or notice.

RSS can be used to collect time-sensitive data about emerging and priority health concerns for decision making by reducing the time needed for data collection and processing. Yet unlike many other quick-turnaround surveys and polls, RSS will also provide decision makers with information on the quality of the estimates using methodological evaluations and ongoing quality assessments.

CDC uses other data sources to identify and track emerging public health threats, such as those associated with disease outbreaks. During the COVID-19 pandemic, the implications of *unknown data quality* from some public health surveillance approaches became clearer. For example, new surveys such as the US Census Bureau Household Pulse Survey ([Household Pulse Survey \(COVID-19\) \(census.gov\)](https://www.census.gov/hhes/health/pulse)) were launched without going through usual design evaluation. The quality of estimates from these surveys was not well understood; however, in the absence of better information, these estimates were disseminated to the public. In response to these challenges, the RSS was launched to develop a mechanism that facilitates collection of time-sensitive survey data using online panels with thorough and ongoing data quality evaluation.

NCHS has been using online panels for methodological research since 2015 through the Research and Development Survey (RANDS); for more information please see <https://www.cdc.gov/nchs/rands/index.htm>. RSS expands on this effort to produce public-facing estimates using online panels. Because online panels do not meet the rigor of gold standard NCHS surveys, RSS includes mechanisms to facilitate continuous quality improvement by supplementing these panels with intensive efforts to understand how well the estimates reflect the population as a whole and, depending on the sample size, topic, and analytic goals, how well estimates for specific subpopulations defined by demographics or socioeconomic characteristics can be generated. An important aspect of RSS is a data dissemination strategy that communicates the strengths and limitations of data collected through the RSS's online panel approach, depending on the topic and sample, as compared to more traditional data collection methods. While these assessments will provide users more specific information on the quality of the estimates each round, RSS is intended to be suitable for:

- time-sensitive data needs for which existing resources are unavailable, not timely, or of insufficient or unknown quality;
- current public health attitudes or behaviors, because estimates from annual surveys might be outdated when available; and
- developmental work to improve concept measurement and inform future question design.

1.2 RSS Samples

The RSS uses cross-sectional samples of adults in the United States from two online panels: NORC at the University of Chicago's (NORC's) AmeriSpeak Panel and Ipsos's

KnowledgePanel. Each sample is surveyed over the same time period, using the same RSS survey instrument, so that the samples can be combined. This allows NCHS to produce statistics more rapidly than using data from traditional NCHS household surveys that rely on trained interviewers and face-to-face data collection. The sample design for the first round of the Rapid Surveys System (RSS-1) is described in Section 3.1.

1.3 Survey Components

Each round's questionnaire consists of four components:

1. basic demographic information on respondents to be used as covariates in analyses;
2. new, emerging, or supplemental content proposed by NCHS, other units within CDC, and other federal agencies;
3. questions used for calibrating the survey weights, or adjusting the weights to increase precision; and
4. additional content selected by NCHS to evaluate against relevant benchmarks which provides an assessment of how well the weighting scheme performed.

Component 1 contains questions about demographic characteristics. Both AmeriSpeak and KnowledgePanel have existing, previously collected, demographic data for each panel member. These data are collected periodically from each panel member during their panel tenure, and therefore prior to the completion of the RSS questionnaire. These "profile" variables include sex, race, education, and other characteristics. Profile variables differ slightly between the two panel providers and are harmonized when combined for RSS. Some demographic variables for component 1 come directly from an RSS questionnaire, while others come indirectly from the data respondents provide when initially joining the individual panels and periodically throughout their panel tenure.

Component 2 provides relevant, timely data on new, emerging, and priority health topics that are fit for use for decision making. Prior to each round of the RSS, CDC divisions and other HHS agencies are invited to propose topics and questions to be added to that round. Sponsored topic areas must be consistent with at least one of the four RSS topic criteria:

1. **Time-sensitive data needs**
2. **Public health attitudes and behaviors** (e.g., opinions, beliefs, stated preferences, and hypotheticals)
3. **Developmental work** to improve concept measurement/questionnaire design
4. **Methodological studies** to compare, test, and develop approaches to data collection and analysis

Component 3 calibration questions are used for calibration of RSS weights, to improve the precision of the resulting estimates, and come from the NHIS, the American Community Survey (ACS), and other large federal surveys. RSS survey weights are calibrated so that the weighted distributions of calibration variables align with the source survey(s). In addition, new content may be added to both NHIS and a Rapid Surveys questionnaire to

evaluate its utility for calibration. Information about RSS-1 weight calibration can be found in Section 3.4.

Component 4 includes questions specifically used for benchmarking, evaluating, and communicating the utility of health estimates collected via RSS. Over time, the benchmarks may also be helpful in evaluating estimates from other available online panels. These questions come from NHIS or other surveys that have relatively stable estimates with known quality. Once RSS data are weighted and calibrated to NHIS data, the RSS data are compared with the benchmark data to evaluate the quality of the estimates. See Section 2.1 for information about RSS-1 benchmarking.

Each round of RSS will emphasize different topics, and the content of each component will vary. Component 3 calibration questions will be relatively consistent across rounds, although they may change based on the results of methodological evaluations. Additionally, paradata are collected about the survey mode (web or phone), length of time taken in each section, whether the data came from AmeriSpeak or KnowledgePanel, and other data collection information. More information about the RSS-1 components can be found in Section 2. For details on the RSS-1 questionnaire, please see <https://www.cdc.gov/nchs/data/rss/questionnaire.pdf>.

This document provides guidance and information for users of RSS-1 data and estimates. Section 2 provides an overview of RSS-1 content and methodology experiments. Section 3 describes the survey methodology, including sample design, data collection, editing and imputation, sample weights, and confidentiality. Section 4 provides an overview of RSS-1 data files and guidance on variance estimation and data quality.

In the *Journal of Survey Statistics and Methodology*, Seidenberg, Moser, and West (2023) proposed an itemized checklist to guide researchers publishing analyses using complex sample survey data. This checklist—the Preferred Reporting Items for Complex Sample Survey Analysis (PRICSSA)—is intended to help eliminate analytic and reporting errors and increase transparency and reproducibility. Below is a bulleted summary of PRICSSA-based reporting elements.

- Name and wave of survey: NCHS Rapid Surveys System (RSS), Round 1
- Data collection mode: Two commercially available probability-based online panels: NORC at the University of Chicago’s (NORC’s) AmeriSpeak Panel and Ipsos’s KnowledgePanel with some telephone supplementation
- Dates of data collection: August 01–August 29, 2023 (August 04–August 29, 2023, for the AmeriSpeak Panel and August 01–August 23, 2023, for the KnowledgePanel)
- Target population: Adult noninstitutionalized population residing in the 50 U.S. states and Washington, DC
- Populations excluded: Persons in long-term care and correctional facilities, persons with no fixed household address

- Design: Stratified cluster sample (AmeriSpeak Panel) and probability proportional to size sampling (KnowledgePanel)
- Variance estimation: Taylor Series Linearization
- Weight and design variables
 - Weight: WEIGHT_M1
 - PSU: P_PSU
 - Stratum: P_STRATA
- Sample size: 7,599 adults (2,898 adults for the AmeriSpeak Panel and 4,701 adults for the KnowledgePanel)
- Unweighted survey completion rate: 45.1% (25.1% for the AmeriSpeak Panel and 69.8% for the KnowledgePanel)
- Unweighted final cumulative response rates, incorporating panel recruitment and retention rates: 4.0% (AmeriSpeak Panel) and 4.1% (KnowledgePanel). For more information on calculation of final response rates, please see <https://www.cdc.gov/nchs/data/rss/quality-profile.pdf>.

Note that two samples were drawn from each panel for the purpose of evaluating two data collection methodologies. The dates of data collection, sample size, and unweighted completion rates above are specific to the first sample. Further description of the two samples are available in this document starting in Section 2.2.

2. Round 1 Overview

This section summarizes the content and methodology experiments for RSS-1.

2.1 Round 1 Content

As described in Section 1.1, RSS-1 includes four components: demographic characteristics, new emerging or supplemental topics, calibration variables, and benchmarking variables, described below. For a complete list of variables, please see the RSS-1 codebook (<https://www.cdc.gov/nchs/rss/data.html>).

Demographic Questions. Demographic questions such as age, race, ethnicity, gender, marital status, education, income, and employment come from the panel profile variables. Because panel profile data were collected by the panel providers over a period of years, questions on marital status and employment were asked again in the RSS-1 questionnaire for comparison to the corresponding panel variables.

New, Emerging, or Supplemental Topic Questions (from contributing agencies). In RSS-1 there were 10 new emerging or supplemental topics:

1. Long COVID (National Center for Emerging and Zoonotic Infectious Diseases)
2. Mammograms and breast density (National Center for Chronic Disease Prevention and Health Promotion [NCCDPHP] and National Cancer Institute [NCI])
3. Medical procedures on fallopian tubes and ovaries (NCCDPHP and NCI)
4. Concerns about genetic testing (NCCDPHP and NCI)
5. Knowledge of the relationship between alcohol use and cancer (NCCDPHP and NCI)
6. Sunscreen use and beliefs about sunscreen (NCCDPHP)
7. Use of chemical hair straighteners, relaxers, or pressing products (NCCDPHP and NCI)
8. Use of air cleaners or purifiers (National Center for Environmental Health)
9. Intimate partner violence (National Center for Injury Prevention and Control)
10. New questions about race and ethnicity (Office of Management and Budget [OMB])

As described in Section 1, each topic had to have met at least one of the previously described criteria (see [SSA Attachment D](#) in the OMB package for the justification for each content area).

Calibration Questions. Questions included for calibration of RSS-1 weights, or for evaluation for use as calibration variables, include ever diagnosed with high cholesterol, social and work limitations, civic engagement, and marital status. Several panel profile variables were also used for calibration: Census region, age, race, ethnicity, gender, education, income, and home ownership. See Section 3.4 for more information about the calibration variables used in RSS-1.

Benchmarking Questions. In RSS-1, all estimates used for benchmarking came from the 2023 NHIS. The weighted RSS-1 estimates for these benchmarking questions were compared with NHIS data from the first quarter of 2023 (<https://www.cdc.gov/nchs/data/rss/quality-profile.pdf>). RSS-1 respondents were asked about self-reported health; hypertension, coronary heart disease, asthma, cancer, and diabetes; height and weight; difficulty paying medical bills, access to and use of medical care; preventive care including blood pressure, cholesterol, and blood sugar screenings; mental health including anxiety and depression; and cigarette smoking. The full NHIS questionnaire can be found at <https://www.cdc.gov/nchs/nhis/2023nhis.htm>.

2.2 Round 1 Methodological Studies

The methodology experiments in RSS-1 are described below.

2.2.1 Data Collection Nonresponse Follow-Up Experiment

This experiment evaluated the impact of expending additional effort on nonresponse follow-up on the quality of estimates. Two independent samples were selected from each panel. Data collection for the first sample was conducted using standard protocols while data collection for the second sample was collected using additional efforts to increase response rates and representativeness of the sample. Details are described in Section 3.

2.2.2 Race and Ethnicity Question Wording

In response to recommendations of the OMB Interagency Technical Working Group on Race and Ethnicity Standards (<https://spd15revision.gov>), RSS-1 was used to test wording of questions for collection of detailed race and ethnicity using a two-by-two factorial design. The two factors were singular/plural form of the general questions and the length of instructions about details of the race or ethnicity. Approximately one-quarter of the sample received one of four combinations of the two factors. Each question version can be found in the questionnaire (<https://www.cdc.gov/nchs/data/rss/questionnaire.pdf>), and the corresponding data can be found in the restricted-use file (RUF) (Section 4.1).

2.2.3 Cognitive Interviews

In addition to data collection through panel surveys, RSS-1 included accompanying cognitive interviews conducted by RTI International and the NCHS Collaborating Center for Questionnaire Design and Evaluation Research (CCQDER). All questions in the RSS-1 survey were included, with probing related to the sponsored questions outlined in Section 2.1 of this document.

Cognitive interviews will be conducted in most rounds of the RSS. Probes are planned for sponsored questions in future rounds but not for all questions. Information on cognitive interviewing can be found at [CCQDER - Cognitive Interviewing \(cdc.gov\)](https://www.cdc.gov/nchs/data/dds/2018/CCQDER-Cognitive-Interviewing.pdf).

For RSS-1, cognitive interviews for several questions were conducted after the survey was fielded. Because of this, cognitive interviews should be understood as an examination of the RSS-1 items' construct validities, or how well a question captures the intended measurement, rather than as a method to evaluate question wording. The cognitive interviewing report, including a question-by-question analysis, will be available in Spring 2024 on the RSS Data Files and Documentation page (<https://www.cdc.gov/nchs/rss/data.html>) and on Q-Bank (<https://wwwn.cdc.gov/qbank>). Data users should consult this report to understand what information the survey questions captured and to frame their own analysis of the RSS-1 data.

3. Methodology

This section describes the procedures used to collect and prepare RSS-1 data, including sample design, data collection, weighting, editing and imputation, and protection of respondent confidentiality.

3.1 Sample Design

This section describes the sample design for RSS-1. The target population of RSS-1 is all U.S. adults aged 18 and older.

As described in Section 1, the RSS uses two online panels: Ipsos KnowledgePanel and NORC AmeriSpeak. For RSS-1, two independent samples were collected from each panel.

3.1.1 Sampling Frames

These panels are based on probability samples of the population of U.S. households and are designed to serve as sampling frames for sample selection and production of national estimates. All members of both panels complete questions about demographics and household composition before participating in any surveys. Although both panels include individuals aged 13-17, these younger panelists are not included in the RSS-1 sample.

The KnowledgePanel has approximately 60,000 adults in 44,000 households. Panel members are primarily recruited using address-based sampling (ABS) methods. This panel is used to conduct surveys for researchers, governmental agencies (federal, state, and city), and commercial companies on a variety of topics including health, political, and consumer studies. For additional information see <https://www.ipsos.com/en-us/solutions/public-affairs/knowledgepanel>.

The AmeriSpeak Panel includes approximately 59,000 adults in 53,000 households. Panel members are recruited using ABS of U.S. households. It is used to conduct surveys for academic, commercial, nonprofit, and government organizations. In addition, a subset of about 26,000 adults in 23,000 households, referred to as AmeriSpeak Federal, was used as the sampling frame for one of the samples drawn for RSS (see below). This subset is designed to increase representativeness of the responding panelists. For additional information see <https://amerispeak.norc.org/us/en/amerispeak.html>.

3.1.2 Sample Selection

As mentioned previously, two samples were drawn from each panel for the purpose of evaluating two data collection methodologies. For each panel, Sample 1 was collected using standard protocols (method 1) and Sample 2 was collected using additional efforts to increase response rates and sample representativeness (method 2). This section describes the sample designs, and the data collection methodologies are described in Section 3.2. If a panel household had more than one active adult panel member, only one adult in the

household was selected to participate in the study. Table 3.1 summarizes the target sample sizes for each panel and sample.

Table 3.1. Number of Selected Panelists and Expected Completed Surveys by Panel and Sample

Panelists	KnowledgePanel		AmeriSpeak	
	Sample 1	Sample 2	Sample 1	Sample 2
Selected panelists	6,739	4,679	11,568	14,582
Expected interviews	4,000	3,094	3,000	3,100
Actual interviews	4,701	3,547	2,898	4,031

KnowledgePanel. A single sample was drawn from the KnowledgePanel using a probability proportional to size (PPS) sample selection method and then divided into two samples using a random number generator. The measure of size for the PPS selection is a KnowledgePanel weight that has been calibrated to population benchmarks from the 2022 March supplement of the Current Population Survey (CPS). The benchmarks include gender, age, race and ethnicity, education, census region, household income, homeownership status, metropolitan area, and Spanish language dominance. The target sample sizes were 4,000 for Sample 1 and 3,000 for Sample 2. Assuming a 60% completion rate and a 3% data cleaning rate (i.e., interviews that will not pass the data cleaning checks), 6,739 panelists were selected for Sample 1, and 4,679 were selected for Sample 2.

AmeriSpeak. For Sample 1, a probability sample was selected from the AmeriSpeak panel with a target sample size of 3,000 interviews. For Sample 2, a sample was selected from AmeriSpeak Federal, excluding any panelists selected for Sample 1, with a target sample size of 3,100 interviews. The AmeriSpeak Federal panel, a subsample of the AmeriSpeak Panel, has a higher percentage of invited households that received in-person nonresponse follow-up during the recruitment phase (40% compared to 20% in the AmeriSpeak Panel) and is expected to result in higher response rates. Both sampling frames were stratified by age, race/ethnicity, education, and gender. For Sample 1, the frame was stratified using two levels of education (Some college or less, Bachelor’s or above) while for Sample 2, the frame was stratified using three levels of education (Less than high school, Some college, Bachelor’s degree or higher) for the purpose of increasing the representation of individuals with lower educational attainment.

Sample allocation across the strata was determined such that the expected distribution of complete surveys matches that of census population benchmarks. To achieve the target number of interviews, 11,568 panelists were selected for Sample 1 and 14,582 for Sample 2. Historical completion rate by stratum was used to calculate the number of panelists to sample.

3.2 Data Collection and Completion Rates

Data collection was coordinated between NCHS and the panel providers to ensure that the samples collected from each were comparable. Protocols and completion rates for each sample and panel can be found in Section 3.2.2. Data collection for RSS-1 was conducted between August 1 and September 8, 2023 (Table 3-2).

Table 3.2. Data Collection Time Frame

Panel	Sample 1	Sample 2
KnowledgePanel	August 04–August 29, 2023	August 08–August 29, 2023
AmeriSpeak	August 01–August 23, 2023	August 01–September 08, 2023

3.2.1 Data Collection Protocols

Both panel providers used both web and telephone interviews for data collection. Table 3-3 outlines interview modes and recruitment protocols by provider and sample.

Table 3.3. Interviewing Modes and Recruitment Protocols by Panel and Sample

Mode	KnowledgePanel		AmeriSpeak	
	Sample 1	Sample 2	Sample 1	Sample 2
Data collection modes	Web	Web, phone, and phone-prompt	Web and phone	
Incentives	1,000 points (equivalent of \$1)		\$5 for web and \$10 for phone completes	
Collection Period	Three weeks		Two weeks	Four weeks
Protocol for recruitment	<ul style="list-style-type: none"> ▪ A prenotification email 2 days prior to fielding. ▪ Reminders on Days 3, 7, 11, 14, 18, and 20 for hard-to-reach groups,¹ otherwise reminders on Days 3, 14, 18, and 20. ▪ All reminders after Day 3 were customized with email text used only for this study. 		<ul style="list-style-type: none"> ▪ Five emails: one invitation and four reminders. ▪ Up to three call attempts per phone-preference case. 	<ul style="list-style-type: none"> ▪ Seven emails: one invitation and six reminders. ▪ Up to five call attempts per phone-preference case.

Mode	KnowledgePanel		AmeriSpeak	
	Sample 1	Sample 2	Sample 1	Sample 2
Additional nonresponse follow-up	None	Calls to nonrespondents ² on Day 11 of the field period. Up to five call attempts. For Group 1, a phone interview was attempted, for Group 2, a human caller prompted them to take the survey online. For both groups, voice messages were left prompting them to take the survey online.	None	Prenotification postcards to panelists with low cooperation rates in prior surveys, and to phone-preferred panelists. Reminder postcards to all nonrespondents after Day 10.

¹The hard-to-reach group is defined as young adults who are ages 18 to 29, are panelists of racial and ethnic minority groups, or are panelists with a high school or less education.

²Only nonrespondents who did not opt out of telephone calling and who are not on the do-not-call list.

Interviews for the KnowledgePanel Sample 1 were conducted solely by web while Sample 2 included some phone interviews. No nonresponse follow-up was conducted for Sample 1 while two nonresponse follow-up protocols were tested in Sample 2 (see Table 3-3). Sample 2 was randomly divided into two equal groups: (1) Group 1 phone interviews; and (2) Group 2 phone prompt whereby the participant was instructed that the online survey was still open and that their participation was desired. If unable to reach the intended participant directly, both groups received up to five call attempts; on the first, third, and fifth call attempts, participants in both Group 1 and Group 2 received voice messages requesting their participation—in Group 1, requesting participation either by phone interview or online, while in Group 2 they were requested to go online to participate.

Interviews for both AmeriSpeak samples were also primarily web-based; however, telephone interviews were used for panelists known to prefer completing surveys over the phone. AmeriSpeak Sample 2 received a higher level of recruitment effort and nonresponse follow-up than Sample 1. To maximize the number of telephone respondents in AmeriSpeak Sample 2 (to about 500 interviews), additional panelists were selected for telephone interviews from the full AmeriSpeak panel.

3.2.2 Completion Rates

The completed number of interviews for all samples were close to or above the sample size targets, as shown in Table 3-4. A longer data collection period is being considered for AmeriSpeak’s Sample 1 in future rounds to improve the likelihood reaching the target number of completed surveys. Table 3-5 lists the number of sampled, interviewed, partially interviewed, and nonrespondent panelists for each sample. Unweighted completion rates

were 69.8% for Sample 1 and 72.2% for Sample 2 among KnowledgePanel panelists, and 25.1% for Sample 1 and 27.6% for Sample 2 among AmeriSpeak panelists (Table 3-5).

Final weighted response rates that reflect not only the survey completion rate but also the panel recruitment and retention rates are reported elsewhere

(<https://www.cdc.gov/nchs/data/rss/quality-profile.pdf>).

Table 3.4. Target and Actual Number of Interviews by Sample and Mode

Interviews	KnowledgePanel		AmeriSpeak	
	Sample 1	Sample 2	Sample 1	Sample 2
Target number of interviews				
Total	4,000	3,094	3,000	3,100
Web	4,000	2,634	2,800	2,600
Phone		230	200	500
Phone-prompt		230		
Actual number of interviews				
Total	4,701	3,547	2,898	4,031
Web	4,701	3,511	2,761	3,165
Phone		36	137	866

Table 3.5. Sample Counts and Completion Rates, by Panel and Sample

Panel	Sample	Sample size	Respondents		Non-respondents	Completion Rate (%) ¹
			Complete	Partial		
Overall	Overall	37,568	15,177	462	21,929	40.4
	Sample 1	18,307	7,599	234	10,474	41.5
	Sample 2	19,261	7,578	228	11,455	39.3
KnowledgePanel	Overall	11,418	8,248	285	2,885	72.2
	Sample 1	6,739	4,701	163	1,875	69.8
	Sample 2	4,679	3,547	122	1,010	75.8
AmeriSpeak	Overall	26,150	6,929	177	19,044	26.5
	Sample 1	11,568	2,898	71	8,599	25.1
	Sample 2	14,582	4,031	106	10,445	27.6

¹ The unweighted survey completion rate uses the AAPOR RR5 response rate definition (AAPOR, 2023).

3.3 Editing and Imputation

A key component of RSS is combining data from two panels into one analytic dataset. This section describes edit and imputation steps performed on the combined dataset. Both panel providers followed the same guidelines to standardize their datasets. In cases where there

were differences between the datasets, such as for the panel profile variables, the data were standardized by aligning the variables' names, value labels, and value coding.

3.3.1 Open-Ended Coding

Open-ended responses were reviewed in an "upcoding" process to determine whether the text response could be coded into a preexisting response option. If a text response was identified, the data were edited as follows:

- Responses were upcoded into their respective preexisting response value.
- If an open-ended response is repeated by participants and comprises more than 5% of the eligible respondents, then a new response category or response flag variable was created with the next logical name in the variable name series incrementing upward.

For RSS-1, sponsored OMB race questions were asked which included opportunities for verbatim responses (Section 2.3). If an open-ended response identified additional races/ethnicities that were not previously selected, those responses were upcoded into preexisting variables.

The racial groupings listed in Appendix F of the [2020 Census National Redistricting Data Summary File](#) were used as a guide for categorization for racial groups and subgroups.

The variables *DEM_<RACE>_C7* related to *Another <race> group...* were reviewed for upcoding, where *<RACE>* is one of White, Hispanic, Black, Asian, Middle Eastern/North African, and Native Hawaiian/Pacific Islander. The variable *DEM_AIAL* referring to the American Indian/Alaska Native group is an open-ended question with no corresponding closed-ended question; as a result, there was no upcoding performed into preexisting categories. However, text responses for *DEM_AIAL* were reviewed for frequent responses (>5% of eligible respondents) for the creation of new variable flags and to provide a count of total number of race/ethnicities that were provided for this group. The variables *DEM_RACE_C1 – DEM_RACE_C7* and *DEM_<RACE>_C1 – DEM_<RACE>_C6* could receive an upcoded value based on the other specified responses. The original responses were preserved and cases which were upcoded into preexisting categories received a value of "2" to indicate the response was upcoded as opposed to a respondent-provided response.

Additionally, to support the computation of derived variables (*DEM_<RACE>_N*) that indicate the total number of race/ethnicities for each racial group provided by the participant, open-ended text was reviewed to identify how many responses were provided in the text field (e.g., the text response "Czech and Dutch" counts as two additional responses, rather than just one). Upcoded responses are only counted once in the computed totals.

All variables associated with this content, including verbatim responses, are available on the restricted-use data file (see Section 4 for a description of data products).

3.3.2 Missing Data Imputation

Variables used for calibrating the harmonized analysis weights were imputed if data were missing. Of the 12 variables used for calibration, 6 had missing values and were imputed: 2 panel variables (Race and Hispanic origin, and Metropolitan status) and 4 composite variables derived from questionnaire variables (Marital status, Ever diagnosed with high cholesterol, Difficulty participating in social activities, and Civic engagement). These imputed variables are included in the data files (Section 4.1), along with imputation flags which use the naming convention: *<variable name>_IFLG*. See Section 3.4 for additional details about the weighting variables and weighting procedures.

Missing values were singly imputed using the fully conditional specification approach with SAS PROC MI (SAS Institute, 2015). The imputation models used the default discriminant functions for classification variables and the predictor variables included all 12 weighting variables and the sample design variables (i.e., strata and cluster). Imputation rates ranged from 0.2% to 1.5%.

Additional missing data imputation was conducted by the panel providers prior to data harmonization. The panel providers first performed imputation required to calculate their respective panel-specific analysis weights. These variables include panel variables associated with age, gender, race/ethnicity, income, and homeownership.

3.4 Sample Weights

Each panel provider produced weights for (1) analysis of Sample 1 data, and (2) analysis of concatenated Sample 1 and Sample 2 data. Section 3.4.1 describes these weights, and Section 3.4.2 describes the creation of a weight for analyzing data from both panel providers at once. Section 3.4.3 describes the calibration methodology. The panel providers produced additional weights that were not recalibrated but are available in the RUF. Additional information about the weights available in the RUF and public-use file (PUF) is provided in Section 4.2.

3.4.1 Panel-Specific Analysis Weights

Each panel provider computed calibrated weights for analysis of Sample 1 and for analysis of concatenated Sample 1 and Sample 2 data. Each set of weights was then scaled to the total population of U.S. adults aged 18 or more as estimated by the first quarter of the 2023 NHIS.

KnowledgePanel. The base weights for KnowledgePanel are modeled design weights that account for their most common observed patterns of nonresponse. These are calibrated to population totals for subgroups defined by race and ethnicity, education, household income, Spanish language proficiency, gender by age, and Census region by metropolitan status.

These totals are obtained from the March 2022 Supplement of the CPS, except for language proficiency, which comes from the 2021 ACS.

AmeriSpeak. Base weights are created using weights developed for the full AmeriSpeak panel, adjusted for unequal sample selection probabilities and frame coverage limitations. The base weights are adjusted for survey nonresponse using a weighting class method, with weighting classes defined by age, race and ethnicity, gender, and education. A raking ratio adjustment is then applied to align the sample with population benchmarks from the March 2022 Supplement of the CPS, including age, gender, Census division, race and ethnicity, education, age by gender, age by race and ethnicity, and gender by race and ethnicity.

The final panel-specific weights (*P1_CALWT_M1* and *P1_CALWT_M12*, *P2_CALWT_M1* and *P2_CALWT_M12*) for analysis of RSS-1 data were obtained by calibrating the panel-provided weights to population totals from NHIS, given in Table 3-5.

3.4.2 Combined Weight for Sample 1

A composite calibrated weight was calculated for analysis of the concatenation of Sample 1 from both panel providers. The composite calibrated weight, *WEIGHT_M1*, was calculated as a composite version of the final panel-specific calibrated weights (Section 3.4.1):

$$P1_CALWT_M1 * \lambda_1 + P2_CALWT_M1 * (1 - \lambda_1).$$

The adjustment factor λ_1 is a ratio of the effective sample sizes and is defined as:

$$\lambda_1 = \frac{n_{e,1}}{n_{e,1} + n_{e,2}}$$

where $n_{e,i}$ is the effective sample size for the respondent sample from the respective panel *i* calculated as:

$$n_{e,i} = \frac{(\sum_s w_k)^2}{\sum_s w_k^2}$$

where *s* is the total number of respondents from the panel, and w_k is the calibrated weight for the *k*th respondent. See Table 3.6 for values of $n_{e,i}$ and λ_1 .

Weighted estimates (using *WEIGHT_M1*) from the combined data of NORC (Sample 1) and Ipsos (Sample 1) match the calibration totals from NHIS in Table 3.7.

Table 3.6 Sample Size, Effective Sample Size and Composite Factor by Panel Provider Sample 1

Panel Provider	<i>n</i>	$n_{e,i}$	λ
NORC	2,898	1365.93	0.271
Ipsos	4,701	3675.10	0.729

Table 3.7. Calibration Variables and Their 2023 Q1 NHIS Estimated Population Totals (estimated population size = 257,463,254)

Variable	Total
Age	
18-34	75,104,258
35-49	62,680,878
50-64	62,090,869
65+	57,587,249
Sex	
Male	125,654,228
Female	131,809,026
Race and Hispanic Origin	
Hispanic	44,875,623
Non-Hispanic white	159,339,969
Non-Hispanic black	32,422,939
Non-Hispanic other	20,824,723
Education	
Less than high school	27,882,818
HS degree or equivalent	70,178,837
Some college or above	159,401,599
Region	
Northeast	45,273,006
Midwest	53,211,378
South	98,132,787
West	60,846,083
Home Ownership	
Own or buying	178,451,659
Rent/other	79,011,595
Marital Status	
Married	132,034,491
Not married	125,428,763
Ever Diagnosed with High Cholesterol	
Yes	73,993,961
No	183,469,293
Difficulty Participating in Social Activities	
No difficulty/some difficulty	246,196,640
A lot of difficulty/cannot do	11,266,614
Civic Engagement	
Yes	162,917,151
No	94,546,103
Metropolitan Status	
Metropolitan	221,824,957
Nonmetropolitan	35,638,297
Household Income	
< \$50,000	82,811,730
\$50,000 - < \$100,000	75,348,032
\$100,000 +	99,303,492

3.4.3 Weight Calibration Methodology

The procedure WTADJUST in SUDAAN (RTI International, 2012) was used for all weight calibration. Starting with a respondent data set S containing weights scaled to the population size, WTADJUST generates adjustment factors $\{\alpha_k\}$ that convert the scaled weights $\{d_k\}$ into calibrated weights $\{w_k\}$, that is to say, $w_k = d_k\alpha_k$. Given a vector of calibration variables, \mathbf{z}_k (the levels of the categorical variables in the table above are converted into dummy variables) and a vector of totals for those variables, \mathbf{Z}_k , the w_k are chosen to solve the calibration equation,

$$\sum_{k \in S} w_k \mathbf{z}_k = \sum_{k \in S} d_k \alpha_k \mathbf{z}_k = \mathbf{Z}_k,$$

given adjustment factors with an appropriate β having the form:

$$\alpha_k = \alpha(\mathbf{g}^T \mathbf{z}_k) = \frac{\frac{u}{u-1} \exp\left(\frac{u}{u-1} \beta^T \mathbf{z}_k\right)}{1 + \frac{u}{u-1} \frac{\exp\left(\frac{u}{u-1} \beta^T \mathbf{z}_k\right)}{u}},$$

where $u > 1$ is the upper bound for the adjustment factors. This is a generalization of the raking algorithm. Under that algorithm u is effectively set to infinity. In practice, u is set by judgment with the aim of reducing the variability of the adjustment factors and by doing that the final weights. Here the choices for u had little impact on the variability of the adjustment factors. The value of u was set to 9 for all four respondent samples (i.e., Sample 1 and the concatenation of Samples 1 and 2 for both Ipsos and NORC).

3.5 Confidentiality

NCHS is required to follow Section 308(d) of the Public Health Service Act (42 U.S.C.m(d)), which forbids disclosure of any information that may compromise the confidentiality promised to survey respondents. In addition, confidentiality protections are mandated by the Confidential Information Protection and Statistical Efficiency Act of 2018 (Title III, Public Law No.115-435).

When releasing data files to the public, NCHS takes steps, including disclosure analysis and a formal review process, to minimize the likelihood that individuals participating in RSS can be identified. As a result, some information in the PUF is suppressed or coarsened to protect the confidentiality of respondents. Users wishing to analyze more detailed data may request access to the RUF, described in Section 4.1. For information about procedures for accessing NCHS restricted-use data, see <https://www.cdc.gov/rdc/>.

4. How to Use RSS Data

This section describes the data files available from RSS-1, their contents, and appropriate use, including variance estimation that accounts for the sample design.

4.1 Available Files

The following data files and codebooks are available to researchers in an NCHS Research Data Center:

- RUF in SAS and CSV format. This file combines records for all sampled panelists, across all samples, for a total of 15,177 records.
- SAS import code for RUF.
- Codebook for RUF with frequencies.

The following data files and codebooks are publicly available:

- PUF in SAS and CSV format. This file combines respondent records from Sample 1 in each panel, for a total of 7,599 records.
- SAS import code for PUF.
- Codebook for PUF with frequencies.
- Codebook for RUF without frequencies.

Indicators are provided in each dataset to distinguish which sample or panel each record came from. The codebooks contain information on all variables in the corresponding dataset (public or restricted use). In addition to the variable name and label, frequency tables are provided for categorical variables and summary statistics are provided for numeric variables.

The PUF contains a subset of variables from the RUF, and some variables have been modified to protect the confidentiality of respondents (Section 3.5). Because they were collected using experimental methods, responses from Sample 2 in each panel were not used to produce published RSS-1 estimates and are not available in the PUF. The RUF contains variables not in the PUF, and for some variables, finer categories. Sample 2 data are available in the RUF, along with weights for analyzing the combined samples. Section 4.2 discusses which weights to use for which analyses. The RUF codebook without frequencies provides additional information about the RUF contents for researchers interested in requesting access to the RUF.

4.1.1 Organization of the Data Files

Each dataset and codebook first presents the panel profile characteristics, followed by questionnaire variables as they appear in the questionnaire. This is followed by paradata, recoded variables, and weighting variables.

Codebook descriptions of recoded variables provide the source variable name. The universe for these variables can be found in the questionnaire (<https://www.cdc.gov/nchs/data/rss/questionnaire.pdf>).

4.1.2 Variable Naming Conventions

The following naming conventions are used in the data files:

Questionnaire Variables. Questionnaire variables are labeled with a prefix associated with the section of the questionnaire they appear in (e.g., questions about cancer screening have the prefix *CAN_*). For questions that allow for multiple selected responses (e.g., “Select all that apply”), responses are coded as binary flags (0 or 1) for each possible response option and follow the format *<VariableName>_<ChoiceNumber>* (e.g., *CAN_BDENSINF_C1*, *CAN_BDENSINF_C2*). Derived variables that use multiple variables or produce a conceptually separate measure from the questionnaire variables are given a new name based on underlying construct (e.g., using Height and Weight to compute BMI).

Panel Variables and Paradata. These variables are identified with a prefix depending on their source:

- *P_* indicates the variable is common to both providers or has been harmonized across the panels.
- *P1_* and *P2_* indicate the variable is specific to one panel provider.

Recoded Variables. If there is recoding that transforms the variable response categories (e.g., *AGE* [continuous] to *AGE_R* [categorical grouping of *AGE*]), a new variable is created with the suffix *_R*. If multiple recodes are performed on the same variable, a brief descriptive abbreviation is added to the *_R* to make a unique variable name, for example, *P_AGE* (continuous) to *P_AGE_R5* (5 level categorical grouping of *AGE*) and to *P_AGE_R7* (seven-level categorical grouping of *AGE*).

Imputed Variables. If a variable has been imputed (Section 3.3), a flag is created to indicate which values were imputed. The naming of the flag uses the naming convention *<varname>_IFLG*. All imputation flags are defined such that:

- 0 = no imputation;
- 1 = logical assignment; and
- 2 = statistical imputation.

4.1.3 Missing Values and Reserve Codes

The following reserve codes are used for all questionnaire variables where they apply:

- -5 = Edited response due to invalid logic, out of range responses, or identified outlier;
- -6 = Skipped question/Implied refusal;

- -7 = Explicit refusal (telephone interview);
- -8 = Question not asked (legitimate logical skip/out of universe); and
- -9 = Don't know.

4.2 Analyzing RSS Data

Sample weights are required for any analysis using RSS-1 data. Survey analysis software that can compute Taylor series variance estimates should be used to account for the complex sample design (Section 4.2.1). Sample weights are provided in both the RUF and PUF, along with strata and primary sampling unit (PSU) for variance estimation. The PUF includes three weights for analysis of Sample 1 data:

- *WEIGHT_M1* for analysis of Sample 1 from both panel providers combined. This is the weight which was used to generate estimates in NCHS dashboards and web tables.
- *P1_CALWT_M1* and *P2_CALWT_M1* for analysis of Sample 1 by panel provider.

The RUF dataset includes the above weights and the following:

- *P1_CALWT_M12* and *P2_CALWT_M12* for analysis of combined Sample 1 and Sample 2 by panel provider.

In addition, the RUF contains all weights and components produced by the panel providers, including base weights and weights for subsamples, such as NORC's federal sample, or Ipsos' computer-assisted telephone interview sample. Additional information about these weights is available in the RUF codebook.

4.2.1 Variance Estimation

Users of the PUF and RUF should use the Taylor series linearization method to estimate variances. Sample design variables are provided in the data files for this purpose. This method requires the use of statistical software with this functionality. Table 4-1 provides examples of how to specify the sample design for variance estimation in five statistical software packages when using *WEIGHT_M1*. The same strata and PSU variables should be specified when panel-specific weights are used.

A few strata have only a single PSU, making traditional variance estimation impossible because the variance contribution from these strata cannot be computed (variance is computed as the sum of the strata-level variances). There are a variety of approaches for handling this. In Table 4-1, the examples shown for SUDAAN, Stata, and R's survey package use the same approach as used for variance estimates reported for RSS-1, which may overestimate variances slightly; by contrast the approach used by SAS and SPSS may underestimate variances slightly. Some statistical software packages provide users with multiple options; refer to software documentation for additional information. In practice, the choice of approach is unlikely to be important unless estimating the variance of a total, in which case users should exercise more caution in the choice of approach.

Table 4.1. Examples of Variance Specification in Statistical Software

Software	Design Specification
SUDAAN	DESIGN = WR WEIGHT WEIGHT_M1; NEST P_STRATA P_PSU/ MISSUNIT;
Stata	svyset P_PSU [pweight = WEIGHT_M1;], strata (P_STRATA) vce(LINEARIZED) singleunit(centered)
SAS survey data analysis procedures	VARMETHOD = TAYLOR WEIGHT WEIGHT_M1; STRATA P_STRATA; CLUSTER P_PSU;
IBM SPSS complex samples	CSPLAN ANALYSIS /PLAN FILE='myfile.csplan' /PLANVARS ANALYSISWEIGHT= WEIGHT_M1; /DESIGN STRATA= P_STRATA CLUSTER= P_PSU /ESTIMATOR TYPE=WR
R survey package	mydesign<-svydesign(id=~ P_PSU, strata=~ P_STRATA, weights=~ WEIGHT_M1;, data=mydata) options(survey.lonely.psu="adjust")

4.2.2 User Cautions

The RSS is not designed for longitudinal analyses. Although additional rounds are forthcoming, users should not combine data from multiple rounds.

The RSS was not designed to replace national health surveys. Benchmarking variables in RSS were obtained using questions from other surveys and were collected for benchmarking and calibration purposes only. Because of the potential for increased bias associated with online panels, the population estimates from these other surveys are still considered gold standard prevalence estimates. However, corresponding RSS estimates are useful for methodological purposes including benchmarking and studies of online panels.

Users of the PUF are cautioned against analyzing and interpreting near zero or low prevalence outcomes and estimates based on small sample sizes. PUF users are encouraged to implement suppression criteria to eliminate estimates considered to have low precision. See [NCHS Vital and Health Statistics, Series 2, Number 175, August 2017 \(cdc.gov\)](#) and [Vital and Health Statistics, Series 2, Number 200 \(cdc.gov\)](#) for more detail on NCHS data presentation standards for proportions and rates.

4.3 Strengths and Limitations

RSS has notable strengths and significant limitations, which affect its suitability for different uses.

The primary strength of the RSS is its ability to produce data of known quality about key public health issues in a timely manner. By contrast, large-scale national surveys with well-established quality measures require more time to collect and release data, making them less able to adapt to time-sensitive needs. With multiple rounds each year, the RSS will provide ample opportunities for new topics to be explored. Questions that might not be appropriate for other surveys (e.g., opinions, beliefs, stated preferences, and hypotheticals) can be asked in the RSS. The RSS can also be used for methodological work. For example, if there is a need for data on topics for which questions have not gone through rigorous testing, the RSS can be used to test and improve measurement of the underlying constructs.

Although much faster than in-person surveys, online panel surveys face different threats to accuracy and usability. Online panel surveys often have lower response rates than large-scale national surveys and may underrepresent certain subpopulations, increasing the potential for nonresponse bias. Panel survey nonresponse occurs at many stages, including panel recruitment, panel retention, and at the individual survey level. The RSS aims to compensate for nonresponse through calibration and weighting of the RSS to gold standard NCHS surveys. However, the effectiveness of these weighting adjustments for nonresponse may vary across survey estimates and will depend on the availability of appropriate gold standard survey data. The RSS also includes a benchmarking component to facilitate bias assessments for a wide array of health-related estimates. These bias assessments will provide context on the effectiveness of the weighting adjustments and quality of estimates generated from RSS. Please see the Quality Profile (<https://www.cdc.gov/nchs/data/rss/quality-profile.pdf>) for the results of initial quality evaluation.

Another limitation is that some of the demographic covariates, or profile variables collected by the panels separately from RSS, are collected at different times and using different questions in each panel. Although the two panels may have collected their profile data using different questions, wherever possible, RSS provides harmonized profile variables. Although they are updated regularly, it is not known whether any of these characteristics had changed between the last time the panel collected the information and the respondent completed the RSS-1 questionnaire. Throughout each round of the survey, NCHS uses its best judgment to determine when the profile variables questions asked of each panel's members are comparable enough to be used and when questions with consistent wording should be added to the survey.

References

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