Quality Profile, Rapid Surveys System Round 1

National Center for Health Statistics
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Introduction

The National Center for Health Statistics (NCHS) Rapid Surveys System (RSS) is a platform that utilizes commercially available probability-based online panels to provide time-sensitive data about emerging and priority health concerns. RSS data differ in quality from NCHS' traditional household surveys and findings should be interpreted within this context. This quality profile reports on various aspects of data quality for the first round of RSS and provides transparency to data users about data collection, processing, and methodological limitations that may increase the risk of bias in RSS estimates. The quality profile is organized by various components of the data quality including data collection, data processing, weighting, and benchmarking.

RSS Round 1 (RSS-1) featured data collection from two commercial panels, which are referred to anonymously as Panel 1 and Panel 2 in this report. A separate document, the Round 1 Survey Description, which provides detailed information on the data collection weighting methodologies, recoding and other data processing components is available at: https://www.cdc.gov/nchs/data/rss/survey-description.pdf.

Data Collection

Sampling and Data Collection Dates

The target population of RSS-1 is U.S. adults ages 18 and older. Each panel provider drew two independent samples from their respective panels for RSS-1 to conduct data collection using both standard protocols and additional efforts to increase response rates and representativeness of the sample (https://www.cdc.gov/nchs/data/rss/survey-description.pdf). This report will focus on the data collection using standard protocols (method 1), as these data were used in the production of web table and dashboard estimates released for RSS-1 (https://www.cdc.gov/nchs/rss/rss-topics.html).

Table 1 presents the targeted sample size, the number of persons sampled, and the number of respondents, overall and by panel provider for the standard data collection. The target number of completed surveys was 3,000 for Panel Provider 1 and 4,000 for Panel Provider 2. To achieve the targeted number of completed interviews, samples of 11,568 (Panel Provider 1) and 6,739 (Panel Provider 2) adult panelists were drawn.

Data collection commenced on August 1, 2023, and finished on August 23, 2023, for Panel Provider 1. Data collection for Panel Provider 2 started on August 4, 2023, and finished on August 29, 2023. Of the 2,898 fully completed interviews for Panel Provider 1, 137 were completed by computer-assisted telephone interviewing (CATI), while all other completed interviews were self-administered via computer-assisted web interviewing (CAWI). For Panel Provider 2, all 4,701 interviews were completed via CAWI.

Response and Completion Rates

The survey completion rates shown in Tables 2 and 3 are based on American Association for Public Opinion Research (AAPOR) Response Rate Definition #5 or AAPOR RR5 (AAPOR, 2023), and reflect the

percent of sample members who completed the survey. All panelists selected for the survey, for both panels, were deemed eligible to participate. Note that survey completes exclude any cases removed for data quality reasons (e.g., speeding, excessive item nonresponse).

The unweighted, combined survey completion rate for RSS-1 was 41.5% (Table 2). However, rates by panel provider differed: 25.1% for Panel Provider 1 and 69.8% for Panel Provider 2. In part, this is due to Panel Provider 1 including currently active and inactive panelists in their sample to meet the goal of 3,000 completes. Panelists are considered currently active if they participated in at least one survey in the past 6 months and are not removed from Panel Provider 1's panel unless requested (temporarily or permanently). Given anticipated lower completion rates among inactive panelists, 11,568 panelists were sampled overall. Alternatively, Panel Provider 2 removes inactive panelists from their panel, which may explain the smaller overall sample selected (n=6,739) to reach their target of 4,000 completed surveys.

Final cumulative response rates (AAPOR CUMRR1) for RSS-1 are also shown in Table 2. Panel providers 1 and 2 compute the cumulative response rate differently. For Panel Provider 1, the final cumulative response rate of 4.1% is the product of a household panel recruitment rate, a household panel retention rate, and the RSS-1 survey completion rate. The final cumulative response rate for Panel Provider 2 was 4.0% and is the product of a household panel recruitment rate, a household profile rate, and the RSS-1 survey completion rate. (See Table 2 for definitions of household panel recruitment rate, household panel retention rate, and household profile rate.)

Unweighted completion rates, overall and by select demographic characteristics, are presented in Table 3. Note that the subsequent comparisons of completion rates by panel provider were not subjected to tests for statistical significance. While completion rates are consistently higher for Panel Provider 2, patterns of completion rates by demographics are similar across the panel providers. For example, adults 65 years of age and older generally had the highest completion rate of all age groups for both providers, while adults aged 18-34 generally had the lowest completion rate. Large differences in completion rates by race and Hispanic origin are observed for both providers, with White, non-Hispanic adults tending to have the highest completion rates and Hispanic adults having the lowest. Differences in completion rates by educational attainment are also observed for both panel providers. Adults with a bachelor's degree or more tended to have the highest completion rates, while adults with less than a high school diploma or a GED tended to have the lowest completion rates. Completion rates by sex differed by panel provider, with females generally completing the survey at a higher rate than males for Panel Provider 1, while males tended to complete the survey at a higher rate than females for Panel Provider 2. Finally, the survey completion rate for nonmetropolitan panelists tended to be higher than for metropolitan panelists for Panel Provider 1, while the opposite was observed for Panel Provider 2 (although the difference between metropolitan and nonmetropolitan panelists was less than two percentage points).

Survey Duration

As shown in Table 4, the median survey completion time among respondents who completed interviews in one visit to the survey instrument was 12.0 minutes for Panel Provider 1, while the median completion time for Panel Provider 2 was 12.6 minutes. Completion times were only evaluated among respondents who completed interviews in a single visit, as survey durations were calculated from the initial entry into the instrument until the survey was submitted, which could be over multiple days for respondents who return to the instrument at another time. Completions in a single visit accounted for 89.0% of all completed surveys. Section times were largely consistent between panel providers, with

only three sections requiring more than 1 minute, on average, to complete: Long COVID (CVL), healthcare access and utilization (ACC), and sunscreen safety (SUN). A complete list of all questionnaire sections can be found here: https://www.cdc.gov/nchs/data/rss/questionnaire.pdf.

Survey Breakoffs

Survey breakoffs for RSS-1 were defined as starting, but not fully completing, the survey. Panelists who broke off and did not fully complete the survey were considered nonrespondents for response and completion rate calculations and were not included on the final datafile. Overall, breakoffs were minimal across the two panel provider surveys. There was a total of 71 breakoffs (out of 2,969 panelists who started the survey) in the Panel Provider 1 survey, representing a breakoff rate of 2.4%, while 163 panelists (out of 4,864) broke off the Panel Provider 2 survey for a breakoff rate of 3.4%.

The number and percentage distribution of breakoffs by section for each panel provider and combined are presented in Table 5. For both panel providers, the largest percentage of breakoffs occurred in the introductory portion of the survey up through the first question on self-reported health status (HIS): 19 of 71 breakoffs for Panel Provider 1 (26.8%), and 68 of 163 breakoffs for Panel Provider 2 (41.7%). Combined, 37.2% of breakoffs occurred at the outset of the survey. Once in the survey, questions on healthcare access and utilization (ACC section) produced the next highest percentage of total breakoffs for Panel Provider 1 (12.7%), while 11.7% of all breakoffs for Panel Provider 2 occurred in the intimate partner violence (IPV) section. For both sections, most breakoffs occurred at the first question.

Item Nonresponse

Item nonresponse for RSS-1 was defined as don't know or refused responses entered by interviewers in the CATI mode, as well as skipping a question for which the panelist was eligible (soft refusal) in CAWI. Table 6 summarizes the number and percent of questions by level of item nonresponse. Of the 144 survey items, most questions had an item nonresponse rate of less than 1% for Panel Provider 1 (56.9%), Panel Provider 2 (54.9%), and in the combined file (51.4%). Very few questions had item nonresponse of 5% to less than 10% or greater than 10%.

Table 7 provides more detailed item nonresponse rates for the panel providers by questionnaire section (https://www.cdc.gov/nchs/data/rss/questionnaire.pdf). Overall, item nonresponse rates across all items were low, averaging 1.2% per item in the combined datafile, 1.1% for Panel Provider 1 and 1.2% for Panel Provider 2 (Table 7, TOTAL row).

For both panel providers, the section on ventilation (VEN) produced the highest rate of item nonresponse (Panel Provider 1=4.9%, Panel Provider 2=4.6%). Of the 14 items (when combining Panel Provider 1 and Panel Provider 2 data) with item nonresponse in excess of 5%, 6 are in the VEN section: some other reason for why the respondent uses a portable air cleaner or air purifier in their home (VEN_ACOTHER, 5.3%); do not use a portable air cleaner or purifier with a HEPA filter because a HEPA unit or filter couldn't be found in stores or online (VEN_HPNOFIND, 5.6%); do not use a portable air cleaner or purifier with a HEPA filter for some other reason (VEN_HPNOOTH, 5.9%); do not use a portable air cleaner or purifier with a HEPA filter because HEPA filter units are too noisy (VEN_HPNOLOUD, 6.8%); do not use a portable air cleaner or purifier for some other reason (VEN_ACNOOTH, 7.5%); and whether or not any portable air cleaners or purifiers in the home use a HEPA filter (VEN_HEPAUSE, 27.9%).

Of the remaining items with nonresponse rates greater than 5%, six are in the race and ethnicity (DEM) section and two are in the body mass index (BMI) section. The DEM items are primarily text fields where the respondent could type in a race, while the two BMI items captured height in centimeters and weight in kilograms. For seven of the eight items, no more than 183 respondents were in universe.

The primary concern with high item nonresponse is the risk of nonresponse bias, which leads to incorrect survey estimates (Yan, 2021). Item nonresponse also increases the variance of a point estimate since the observed sample size is smaller than initially planned. For items with moderate to high item nonresponse (e.g., rates > 5%), data users may want to compare item nonrespondents to those who responded using other, more complete, sociodemographic and health variables on the file. If differences exist, the point estimate for the item under investigation may be biased. Data users may want to consider imputing the missing values or at least reporting the potential for bias in the estimate derived from the variable.

Summary

- Panel Provider 1 came up just short of their completion target for RSS-1 (target=3,000; completes=2,898), while Panel Provider 2 exceeded their target (target=4,000; completes=4,701). The result was a final combined sample (n=7,599) that exceeded the targeted number of completed interviews by 599 respondents.
- Panel Provider 2 had a higher overall completion rate than Panel Provider 1. However, similar patterns of completion rates were observed for both providers by select demographic characteristics such as age, race and Hispanic origin, and educational attainment.
- Survey completion time was largely consistent between the two panels, overall and by questionnaire section.
- Survey breakoff rates were low for both providers, albeit slightly higher for Panel Provider 2. The largest percentage of breakoffs for both providers occurred during the survey introduction or first question (self-reported health status). Sections on health care access and utilization and intimate partner violence produced the next highest breakoff rates.
- Item nonresponse rates were low for both panel providers, with just over 50% of items having an item nonresponse rate of less than 1%. Less than 5% of all items had a double-digit item nonresponse rate, mostly from the ventilation (VEN) and race and ethnicity (DEM) sections. As noted previously, data users may want to investigate these items further for potential nonresponse bias.

Question Evaluation

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.

Data Processing

Removed Interviews

Both panel providers applied standardized data cleaning procedures to the set of completed interviews to remove low-quality responses. Speeders and respondents with high refusal rates were removed. Speeders are defined as those who completed the survey in or less than one-quarter of the median duration and respondents with high refusal rate are those who skipped or refused to respond to more than 50% of the eligible questions. Table 8 reports the total speeders and respondents with high refusal rates as well as the percent of interviews removed by panel provider.

Harmonization

Data harmonization was performed to align the variables provided by the two panel providers. Harmonization includes aligning the variable labels and corresponding code for responses across the two panel providers as well as aligning the variable types. While most differences were resolved, notable discrepancies are listed below:

- For Panel Provider 1, legitimate skips on the survey questions as well as nonresponse due to break off are both coded using SAS system missing. For Panel Provider 2, legitimate skips are coded as –8 while break offs are coded using SAS system missing.
- For Panel Provider 1, the survey mode (P_MODE) is missing for panelists who broke off and did not complete the survey. For Panel Provider 2, P_MODE is missing for panelists who never attempted the survey.
- For the experimental race and ethnicity questions fielded on the questionnaire with an open-ended response, Panel Provider 1 required panelists who selected the response option "other" to type in the response while Panel Provider 2 allowed the panelist to select "other" without providing any additional detail in the text box (allowed missing). This applies to variables DEM_ASIAN_C7TXT, DEM_BLACK_C7TXT, DEM_HISP_C7TXT, DEM_MENA_C7TXT, DEM_NHPI_C7TXT, DEM_WHITE_C7TXT, and DEM_AIAL (see codebook, https://www.cdc.gov/nchs/data/rss/codebook.pdf).

Imputation

Variables used for weighting adjustments were imputed prior to weighting in two stages. First, the panel providers imputed variables needed for their own weighting procedures. Panel Provider 1 imputed missing panel data first logically, if household or other information was available, and then used hot deck imputation. Panel Provider 2 used hot deck imputation for imputing missing values in panel data. Second, after the data were delivered to NCHS, remaining panel and non-panel variables required for weight calibration to the National Health Interview Survey (NHIS) were imputed for respondents using conditional mean imputation. The weighting procedures to calibrate each panel provider's weights to NHIS totals on the selected variables are described in the survey description document: https://www.cdc.gov/nchs/data/rss/survey-description.pdf.

Table 9 reports the percent of missing values imputed in the two stages. While imputed values for the variables from the second stage imputation are not reflected on the data file, values imputed by the

panel providers in stage 1 appear on the data file. The corresponding imputation flags can be used to identify imputed values. Data users should consider the potential underlying measurement error of these variables when using them in analyses.

The imputed variables were used only for weighting to the NHIS. No other variables were imputed in the RSS-1 data.

Summary

- Data cleaning procedures were applied to remove low-quality responses. Overall, 1.0% of RSS-1 records were removed due to speeders or respondents with high refusal rates.
- Data from the two panel providers were harmonized prior to release. However, due to discrepancies between variable definitions from the two panel providers, users should note differences when conducting analyses on: P_MODE, DEM_ASIAN_C7TXT, DEM_BLACK_C7TXT, DEM_HISP_C7TXT, DEM_MENA_C7TXT, DEM_NHPI_C7TXT, DEM_WHITE_C7TXT, and DEM_AIAL.
- Variables were imputed by the panel providers for their internal weighting procedures and in post-processing for weighting to the NHIS. The percent of values imputed ranged from 0.0% to 2.5%. Imputation flags can be used to identify imputed values in the data file.

Weighting

At the conclusion of data collection, each panel provider developed final study weights that included calibration to select population control totals. Note that control totals varied somewhat by panel provider. Panel Provider 1, for example, calibrated to 2022 Current Population Survey (CPS) March Annual Social and Economic Supplement (ASEC) estimates for age, sex, Census division, and race and Hispanic origin. Panel Provider 2 calibrated to these same variables along with educational attainment, household income, Census region and language proficiency. The weighted control total for language proficiency came from the 2021 American Community Survey (ACS), while all other totals were obtained from the March 2022 ASEC Supplements to the CPS.

Next, each of the RSS-1 panel provider weights were separately calibrated to control totals based on the 2023 Quarter 1 NHIS Early Release (ER) Datafile for adults and then combined. In total, 12 variables producing 32 control totals were included in this weight calibration step (see Table 10). In addition to standard sociodemographic measures (age, sex, race and Hispanic origin, educational attainment, marital status, household income, housing tenure, region, and urbanization level), questions on ever diagnosed with high cholesterol, difficulty participating in social activities, and civic engagement were added to the RSS-1 questionnaire specifically for calibration to NHIS control totals. The larger literature on coverage and nonresponse error associated with probability-based panels, as well as recommendations made by a special working group of the NCHS Board of Scientific Counselors, suggest that panels over-represent the civically engaged, for example, making such a measure an ideal candidate for calibrating panel weights (Mercer and Lau, 2023; Peytchev, 2022). Similarly, prior research with the NCHS Research and Development Survey (RANDS), conducted with NORC's AmeriSpeak Panel, has shown the utility of adding health questions to RANDS questionnaires for calibrating RANDS weights to NHIS control totals, thereby reducing nonresponse and coverage bias in RANDS health-related estimates (Irimata et al., 2023).

The complete set of calibration variables is available in the codebook: https://www.cdc.gov/nchs/data/rss/codebook.pdf. A complete description of the weighting methodology for RSS-1 can be found here: https://www.cdc.gov/nchs/data/rss/survey-description.pdf.

Panel Composition Prior to Calibration Weighting

Table 10 presents NHIS estimates (32 estimates based on 12 calibration variables) that served as population control totals for calibration of RSS-1 panel provider weights. Also presented are panel provider estimates for the same calibration variables, but *prior* to calibration to NHIS control totals.

For most estimates presented in Table 10, differences between each panel provider and the NHIS were less than 3 percentage points. This can be attributed, in part, to each panel provider using a similar mix of calibration variables to the NHIS (e.g., age, sex, race and Hispanic origin, educational attainment, housing tenure, region, and urbanization level) in development of their final study weights. Minor differences observed between the panel provider and NHIS estimates for these variables are likely due to differences in the source and time period used for obtaining the control totals. For example, the NHIS used U.S. Census Bureau population projections and 2021 ACS estimates for control totals for calibration of quarter 1 NHIS ER weights, while, as noted above, the panel providers used totals from the 2022 March ASEC Supplements to the ACS in development of their final RSS-1 study weights.

Differences greater than 3 percentage points were observed for estimates of total household income, ever diagnosed with high cholesterol, and civic engagement for both panel providers. Adults from households with incomes less than $50,000 were over-represented in Panel 1 (37.0%) and under-represented in Panel 2 (28.5%), relative to the NHIS (32.2%). At the upper end of the income distribution, adults with household incomes of $100,000 or more are under-represented in Panel 1 (29.7%) and over-represented in Panel 2 (42.9%) compared with NHIS adults (38.6%). Users should note the difference in income definitions among the three data sources which could contribute to the difference in the estimates. Panel Provider 1 collects total household income for the prior calendar year, while Panel Provider 2 collects total household income for the past 12 months. The NHIS collects total family income for the prior calendar year, which includes households with more than one family residing in the household (97.5% of sample adults in the 2023 Q1 NHIS ER adult dataset resided in single-family households). In addition, a greater percentage of adults reported ever being diagnosed with high cholesterol (Panel Provider 1=37.9%; Panel Provider 2=34.7%) and being civically engaged (Panel Provider 1=67.9%; Panel Provider 2=66.7%) compared with NHIS adults (28.7% and 63.3%, respectively).

Remaining differences greater than 3 percentage points were specific to panel provider. Relative to the NHIS, adults reporting a lot of difficulty/cannot do participating in social activities are over-represented in Panel 1 compared to the NHIS (8.1% versus 4.4%), while married adults were over-represented in Panel 2 (55.8% versus 51.3%).

When comparing panel provider estimates to each other, differences greater than 3 percentage points were observed for total household income, marital status, and ever diagnosed with high cholesterol. A greater percentage of Panel Provider 1 adults reported ever being diagnosed with high cholesterol compared with Panel Provider 2 adults (37.9% vs. 34.7%, $p<0.05$), while a greater percentage of Panel Provider 2 adults reported being married than Panel Provider 1 adults (55.8% vs. 51.3%, $p<0.01$). Finally, Panel Provider 2 adults were skewed toward higher household incomes, with 42.9% of Panel Provider 2

adults having household incomes greater than $100,000 compared with 29.7% of Panel Provider 1 adults ($p<0.01$).

Post Calibration Weighting Evaluations

Table 11 reports the population control totals from the NHIS and the estimates and standard errors of the calibration variables after calibration weighting. Post calibration, all calibration variable estimates aligned with NHIS control totals for both panel provider weights.

Table 12 provides a summary of significant adjustment factors (p-value of F statistic < 0.05) by panel provider. The results show that more than random chance was involved in calibrating both panel providers respondent samples to NHIS control totals. As expected, calibration variables with significant impacts on the calibration of panel provider weights largely aligned with those that produced larger differences in comparisons with the NHIS (see Table 10).

The three non-demographic calibration variables, ever diagnosed with high cholesterol, difficulty participating in social activities, and civic engagement, each had a significant influence on the calibration of each panel provider's weights. As previously noted, questions behind these measures were added to the RSS-1 questionnaire for weight calibration.

For Panel Provider 1, educational attainment, income, and housing tenure also had significant impacts on calibration to NHIS control totals. Both housing tenure and income were not used in calibration of Panel Provider 1's final study weights, possibly explaining their effects on calibration to NHIS control totals. Educational attainment, however, is used in Panel Provider 1's weight calibration routine. The significant F value may be due to different control total sources and time periods (NHIS used 2021 American Community Survey 1-year estimates, while Panel Provider 1 used 2022 CPS March ASEC Supplements estimates). Educational attainment and income also had significant impacts on calibration to NHIS control totals for Panel Provider 2, along with age and marital status. All variables but marital status was used in the weight calibration step for production of Panel Provider 2's study weights, making their influence at this stage more difficult to explain. Like Panel Provider 1, Panel Provider 2 used a different source (2022 CPS March ASEC Supplements estimates) than the NHIS for population control totals.

Table 13 reports the descriptive statistics for the calibration adjustment factors for both panel providers. While more calibration variables had a significant influence on the calibration of Panel Provider 2 weights, the adjustment factors for Panel Provider 2 were less variable, ranging from 0.364 to 1.795, compared with 0.196 to 2.755 for Panel Provider 1. A standard deviation of 0.372 was observed for Panel Provider 1 weights post-calibration, while the corresponding figure for Panel Provider 2 weights was 0.220. While larger adjustment factors were necessary for Panel Provider 1, adjustment factors were relatively small overall. No capping of adjustment factors or trimming of weights was necessary.

As noted in the RSS-1 survey description document (https://www.cdc.gov/nchs/data/rss/survey-description.pdf), the panel provider calibrated weights were combined into a final RSS-1 weight using a compositing factor based on the ratio of effective sample sizes. Table 14 shows the sample size,

effective sample size, and composite factors (0.271 for Panel Provider 1 and 0.729 for Panel Provider 2) for both panel providers.

Table 15 presents descriptive statistics for the panel provider calibrated weights (P1_CALWT_M1 and P2_CALWT_M2) and for the final, combined weight (WEIGHT_M1).

Focusing on the final combined weight, weight values ranged from 322 (minimum) to a maximum weight value of 307,183. The coefficient of variation was 71.24, producing a design effect of 1.51.

Impact of Calibration Weighting

While the panel provider final study weights are adjusted to population demographics, the calibration weighting to the NHIS controls for additional factors including ever diagnosed with high cholesterol, difficulty participating in social activities, and civic engagement. The impact of the calibration weighting was assessed by measuring the absolute bias of RSS estimates using the panel study weights and the final NHIS-calibrated weights compared with the 2023 Q1 NHIS ER adult datafile for a set of benchmarking variables (see more details in the *Benchmarking* section below). The absolute bias and standardized bias of the benchmarking variables based on the panel study weights and the final calibrated weights are reported by panel provider in Table 16 and the standardized bias is displayed in Figure 1. Standardized bias is computed as $\left|panelproviderestimate - NHISestimate\right| / \sqrt{NHISestimate * (100 - NHISestimate)}$.

Of the 43 benchmark variables assessed, 30 had lower standardized and absolute bias using the final calibrated weights compared with the panel study weights for Panel Provider 1 while 23 had lower standardized bias compared with the panel study weights for Panel Provider 2 (25 had lower absolute bias). The magnitude of impact of the calibration weighting varied by panel provider, with larger decreases in bias seen for Panel Provider 1. While the bias for most benchmark variables decreased after calibration to the NHIS, some had an increase in bias as a result of calibration weighting. Seven benchmark variables had an increase in bias compared to the NHIS for both panels, including five measures of healthcare utilization (saw doctor/other health professional in past 12 months, hospitalized overnight in past 12 months, blood pressure checked in past 12 months, cholesterol checked in past 12 months, and blood sugar checked in past 12 months).

Summary

- Pre-calibration differences between panel provider estimates and NHIS estimates greater than 3 percentage points were observed for the following calibration variables: household income (Panel Provider 1 and Panel Provider 2), marital status (Panel Provider 2), ever diagnosed with high cholesterol (Panel Provider 1 and Panel Provider 2), difficulty participating in social activities (Panel Provider 1), and civic engagement (Panel Provider 1 and Panel Provider 2).
- Post calibration, all calibration variable estimates aligned with NHIS control totals for both panel provider weights.
- Adjustment factors were small for both panel providers, maxing out at 2.755 for Panel Provider 1. As a result, there was no need to cap adjustment factors or trim the weights.
- Overall, calibration weighting resulted in lower bias for most of the benchmarking variables compared to the NHIS (30 for Panel Provider 1 and 23 for Panel Provider 2). However, some

benchmarking variables had an increase in bias after calibration weighting, particularly for variables in the healthcare utilization domain. The calibration weighting procedure will be re-evaluated in later rounds of RSS to improve bias reduction in the benchmarking estimates.
- The impact of the calibration weighting varied by panel provider, with larger decreases in bias seen for Panel Provider 1.

Benchmarking

On each round of RSS, a set of questions is included for the purpose of benchmarking to assess the bias of RSS estimates compared to other data sources. In RSS-1, questions from the 2023 Quarter 1 NHIS measuring health status, health behaviors, healthcare access, and healthcare utilization were included for benchmarking. The complete set of benchmarking questions is available in the codebook: https://www.cdc.gov/nchs/data/rss/codebook.pdf. Additional variables available in the NHIS, Household Pulse Survey, and the National Intimate Partner and Sexual Violence Survey were collected in RSS-1 but not compared as benchmark variables due to differences in the mode, questionnaire wording, or year of data collection. However, these variables were used to assess the feasibility of comparisons considering these differences and to inform the feasibility of collecting sensitive data using web panels. Comparisons for variables related to Long COVID and intimate partner violence are reported in Appendix I.

RSS benchmark variables measuring 43 health outcomes were compared to the 2023 Quarter 1 NHIS to evaluate the bias of estimates of health variables and domains in the RSS. The absolute and standardized bias was calculated for each benchmark variable and is reported in Table 17. The standardized biases of the benchmark variables are displayed in Figure 2.

The absolute bias ranged from 0.01% (ever diagnosed with asthma) to 9.80% (blood sugar checked in past 12 months) and varied by topic. Three measures had an absolute bias greater than 9% including excellent or very good self-rated health, cholesterol checked in past 12 months, and blood sugar checked in past 12 months. The standardized bias ranged from nearly 0 to 0.24 for the 43 health measures evaluated, with 30 measures having low bias (standardized bias less than 0.10), 13 measures having medium bias (standardized bias ranging from 0.10 to 0.30), and no measures having high bias (standardized bias ranging from 0.30 to 0.50) (Irimata et al., 2023).

To compare the accuracy of RSS by health domain, the average standardized bias of the benchmark variables was calculated for five health domains: Health Status: Chronic Health Conditions; Health Status: Mental and Self-Rated Health; Health Behaviors; Healthcare Access; and Healthcare Utilization. Table 18 reports the average absolute bias and average standardized bias by health domain. Average standardized bias was calculated as the mean of the standardized biases of the benchmark variables in each health domain. The average standardized bias ranged from 0.03 (Health Behaviors) to 0.14 (Health Status: Mental and Self-Rated Health). Figure 3 displays the average standardized bias by health domain.

Summary

- The absolute bias of the selected benchmark variables compared to the NHIS ranged from 0.01% to 9.80% with most variables reporting an absolute bias of less than 2%.
- Among the 43 health measures evaluated, 30 measures had a low standardized bias and 13 measures had medium standardized bias.

- The average standardized bias of estimates from RSS-1 compared to the NHIS varied by health domain. The health domains Chronic Health Conditions and Health Behaviors tended to have the lowest average standardized bias compared to the NHIS (less than 0.04, low bias), while Mental and Self-Rated Health and Healthcare Utilization had average standardized biases greater than 0.10 (medium bias).
- Health estimates from the RSS differ in quality from traditional NCHS household surveys used to make official statistics and should be interpreted within the quality evaluation presented in this report. While several health outcomes were reported with low bias, certain health domains including Mental and Self-Rated Health and Healthcare Utilization had notable bias compared to the NHIS.

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Figure 1. Standardized bias of panel study and final calibrated weights for benchmarking variables by panel provider compared to the 2023 Quarter 1 National Health Interview Survey: Rapid Surveys System Round 1

Figure 2. Standardized bias of benchmarking variables compared to the 2023 Quarter 1 National Health Interview Survey: Rapid Surveys System Round 1

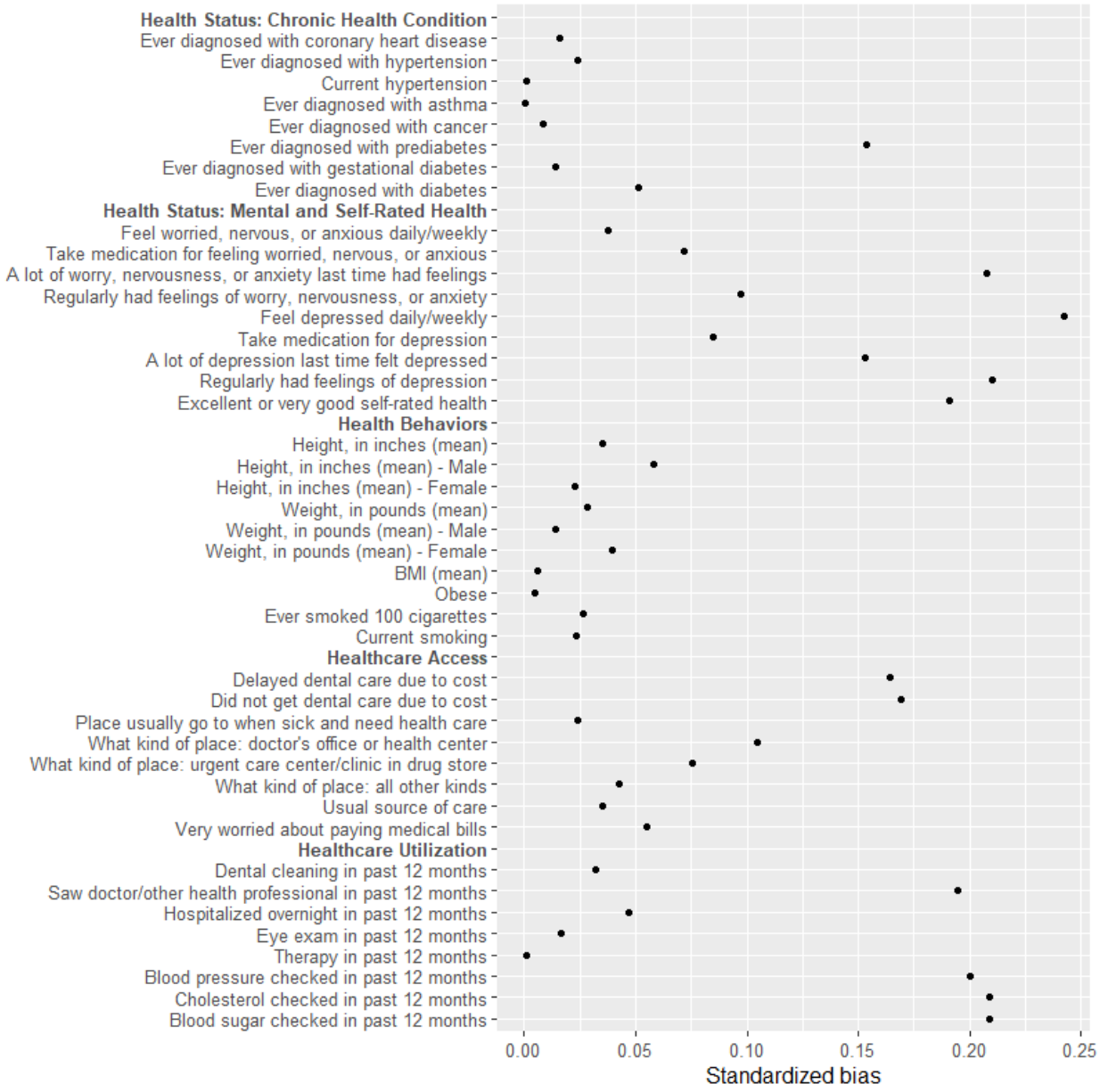
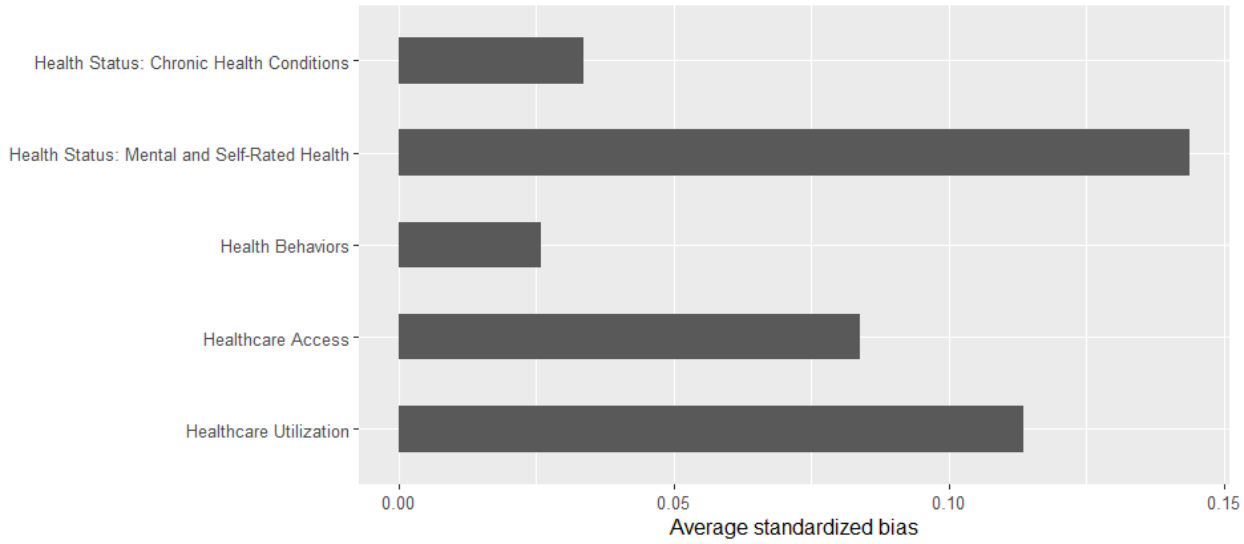


Figure 3. Average standardized bias by health domain compared to the 2023 Quarter 1 National Health Interview Survey: Rapid Surveys System Round 1



Appendix I: Comparison of Estimates for Long COVID and Intimate Partner Violence

The Rapid Surveys System (RSS) is well-suited for developmental work including improving concept measurement, informing future question design, and evaluating the fitness for use of health estimates from commercial online panels. Certain variables collected in round 1 of RSS were not used for benchmarking although estimates are available from external data sources. These topics, including Long COVID and intimate partner violence, were collected for methodological purposes, including assessments of the comparability of data sources and the feasibility of collecting sensitive data using probability-based web panels. While this Appendix reports limited comparisons of Long COVID and intimate partner violence estimates from the RSS and external data sources, further evaluations have yet to be conducted regarding the comparability and feasibility of using RSS for these topics. Thus, users are recommended to use the RSS data on these topics for methodological studies and developmental work and to report official estimates based on the external data source. Limitations are described below.

Table I presents estimates of history of COVID or Long COVID collected with RSS-1 and the 2022 National Health Interview Survey (NHIS). While these topics were collected on both surveys, the estimates differ between the RSS and NHIS. Estimates of ever had COVID and ever had Long COVID tended to be higher for RSS than the NHIS, overall and by age group, sex, and race and Hispanic origin. Although the NHIS and RSS estimates varied, the higher percentage of Long COVID reported in RSS is consistent with the higher estimate reported for ever had COVID. Users should note these differences when conducting comparisons between COVID and Long COVID estimates as the questionnaires and definitions of the conditions differed between the two surveys.

The 2022 NHIS questionnaire defined whether an adult ever had COVID based on two variables,1) if they were ever told they had COVID by a doctor or other health professional or 2) had a positive COVID test, while Long COVID was collected using one question which was asked of the subset of respondents who ever had COVID and reported having symptoms or responded don't know/refused to having symptoms. Alternatively, on RSS-1, whether an adult ever had COVID was measured using one question, whether they ever had COVID-19, and Long COVID was measured based on two questions asked of the subset of respondents who ever had COVID, 1) if they reported having symptoms lasting 3 months or longer that they did not have prior to COVID or 2) if a doctor or health care professional ever told them they had Long COVID. The relevant questions on both surveys are reported below:

<u>2022 NHIS</u>

- **CVDDIAG_A (all adults):** Has a doctor or other health professional ever told you that you had or likely had coronavirus or COVID-19?
- **POSTEST_A (all adults):** Did you ever take a test that showed you had coronavirus or COVID-19? * Read if necessary: Testing includes antibody or blood tests as well as other forms of testing for COVID-19, such as a nasal swabbing or throat swabbing.

- **CVDSEV_A (CVDDIAG_A = 1 or POSTEST_A = 1):** How would you describe your coronavirus symptoms when they were at their worst? Would you say no symptoms, mild symptoms, moderate symptoms, or severe symptoms?
- **LONGCVD_A (CVDSEV_A not equal to no symptoms):** Did you have any symptoms lasting 3 months or longer that you did not have prior to having coronavirus or COVID-19?
  * Read if necessary: Long term symptoms may include tiredness or fatigue, difficulty thinking, concentrating, forgetfulness or memory problems, sometimes referred to as "brain fog," difficulty breathing or shortness of breath, joint or muscle pain, fast-beating or pounding heart (also known as heart palpitations), chest pain, dizziness on standing, depression, anxiety or mood changes.

RSS-1

- **CVL_HEARDEV (all adults):** When people have symptoms for weeks, months, or even years after COVID-19 infection, it is called Long COVID. Some people also refer to it as Post-COVID Conditions. Before today, had you ever heard of Long COVID?
- **CVL_COVIDEV (all adults):** Have you ever had COVID-19?
- **CVL_SYMPT3M (CVL_COVIDEV = 1):** Did you have any symptoms lasting 3 months or longer that you did not have prior to having COVID-19?
- **CVL_LONGCVEV (CVL_HEARDEV = 1 and CVL_COVIDEV = 1):** Did a doctor or other health care professional ever tell you that you had Long COVID?

Due to these differences, users are recommended to report official estimates of COVID and Long COVID based on the NHIS (Adjaye-Gbewonyo et al., 2023) but can use the RSS data to conduct further developmental and methodological work on these topics.

Table II presents estimates of physical violence by an intimate partner collected with RSS-1 and the 2016/2017 National Intimate Partner and Sexual Violence Survey (NISVS) conducted by the National Center for Injury Prevention and Control. Unlike NISVS, RSS-1 data on physical violence by an intimate partner are intended for exploratory methodological purposes and should not be used for making national prevalence estimates (Leemis et al., 2022). See the NISVS for national prevalence estimates. Some reasons why the results from the RSS may differ from previously reported NISVS data include, but are not limited to, the years the data were collected (RSS in 2023 vs. NISVS in 2016/2017), the mode of data collection (web vs. telephone, respectively), order of the questions and other content found on the survey, and the sample itself. Care should be taken when analyzing these variables and it would not be appropriate to compare these data directly to NISVS. Users are recommended to use the intimate partner violence data in RSS for development work and methodological research purposes.