NCHS Rapid Surveys System™

Quality Profile

Round 2: Data collected October-November 2023

Last revised April 16, 2024

CDC
U.S. CENTERS FOR DISEASE
CONTROL AND PREVENTION

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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 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 2 (RSS-2) 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 2 Survey Description, which provides detailed information on the data collection weighting methodologies, recoding and other data processing components is available at: www.cdc.gov/nchs/data/rss/round2/survey-description.pdf.

Data Collection

Sampling and Data Collection Dates

The target population of RSS-2 is U.S. adults ages 18 and older. Each panel provider drew two independent samples from their respective panels for RSS-2 to conduct data collection using both standard protocols and additional efforts to increase response rates and representativeness of the sample (www.cdc.gov/nchs/data/rss/round2/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-2 (https://www.cdc.gov/nchs/rss/rss-topics_2.html).

Table 1 (Quality profile tables, www.cdc.gov/nchs/rss/access.html) 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 12,842 (Panel Provider 1) and 6,086 (Panel Provider 2) adult panelists were drawn.

Data collection commenced on October 16, 2023, and finished on November 6, 2023, for Panel Provider 1. Data collection for Panel Provider 2 started on October 12, 2023, and finished on November 7, 2023. Of the 2,849 fully completed interviews for Panel Provider 1, 263 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 4,197 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-2 was 37.2%. However, rates by panel provider differed: 22.2% for Panel Provider 1 and 69.0% for Panel Provider 2 (Table 2, Quality profile tables, www.cdc.gov/nchs/rss/access.html). 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, 12,842 panelists were sampled overall. Alternatively, Panel Provider 2 removes inactive panelists from their panel, which may explain the smaller overall sample selected (n=6,086) to reach their target of 4,000 completed surveys.

Final cumulative response rates (AAPOR CUMRR1) for RSS-2 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 3.8% is the product of a household panel recruitment rate, a household panel retention rate, and the RSS-2 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-2 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 (Quality profile tables, www.cdc.gov/nchs/rss/access.html). Note that the subsequent comparisons of completion rates by panel provider were not subjected to tests for statistical significance. While completion rates were consistently

higher for Panel Provider 2, patterns of completion rates by demographics were 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. Differences in completion rates by race and Hispanic origin were observed for both providers, with completion rates generally higher among White, non-Hispanic adults and lower among Hispanic adults. Differences in completion rates by educational attainment were also observed for both panel providers. Adults with a bachelor's degree or more tended to have higher completion rates, while adults with less than a high school diploma or a GED tended to have lower 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 completion rates were more similar between metropolitan and nonmetropolitan panelists from Panel Provider 1.

Survey Duration

As shown in Table 4 (Quality profile tables, www.cdc.gov/nchs/rss/access.html), the median survey completion time among respondents who completed interviews in one visit to the survey instrument was 13.9 minutes for Panel Provider 1, while the median completion time for Panel Provider 2 was 13.2 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 84.4% of all completed surveys. Section times were largely consistent between panel providers, with two sections having a median completion time of more than 1 minute: illegal drugs and naloxone (Narcan) awareness (HRD) and swimming (SWM). A complete list of all questionnaire sections can be found here: www.cdc.gov/nchs/data/rss/round2/questionnaire.pdf.

Survey Breakoffs

Survey breakoffs for RSS-2 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 83 breakoffs (out of 2,932 panelists who started the survey) in the Panel Provider 1 survey, representing a breakoff rate of 2.8%, while 229

panelists (out of 4,426) broke off the Panel Provider 2 survey for a breakoff rate of 5.2% (Table 5, Quality profile tables, www.cdc.gov/nchs/rss/access.html).

The number and percentage distribution of breakoffs by section for each panel provider and combined are presented in Table 5. Questionnaire sections producing the largest percentage of breakoffs varied by panel provider. For example, 27.7% of all breakoffs for Panel Provider 1 occurred in the attention-deficit and hyperactivity disorder section (ADHD), while 30.6% of breakoffs for Panel Provider 2 occurred in the introductory portion of the survey up through the first question on self-reported health status (HIS). These screens produced the second largest percentage of breakoffs for Panel Provider 1 (13.3%). The other notable producer of breakoffs was the hearing protector fit testing (HPF) section, but only for Panel Provider 2: 54 of 229 breakoffs (23.6%). All other sections for each provider produced less than 10% of all breakoffs.

Item Nonresponse

Item nonresponse for RSS-2 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 (Quality profile tables, www.cdc.gov/nchs/rss/access.html) summarizes the number and percent of questions by level of item nonresponse. Of the 158 survey items, most had an item nonresponse rate of less than 1% for Panel Provider 1 (67.7%), Panel Provider 2 (65.8%), and in the combined file (65.8%). Very few questions had item nonresponse of 5% to less than 10% or greater than 10% (7 questions for the two panels combined).

Table 7 (Quality profile tables, www.cdc.gov/nchs/rss/access.html) provides more detailed item nonresponse rates for the panel providers by questionnaire section (www.cdc.gov/nchs/data/rss/round2/questionnaire.pdf). Overall, item nonresponse rates across all items were low, averaging 1.0% per item in the combined datafile, 1.2% for Panel Provider 1 and 0.9% for Panel Provider 2 (Table 7, TOTAL row).

For Panel Provider 2, item nonresponse rates were fairly evenly distributed across sections, ranging from 0.1% for self-reported health status (HIS) and paying medical bills (PAY) to 1.5% for illegal drugs and naloxone (Narcan) awareness (HRD). For Panel Provider 1, three sections had item nonresponse rates over 2%, including chronic pain (CPN; 6.2%), pain (PAI; 4.6%), and online connectedness (ONL; 2.4%). These section item nonresponse rates were inflated due to a server error that caused three specific questions, one from each section, to not be asked when the respondent was in universe: ONL_SOCCOM (how much the respondent agrees or disagrees that they use social media to feel like they're a member of a community), PAI_WKLM3M (how often pain limited the respondent's life or work activities over the past three months), and CPN_MEDICARE (whether or not the respondent is currently receiving

medical care from a health professional for their chronic pain). The item nonresponse rates for these three items for Panel Provider 1 were 14.3%, 13.9%, and 13.8%, respectively.

For the combined dataset, only seven questions had an item nonresponse rate over 5%, including the three mentioned previously from the ONL, PAI, and CPN sections. The other four questions were SWM_HELPDRWN (6.6%; ever been trained on how to help a drowning person without putting yourself in danger) in the swimming (SWM) section, ADHD_WHCHMED (12.9%; prescription medications taken in the past 12 months to help with ADHD), ADHD_RX3M (14.7%; plan to have another telehealth visit in the next three months to get a prescription for ADHD medications), and ADHD_CNSEL3M (17.0%; plan to have another telehealth visit in the next three months to receive counseling or therapy for ADHD) in the attention-deficit and hyperactivity disorder (ADHD) section. For the three ADHD items, no more than 232 adults received these questions.

The primary concern with high item nonresponse is the risk of nonresponse bias, which leads to biased 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-2 (target=3,000; completes=2,849), while Panel Provider 2 exceeded their target (target=4,000; completes=4,197). The result was a final combined sample (n=7,046) that exceeded the targeted number of completed interviews by 46 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 higher for Panel Provider 2. Questionnaire sections producing the largest percentage of breakoffs varied by panel provider. The attention-deficit and hyperactivity disorder (ADHD) section produced the highest percentage of breakoffs followed by the introductory portion of the survey up through the first question on self-reported health status (HIS) for panel provider 1, while the introductory screens and the question on self-reported health status (HIS) followed by the hearing protector fit testing (HPF) section produced the highest percentage of breakoffs for panel provider 2.

- Item nonresponse rates were low for both panel providers, with over 65% of items having an item nonresponse rate of less than 1%. Only three items in the combined dataset had a double-digit item nonresponse rate, with all three located in the attention-deficit hyperactivity disorder (ADHD) section. As noted previously, data users may want to investigate these items further for potential nonresponse bias.

Question Evaluation

For RSS-2, 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-2 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-2 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 rates are those who skipped or refused to respond to more than 50% of the eligible questions. Table 8 (Quality profile tables, www.cdc.gov/nchs/rss/access.html) 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. Discrepancies between variables submitted by the two panel providers for RSS-2 were resolved during harmonization.

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: www.cdc.gov/nchs/data/rss/round2/survey-description.pdf.

Table 9 (Quality profile tables, www.cdc.gov/nchs/rss/access.html) 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-2 data.

Summary

- Data cleaning procedures were applied to remove low-quality responses. Overall, 0.9% of RSS-2 records were removed due to speeders or respondents with high refusal rates.

- Data from the two panel providers were harmonized prior to release.

- 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 6.7%. 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 2023 Current Population Survey (CPS) March Annual Social and Economic Supplements (ASEC) estimates for age, sex, Census division, race and Hispanic origin, and educational attainment. Panel Provider 2 calibrated to these same variables along with household income, Census region, metropolitan statistical area (MSA) status, and language proficiency. The weighted control total for language proficiency came from the 2022 American Community Survey (ACS), while all other totals were obtained from the March 2023 ASEC Supplements to the CPS.

Next, each of the RSS-2 panel provider weights were separately calibrated to control totals based on the 2023 Quarter 2 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-2 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: www.cdc.gov/nchs/data/rss/round2/codebook.pdf. A complete description of the weighting methodology for RSS-2 can be found here: www.cdc.gov/nchs/data/rss/round2/survey-description.pdf.

Panel Composition Prior to Calibration Weighting

Table 10 (Quality profile tables, www.cdc.gov/nchs/rss/access.html) presents 2023 Quarter 2 Early Release (ER) NHIS estimates (32 estimates based on 12 calibration variables) that served as population control totals for calibration of RSS-2 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 3 percentage points or less. 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 2023 Quarter 2 NHIS ER weights, while, as noted above, the panel providers used totals from the 2023 March ASEC Supplements to the ACS in development of their final RSS-2 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 (37.9%) and under-represented in Panel 2 (26.4%), relative to the NHIS (31.6%). At the upper end of the income distribution, adults with household incomes of $100,000 or more are under-represented in Panel 1 (28.4%) and over-represented in Panel 2 (45.2%) compared with NHIS adults (39.0%). 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 (98.0% of sample adults in the 2023 Q2 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=37.2%; Panel Provider 2=34.1%) and being civically

engaged (Panel Provider 1=69.4%; Panel Provider 2=67.2%) compared with NHIS adults (27.7% and 62.1%, respectively). The only remaining difference greater than 3 percentage points was specific to Panel Provider 1. 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 (9.7% versus 4.7%).

When comparing panel provider estimates to each other, differences greater than 3 percentage points were observed for total household income, marital status, and housing tenure. Compared with Panel Provider 1 adults, a greater percentage of Panel Provider 2 adults reported being married (53.7% vs. 48.8%, p<0.01) and owning or buying their residence (71.8% vs. 68.6%, p<0.05). Finally, Panel Provider 2 adults were skewed toward higher household incomes, with 45.2% of Panel Provider 2 adults having household incomes greater than $100,000 compared with 28.4% of Panel Provider 1 adults (p<0.01).

Post Calibration Weighting Evaluations

Table 11 (Quality profile tables, www.cdc.gov/nchs/rss/access.html) 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 (Quality profile tables, www.cdc.gov/nchs/rss/access.html) 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, based on the differences shown in 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-2 questionnaire for weight calibration. Income also had a significant impact on the calibration of panel provider weights to NHIS control totals, which is also consistent with the observed differences in income distributions between the NHIS and the panel providers (See Table 10). Age was the remaining variable to have a significant impact on calibration of both providers weights. This is less consistent with the pattern of differences shown for the other calibration variables. Both providers calibrated their panel study weights to age control totals from the CPS. The age distribution for Panel Provider 1, for example, was nearly identical to the age distribution of the NHIS prior to calibration to NHIS control totals. Differences between Panel Provider 2 and the NHIS were somewhat larger, but still less than two percentage points.

Race and Hispanic origin and educational attainment also had significant impacts on calibration to NHIS control totals for Panel Provider 2. Both variables were used in the weight calibration step for production of Panel Provider 2's study weights, making their influence, like age, more difficult to understand. It is possible that different sources and time periods for control totals may explain some of the impact of these variables. As noted previously, Panel Provider 2 calibrated their panel study weight to control totals from the 2023 CPS March ASEC Supplements, while the 2023 Quarter 2 NHIS ER weights were calibrated to U.S. Census Bureau population projections for age, sex, and race and Hispanic origin, and to totals based on 1-year estimates from the 2021 ACS.

Table 13 (Quality profile tables, www.cdc.gov/nchs/rss/access.html) 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 0.176 to 1.674, compared with 0.089 to 2.343 for Panel Provider 1. A standard deviation of 0.408 was observed for Panel Provider 1 weights post-calibration, while the corresponding figure for Panel Provider 2 weights was 0.258. 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-2 survey description document (www.cdc.gov/nchs/data/rss/round2/survey-description.pdf), the panel provider calibrated weights were combined into a final RSS-2 weight using a compositing factor based on the ratio of effective sample sizes. Table 14 (Quality profile tables, www.cdc.gov/nchs/rss/access.html) shows the sample size, effective sample size, and composite factors (0.261 for Panel Provider 1 and 0.739 for Panel Provider 2) for both panel providers.

Table 15 (Quality profile tables, www.cdc.gov/nchs/rss/access.html) presents descriptive statistics for the panel provider calibrated weights (P1_CALWT_M1 and P2_CALWT_M1) and for the final, combined weight (WEIGHT_M1).

Focusing on the final combined weight, weight values ranged from 202 (minimum) to a maximum weight value of 346,684. The coefficient of variation was 73.05, producing a design effect of 1.53.

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 Quarter 2 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 (Quality profile tables, www.cdc.gov/nchs/rss/access.html) and the standardized bias is displayed in Figure 1. Standardized bias is computed for percentages as

$$\left| estimate_{panel} - estimate_{NHIS} \right| / \sqrt{estimate_{NHIS} * (100 - estimate_{NHIS})}$$

and for continuous variables as

$$\left| estimate_{panel} - estimate_{NHIS} \right| / \left(SE_{NHIS} * \sqrt{n_{NHIS} / deff_{NHIS}} \right).$$

Of the 45 benchmark variables assessed, 42 had lower standardized and absolute bias using the final calibrated weights compared with the panel study weights for Panel Provider 1 while 30 had lower standardized and absolute bias compared with the panel study weights for Panel Provider 2. 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. Three benchmark variables had an increase in bias compared to the NHIS for Panel Provider 1 while fifteen benchmark variables had an increase in bias for Panel Provider 2. These measures were from a range of health domains including employment, health behaviors, health status: chronic health conditions, health status: chronic pain, healthcare access, healthcare utilization, and housing costs and transportation, with most of the measures in the healthcare access domain (4 measures).

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), 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 2.343 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 (42 for Panel Provider 1 and 30 for Panel Provider 2). However, some benchmarking variables had an increase in bias after calibration weighting, particularly for variables in the healthcare access 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-2, questions from the 2023 Quarter 2 NHIS measuring employment, health behaviors, health status (chronic health conditions, chronic pain, and mental and self-rated health), healthcare access, healthcare utilization, and housing costs and transportation were included for benchmarking. The complete set of benchmarking questions is available in the codebook: www.cdc.gov/nchs/data/rss/round2/codebook.pdf.

RSS benchmark variables measuring 45 health outcomes were compared to the 2023 Quarter 2 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 (Quality profile tables, www.cdc.gov/nchs/rss/access.html). The standardized biases of the benchmark variables are displayed in Figure 2.

The absolute bias ranged from 0.10 percentage points (very worried about paying medical bills) to 14.92 percentage points (little interest or pleasure in doing things several days or more in past 2 weeks) and varied by topic. Five measures had an absolute bias greater than 10 percentage points including feeling down, depressed, or hopeless several days or more in past 2 weeks; feeling nervous, anxious, or on edge several days or more in past 2 weeks; little interest or pleasure in doing things several days or more in past 2 weeks; not being able to control or stop worrying several days or more in past 2 weeks; and ever had a pneumonia shot. The standardized bias ranged

from nearly 0 to 0.38 for the 45 health measures evaluated, with 23 measures having low bias (standardized bias less than 0.10), 19 measures having medium bias (standardized bias ranging from 0.10 to 0.30), and 3 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 eight health domains: Employment; Health Behaviors; Health Status: Chronic Health Conditions; Health Status: Chronic Pain; Health Status: Mental and Self-Rated Health; Healthcare Access; Healthcare Utilization; and Housing Costs and Transportation. Table 18 (Quality profile tables, www.cdc.gov/nchs/rss/access.html) 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. Figure 3 displays the average standardized bias by health domain. The average standardized bias ranged from 0.03 (Employment and Health Behaviors) to 0.22 (Health Status: Mental and Self-Rated Health). The health domains Employment, Health Behaviors, Chronic Health Conditions, and Chronic Pain had standardized biases less than 0.05 (low bias). Healthcare Utilization had a standardized bias of 0.09, which still fell in the low bias category but was closer to the cut off of 0.10. Housing Costs and Transportation, Healthcare Access, and Mental and Self-Rated Health had standardized biases ranging from 0.14 to 0.22 (medium bias). No domains indicated high bias.

Summary

- The absolute bias of the selected benchmark variables compared to the NHIS ranged from 0.10 to 14.92 with most variables reporting an absolute bias of less than 3 percentage points.

- Among the 45 health measures evaluated, 23 measures had low standardized bias, 19 measures had medium standardized bias, and 3 measures had high standardized bias.

- The average standardized bias of estimates from RSS-2 compared to the NHIS varied by health domain with most indicating medium bias (ranging from 0.14 to 0.22).

- 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,

Healthcare Access, and Housing Costs and Transportation 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 2 National Health Interview Survey: Rapid Surveys System Round 2
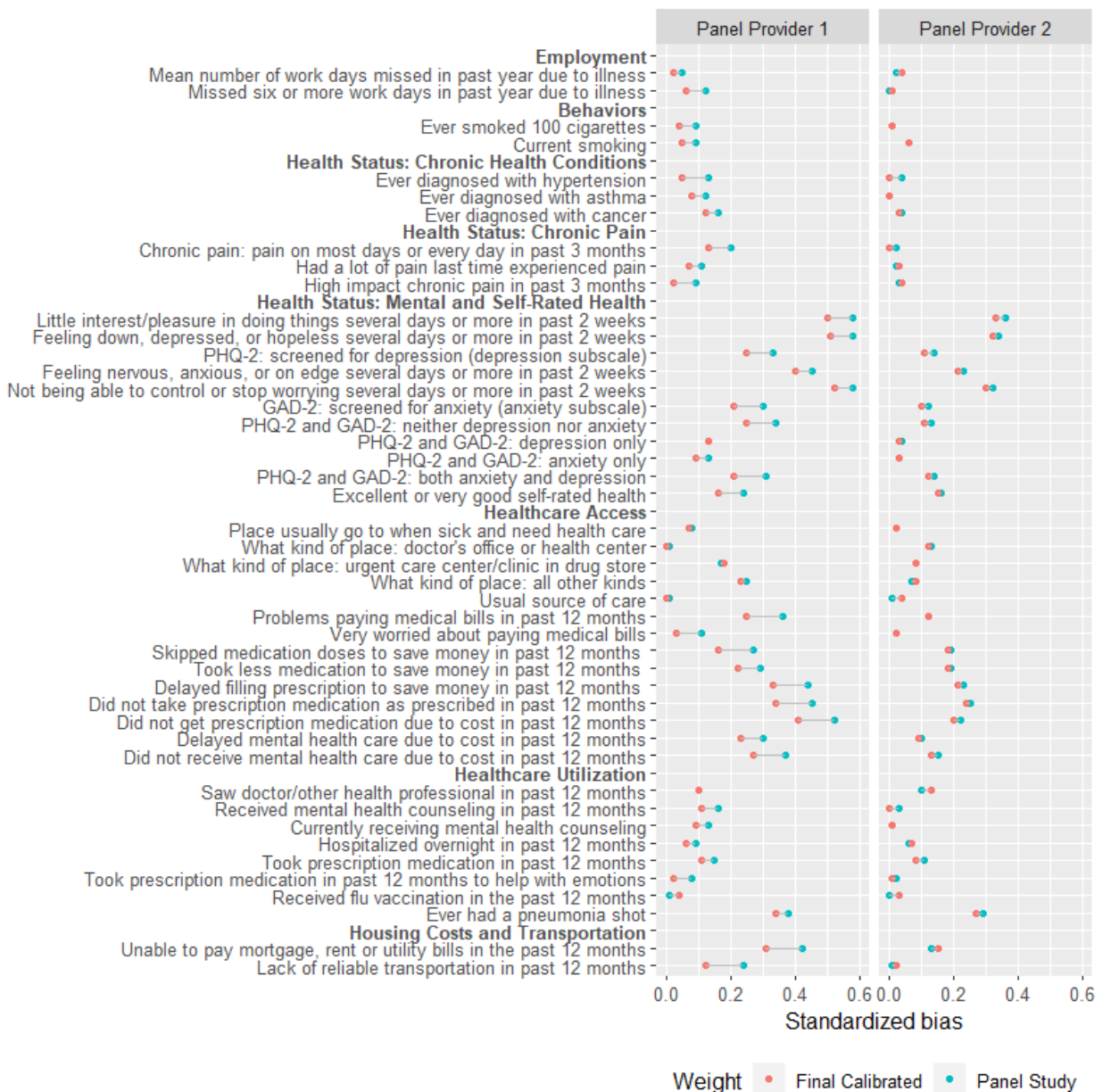
Figure 2. Standardized bias of benchmarking variables compared to the 2023 Quarter 2 National Health Interview Survey: Rapid Surveys System Round 2
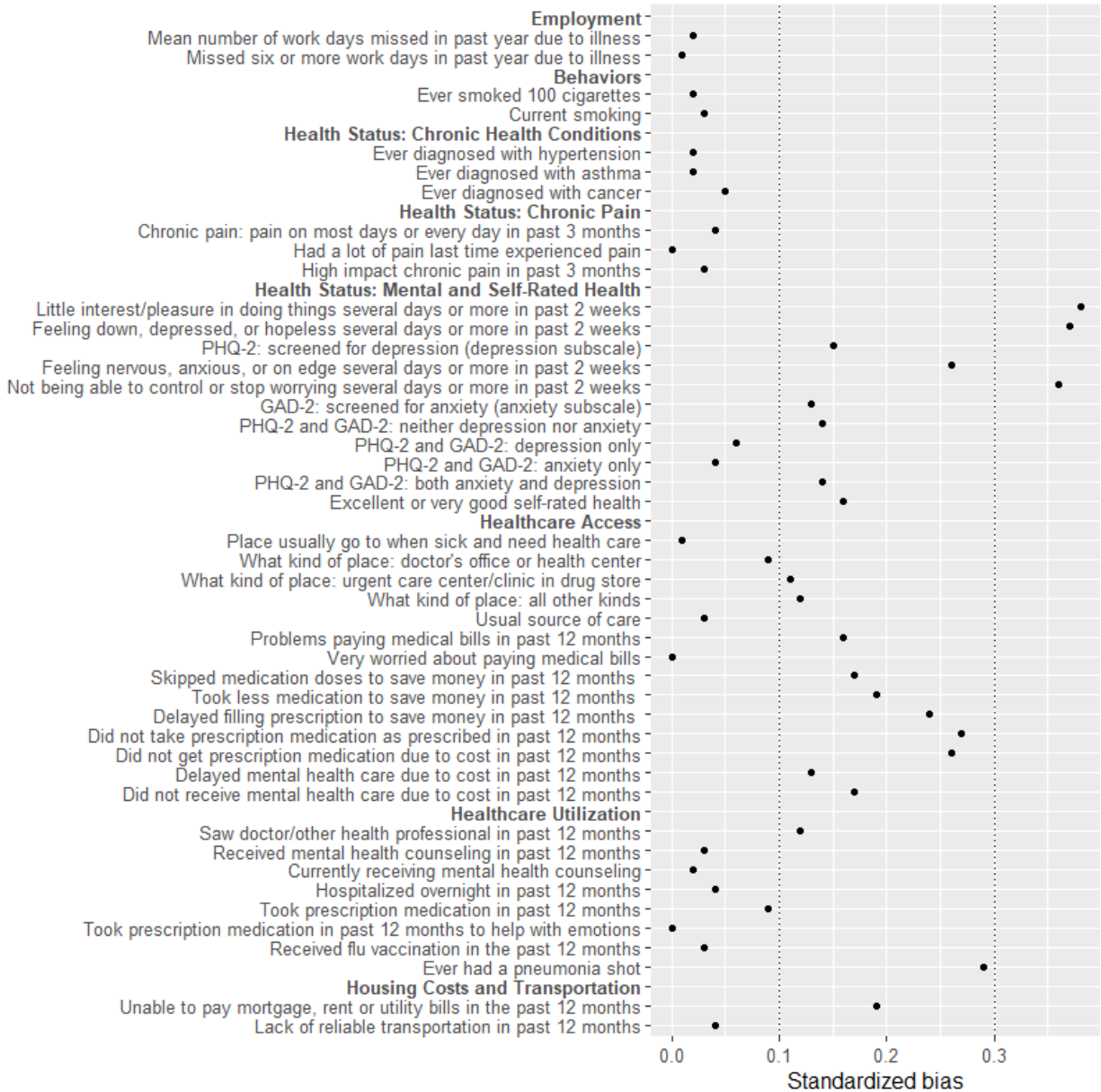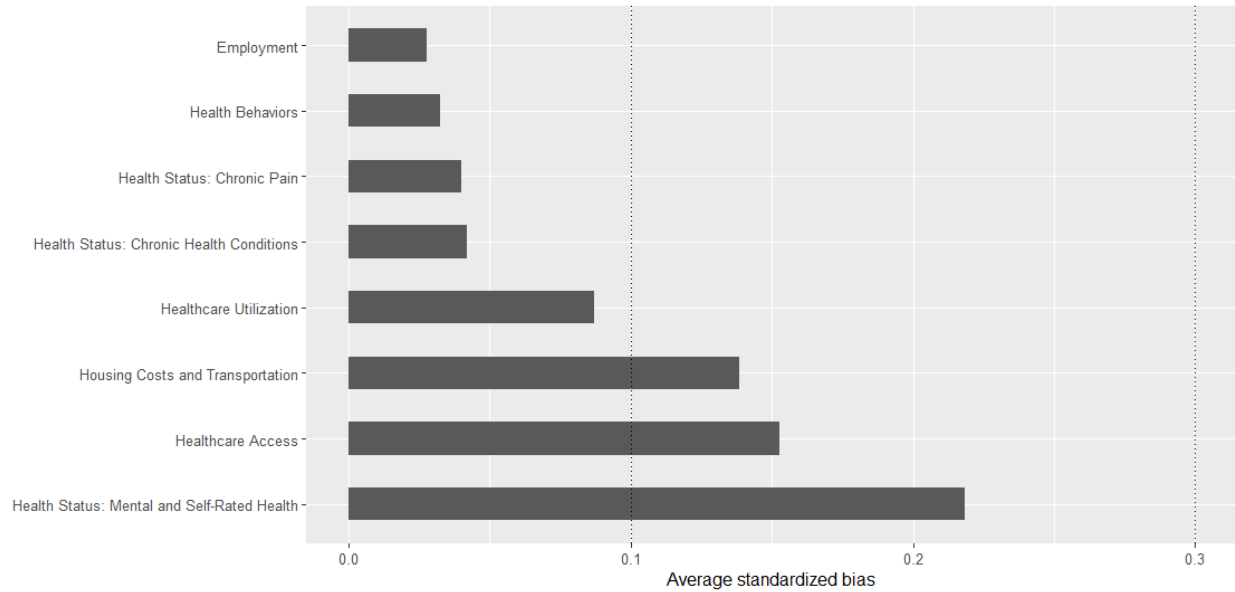
Figure 3. Average standardized bias by health domain compared to the 2023 Quarter 2 National Health Interview Survey: Rapid Surveys System Round 2