NCHS Rapid Surveys System

Quality Profile

Round 3: Data collected January-February 2024

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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 3 (RSS-3) 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 3 Survey Description, which provides detailed information on the data collection weighting methodologies, recoding, and other data processing components is available at: http://www.cdc.gov/nchs/data/rss/round3/survey-description.pdf.

Data Collection

Sampling and Data Collection Dates

The target population of RSS-3 is U.S. adults ages 18 and older. Each panel provider drew a sample from their respective panels for RSS-3. 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. The target number of completed surveys was 4,000 for Panel Provider 1 and 4,000 for Panel Provider 2. To achieve the targeted number of completed interviews, samples of 15,322 (Panel Provider 1) and 5,790 (Panel Provider 2) adult panelists were drawn.

Data collection commenced on January 18, 2024, and finished on February 15, 2024, for Panel Provider 1. Data collection for Panel Provider 2 started on January 15, 2024, and finished on February 2, 2024. Of the 4,205 fully completed interviews for Panel Provider 1, 460 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 4,170 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-3 was 39.7%. However, rates by panel provider differed: 27.4% for Panel Provider 1 and 72.0% 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 4,000 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, 15,322 panelists were sampled overall. Alternatively, Panel Provider 2 removes inactive panelists from their panel, which may explain the smaller overall sample selected (n=5,790) to reach their target of 4,000 completed surveys.

Final cumulative response rates (AAPOR CUMRR1) for RSS-3 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 4.8% is the product of a household panel recruitment rate, a household panel retention rate, and the RSS-3 survey completion rate. The final cumulative response rate for Panel Provider 2 was 4.4% and is the product of a household panel recruitment rate, a household profile rate, and the RSS-3 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 and urbanization level were also observed for both panel providers. Adults with less than a high school diploma or a GED tended to

have lower completion rates than adults in other education groups, while nonmetropolitan adults tended to have higher completion rates than metropolitan adults. Finally, 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.

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 60 minutes or less in one visit to the survey instrument was 12.8 minutes for Panel Provider 1, while the median completion time for Panel Provider 2 was 13.3 minutes. Completion times were only evaluated among respondents who completed interviews in 60 minutes or less 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 hours or days for respondents who return to the instrument at another time. Completions in 60 minutes or less in a single visit accounted for 82.4% of all completed surveys. Section times were largely consistent between panel providers, with one section having a median completion time of longer than 2 minutes (sexual health (SEX)), and four sections having a median completion time between 1 and 2 minutes (employment (EMP); family health history (FHH); genetic testing for cancer and heart disease (GEN); and healthcare access and utilization (ACC)). A complete list of all questionnaire sections can be found here: www.cdc.gov/nchs/data/rss/round3/questionnaire.pdf.

Survey Breakoffs

Survey breakoffs for RSS-3 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 116 breakoffs (out of 4,321 panelists who started the survey) in the Panel Provider 1 survey, representing a breakoff rate of 2.7%, while 182 panelists (out of 4,352) broke off the Panel Provider 2 survey for a breakoff rate of 4.2% (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, 15.5% of all breakoffs for Panel Provider 1 occurred in the chronic conditions section (CHR), while 33.0% 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 (12.9%). Another notable producer of breakoffs for both panel providers was the sexual health (SEX) section: 12 of 116 breakoffs (10.3%) for Panel Provider 1 and 26 of 182 breakoffs (14.3%) for Panel Provider 2. The food insecurity (FSC) section also produced a double-digit percentage of breakoffs (10.3%) for Panel Provider 1. All other sections for each provider produced less than 10% of all breakoffs.

Item Nonresponse

Item nonresponse for RSS-3 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 166 survey items, just over half had an item nonresponse rate of less than 1% for Panel Provider 1 (55.4%), Panel Provider 2 (51.2%), and in the combined file (53.6%). Very few questions had item nonresponse of 5% to less than 10% or greater than 10% (6 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/round3/questionnaire.pdf). Overall, item nonresponse averaged 1.8% per item in the combined datafile, 1.5% for Panel Provider 1 and 2.0% for Panel Provider 2 (Table 7, TOTAL row).

For both panel providers, the sections with the highest item nonresponse rates were genetic testing for cancer and heart disease (GEN; 3.6% for Panel Provider 1, 3.5% for Panel Provider 2), employment (EMP; 2.0% for both Panel Provider 1 and Panel Provider 2), and sexual health (SEX; 1.9% for Panel Provider 1 and 3.9% for Panel Provider 2). All other sections produced item nonresponse rates of 1.1% or less for both panel providers.

For the combined dataset, only six questions had an item nonresponse rate over 5%, including GEN_HRTTST (5.1%; ever had a genetic test to determine if you are at greater risk of getting heart disease), FSC_NOEATNUM (5.3%; how many days in the last 30 did you or other adults in the family not eat for a whole day because there wasn't enough money for food), GEN_RCANEV (6.5%; any biological relatives ever had cancer or a malignancy of any kind), EMP_INSH (7.2%; any other type of health insurance or health coverage plan), GEN_RSRTEV (10.9%; any biological relatives ever had a stroke), and GEN_RHRTEV (11.3%; any biological relatives ever had a heart attack, also called myocardial infarction). Only 374 respondents received FSC_NOEATNUM and only 452 respondents received EMP_INSH.

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

- Both panel providers exceeded their completion targets for RSS-3: Panel Provider 1 (target=4,000, completes=4,205) and Panel Provider 2 (target=4,000, completes=4,170). As a result, the final combined sample (n=8,375) exceeded the targeted number of completed interviews by 375 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, educational attainment, and urbanization level.
- 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 chronic conditions (CHR) 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 sexual health (SEX) section produced the highest percentage of breakoffs for Panel Provider 2.
- Item nonresponse rates were low for both panel providers, with over 50% of items having an item nonresponse rate of less than 1%, and over 94% of items having an item nonresponse rate of less than 5%. Only two items in the combined dataset had a double-digit item nonresponse rate, with both located in the genetic testing for cancer and heart disease (GEN) section. As noted previously, data users may want to investigate these items further for potential nonresponse bias.

Question Evaluation

For RSS-3, cognitive interviews for several sections were conducted after the survey was fielded. Because of this, cognitive interviews should be understood as an examination of the RSS-3 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 Fall 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-3 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-3 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/round3/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-3 data.

Summary

- Data cleaning procedures were applied to remove low-quality responses. Overall, 2.8% of RSS-3 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 7.1%. 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-3 panel provider weights were separately calibrated to control totals based on the 2023 Quarter 3 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-3 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/round3/codebook.pdf. A complete description of the weighting methodology for RSS-3 can be found here: www.cdc.gov/nchs/data/rss/round3/survey-description.pdf.

Panel Composition Prior to Calibration Weighting

Table 10 (Quality profile tables, www.cdc.gov/nchs/rss/access.html) presents 2023 Quarter 3 NHIS ER estimates (32 estimates based on 12 calibration variables) that served as population control totals for calibration of RSS-3 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 3 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-3 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 (38.4%) 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 (30.0%) and over-represented in Panel 2 (45.2%) compared with NHIS adults (37.8%). 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 (97.9% of sample adults in the 2023 Q3 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=38.4%; Panel Provider 2=34.6%) and being civically engaged (Panel Provider 1=66.1%; Panel Provider 2=65.2%) compared with NHIS adults (28.5% and 60.5%, respectively). The only remaining difference greater than 3 percentage points was specific to Panel Provider 2. Relative to the NHIS, married adults are over-represented in Panel 2 compared to the NHIS (54.1% versus 50.3%).

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. Compared with Panel Provider 1 adults, a greater percentage of Panel Provider 2 adults reported being married (54.1% vs. 49.9%, $p<0.01$), while a greater percentage of Panel Provider 1 adults reported ever being diagnosed with high cholesterol compared with Panel Provider 2 adults (38.4% vs 34.6%, $p<0.01$). Finally, Panel Provider 2 adults were skewed toward higher household incomes, with 45.2% of Panel Provider 2 adults having household incomes greater than $100,000 compared with 30.0% of Panel Provider 1 adults ($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, ever diagnosed with high cholesterol and civic engagement each had a significant influence on the calibration of each panel provider's weights. Difficulty participating in social activities also had a significant impact on weight calibration for each provider, although differences with the NHIS shown in Table 10 were relatively small (2% or less). As previously noted, questions behind these three measures were added to the RSS-3 questionnaire for weight calibration. Income also had a significant impact on the calibration of panel provider weights to NHIS control totals, which is consistent with the observed differences in income distributions between the NHIS and the panel providers (See Table 10). Age and race and Hispanic origin were the remaining variables 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 and race and Hispanic origin 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 age for Panel Provider 2 and the NHIS were somewhat larger, but absolute differences were still two percentage points or less. Similarly, the race and Hispanic origin distribution between the NHIS and each panel provider was consistent.

Housing tenure also had a significant impact on calibration to NHIS control totals for Panel Provider 1 and educational attainment had a significant impact on calibration to NHIS control totals for Panel Provider 2. While housing tenure is included in the nonresponse adjustment stage, it is not included in the final raking step in development of the study weights for Panel Provider 1. Educational attainment, however, was used in the weight calibration step for production of Panel Provider 2's study weights, making its 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 3 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 selected descriptive statistics for the calibration adjustment factors for both panel

providers. The adjustment factors for Panel Provider 2 were less variable, ranging from 0.273 to 1.631, compared with 0.145 to 2.230 for Panel Provider 1. A standard deviation of 0.359 was observed for Panel Provider 1 weights post-calibration, while the corresponding figure for Panel Provider 2 weights was 0.240. 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-3 survey description document (www.cdc.gov/nchs/data/rss/round3/survey-description.pdf), the panel provider calibrated weights were combined into a final RSS-3 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 (0.391 for Panel Provider 1 and 0.609 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 and P2_CALWT) and for the final, combined weight (WEIGHT).

Focusing on the final combined weight, weight values ranged from 163 (minimum) to a maximum weight value of 256,704. The coefficient of variation was 71.35, 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 Quarter 3 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 54 benchmark variables assessed, 46 had lower standardized and absolute bias using the final calibrated weights compared with the panel study weights for Panel Provider 1 while 21 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 for Panel Provider 1, more than half of the benchmark variables had an increase in bias as a result of calibration weighting for Panel Provider 2. Eight benchmark variables had an increase in bias compared to the NHIS for Panel Provider 1 while 33 benchmark variables had an increase in bias for Panel Provider 2, although most of the benchmark variables with an increase in bias for Panel Provider 2 had an increase of less than 0.5 percentage points (20 benchmark variables). The measures with increased bias were from a range of health domains, with most of the measures in the healthcare access domain (4 measures) for Panel Provider 1 and in the social determinants of health domain (13 measures) for Panel Provider 2.

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), 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 2.230 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 for Panel Provider 1 (46 variables). However, more than half of the benchmarking variables had an increase in bias for Panel Provider 2 after calibration weighting, particularly for variables in the social determinants of health 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-3, questions from the 2023 NHIS measuring disability, health behaviors, health status, healthcare access, healthcare utilization, and social determinants of health were included for benchmarking. The complete set of benchmarking questions is available in the codebook: www.cdc.gov/nchs/data/rss/round3/codebook.pdf.

RSS benchmark variables measuring 54 health outcomes were compared to the 2023 Quarter 3 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 0.04 percentage points (ever smoked an e-cigarette) to 12.81 percentage points (sometimes or often true couldn't afford to eat balanced meals in last 30 days) and varied by topic. In addition to the measure sometimes or often true couldn't afford to eat balanced meals in last 30 days, three additional measures had an absolute bias greater than 10 percentage points including ate less than you felt you should in last 30 days because there wasn't enough money for food; high food security; and ever hungry but didn't eat in last 30 days because there wasn't enough money for food. The standardized bias ranged from nearly 0 to 0.42 for the 54 health measures evaluated, with 35 measures having low bias (standardized bias less than 0.10), 16 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 six health domains: Disability; Health Behaviors; Health Status; Healthcare Access; Healthcare Utilization; and Social Determinants of Health. 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 0.05 (Health Behaviors) to 0.21 (Social Determinants of Health). Four health domains, Health Behaviors, Disability, Health Status, and Healthcare Utilization, had standardized biases less than 0.10 (low bias). Healthcare Access and Social Determinants of Health had standardized biases of 0.13 and 0.21, respectively (medium bias). No domains indicated high bias.

Summary

- The absolute bias of the selected benchmark variables compared to the NHIS ranged from 0.04 to 12.81 with most variables reporting an absolute bias of less than 3 percentage points.

- Among the 54 health measures evaluated, 35 measures had low standardized bias, 16 measures had medium standardized bias, and 3 measures had high standardized bias.

- The average standardized bias of estimates from RSS-3 compared to the NHIS varied by health domain. On average, four health domains had low bias (Health Behaviors, Disability, Health Status, and Healthcare Utilization) and two health domains had medium bias (Healthcare Access and Social Determinants of Health).

- 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 Social Determinants of Health had notable bias compared to the NHIS.

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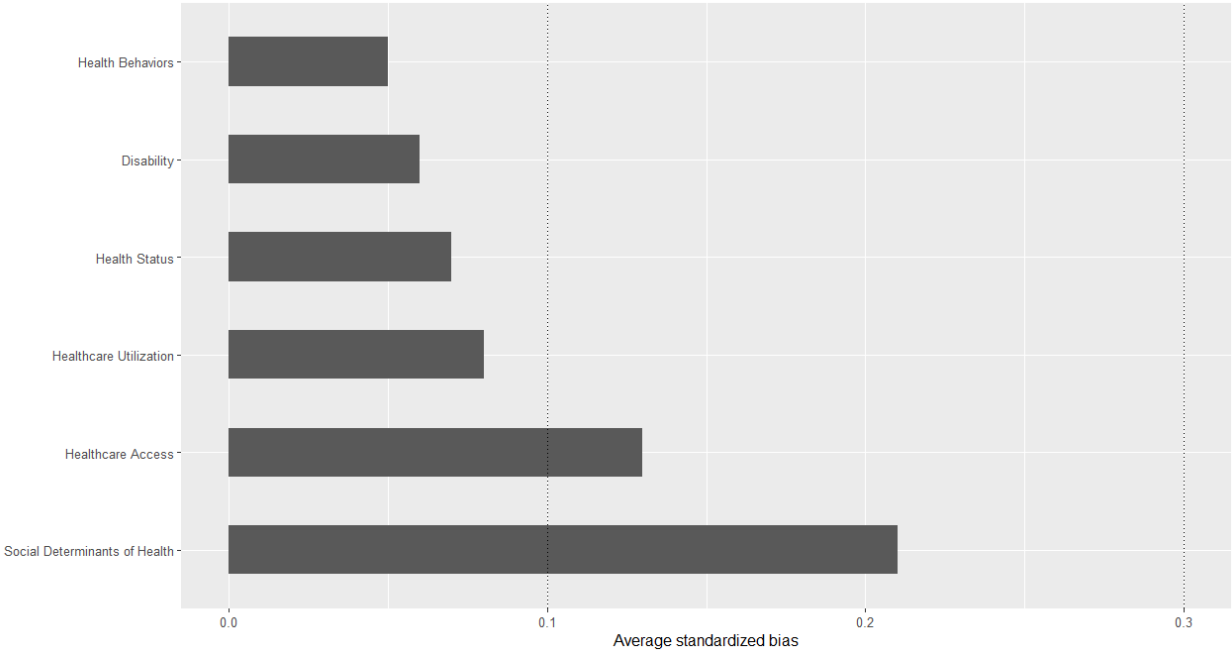Yan T. Consequences of asking sensitive questions in surveys. Annu. Rev. Stat. App., 8: 109-127. 2021.

Figure 1. Standardized bias of panel study and final calibrated weights for benchmarking variables by panel provider compared to the 2023 Quarter 3 National Health Interview Survey: Rapid Surveys System Round 3

Figure 2. Standardized bias of benchmarking variables compared to the 2023 Quarter 3 National Health Interview Survey: Rapid Surveys System Round 3

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