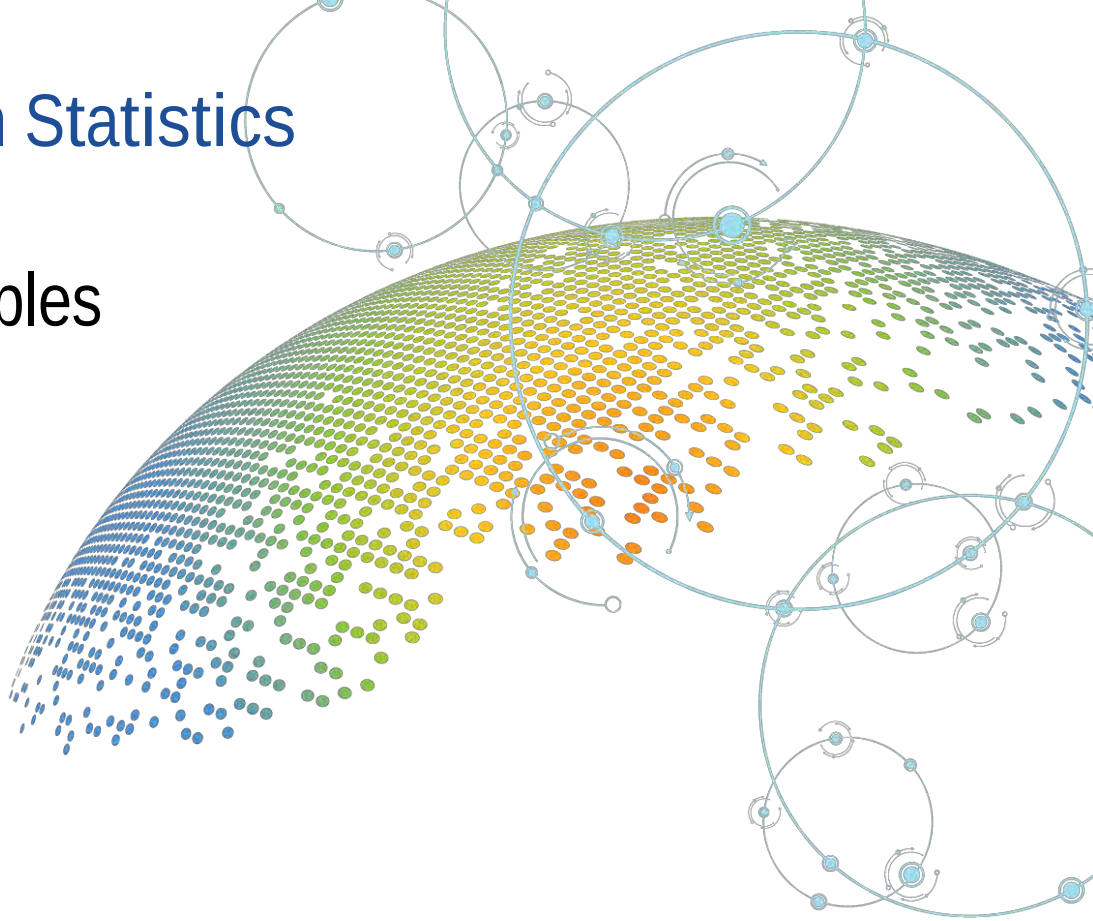
National Center for Health Statistics Rapid Surveys System:

calibrating blended samples



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RTI INTERNATIONAL

Outline

- Background
- Design
- Response rates & modes
- Data harmonization
- Weighting
- Benchmark Comparisons
- What's Next?

Background: Rapid Surveys System (RSS)

- **Objectives**
  - Time-sensitive data of known quality about emerging and priority health concerns.
  - Evaluate the quality of public health estimates generated from commercial online panels.
  - Improve methods to appropriately communicate the fitness for use of public health estimates generated from commercial online panels.
- **Rounds**
  - 2023: RSS-1; RSS-2
  - 2024: RSS-3; RSS-4; RSS-5
  - In future years, the number of rounds will vary depending on public health needs.

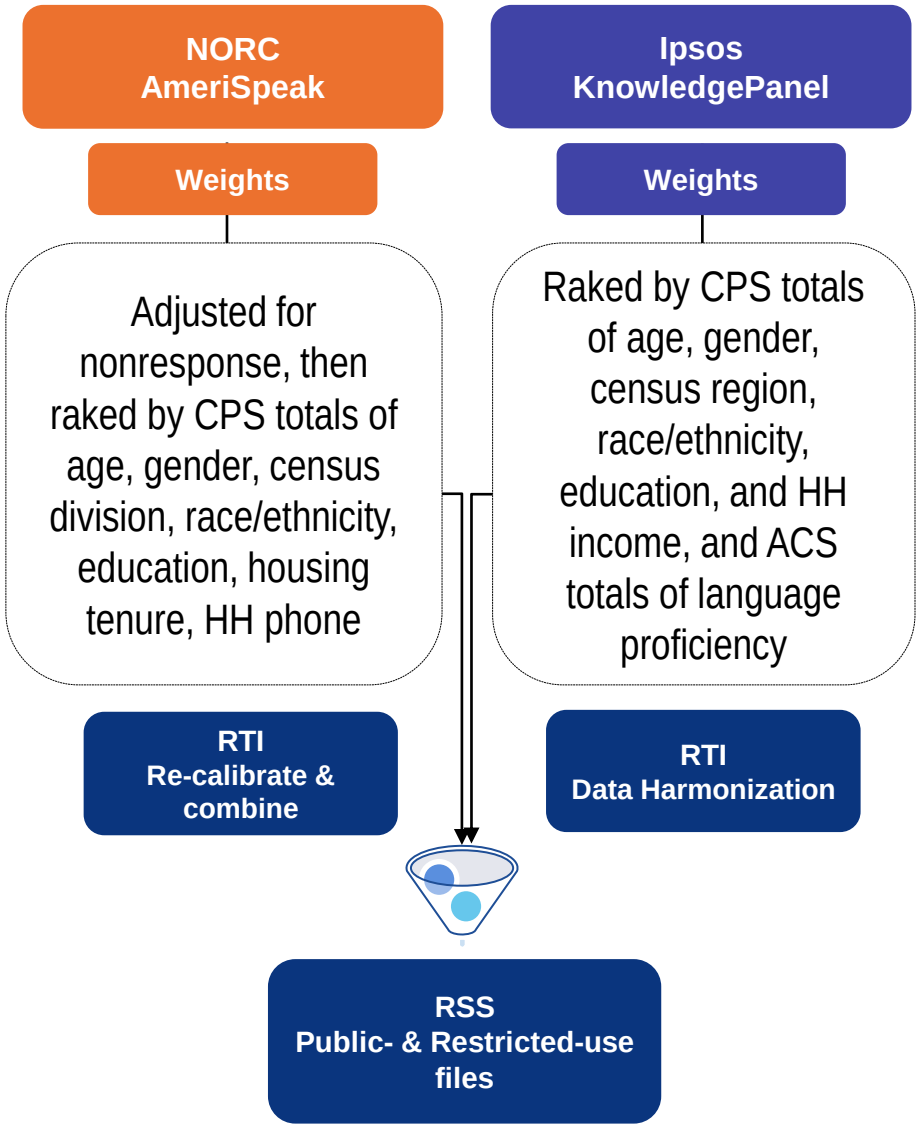
Design

Ipsos:

- Probability Proportional to Size (PPS) sample to Measure of Size (MOS) based on weights that account for gender, age, race/ethnicity, education, census region, household income, metropolitan area, and language proficiency.

NORC:

- Sample stratified by age, race/ethnicity, education, and gender.



Response Rates & modes

S: sampled; R: responded; RR: response rate (i.e., completion rates of panelists)

	RSS-1			RSS-2			RSS-3		
	S	R	RR	S	R	RR	S	R	RR
Panel provider 1	6,739	4,701	70%	6,086	4,197	69%	5,790	4,170	72%
Panel provider 2	11,568	2,898	25%	12,842	2,849	22%	15,322	4,205	27%
RSS	18,307	7,599	42%	18,928	7,046	37%	21,112	8,375	40%

Active panelists

All panelists

% of interviews by mode

	RSS-1		RSS-2		RSS-3	
	CAWI	CATI	CAWI	CATI	CAWI	CATI
Panel provider 1	100%	0%	100%	0%	100%	0%
Panel provider 2	95%	5%	91%	9%	89%	11%

Data Harmonization

- RTI provides layout of questionnaire variables.

Variables	Characteristics
Questionnaire	Questions share same wording and options.
Panel	Different background characteristics across panels.
Design	Different intermediate weights (including stratification and clustering)

- Harmonization activities involve checks for:
  - The use of common variable names;
  - The use of same answer options and skip logics;
  - Frequencies across samples;
  - Missing data patterns;
  - Patterns of drop-outs;
- Harmonization activities also involve fixing any inconsistencies resulting from the checks above.

Weighting

Weighting steps can be summarized as follows:

- Selection probability weights.
- Weight adjustments: e.g., NORC adjusts for nonresponse.
- Post-stratification to population benchmarks.

Panel providers

- Rake panel final weights based on selected variables from the National Health Interview Survey (NHIS): 10-13 variables.
- Concatenate data (including raked weights)
- Estimate a composite factor to combine data across samples.
- Adjust the raked weights using the composite factor.

RTI

Weighting:
Calibration totals

Calibration totals are from The NHIS Early Release data:

- RSS-1: NHIS 2023 Q1.
- RSS-2: NHIS 2023 Q2.
- RSS-3: NHIS 2023 Q3.

Calibration (raking) using SUDAAN – *WTADJUST.*

Variable Label	Value Levels
Age Grouping	1 = "18-34“ 2 = "35-49" 3 = "50-64“ 4 = "65+"
Gender	1 = "Male“ 2 = "Female"
Race/ethnicity	1 = "Hispanic“ 2 = "NH White" 3 = "NH Black“ 4 = "NH Other"
Education	1 = "Less than HS" 2 = "HS degree or equiv." 3 = "Some college or above"
Income	1 = "$0-49,999" 2 = "$50,000 - 99,999" 3 = "$100,000+"
Region	1 = "Northeast“ 2 = "Midwest" 3 = "South“ 4 = "West"
Housing Tenure	1 = "Own or being bought" 2 = "Rent/other arrangement"
MSA Status	1 = "Metro (1,2,3)" 2 = "Non-metro (4)"
Marital Status	1 = 'Married' 2 = 'Not married'
High Cholesterol, Ever	1 = "Yes“ 0 = "No"
Difficulty Participating in Social Activities	1 = "No difficulty/some difficulty" 2 = "A lot of difficulty/cannot do this at all"
Civic Engagement	1 = "Yes“ 2 = "No"

Weighting: *Combine Calibrated Weights*

Where p_1 and p_2 are estimates from panel providers, an RSS estimate is

$$p = \lambda_1 \, p_1 + \, (1 - \lambda_1) \, p_2$$

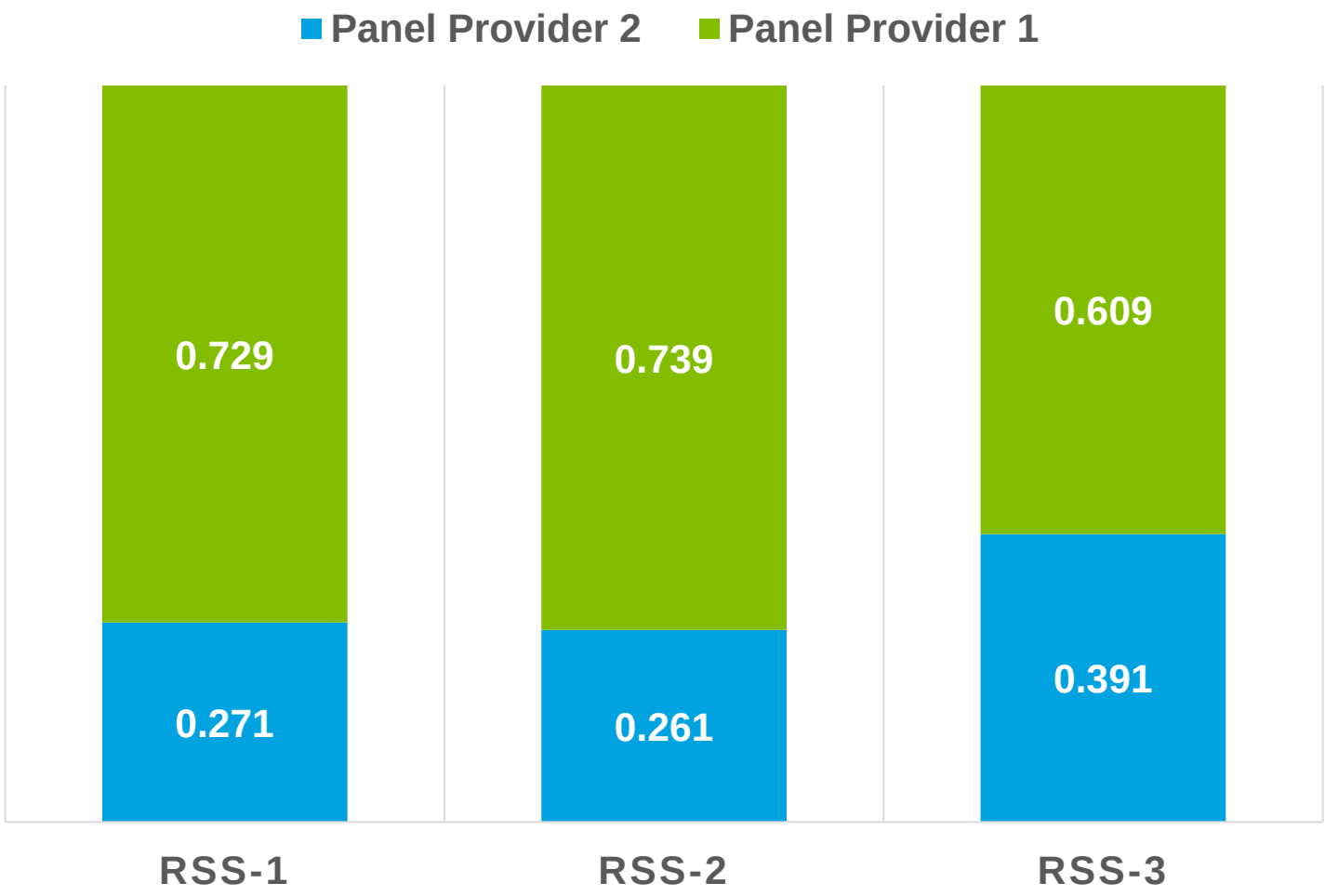
where λ_1 is a composite factor that is a ratio of the effective sample sizes

$$\lambda_1 = \frac{n_{e,1}}{n_{e,1} + n_{e,2}} \qquad \textit{where} \qquad n_{e,i} = \frac{(\sum_s w_k)^2}{\sum_s w_k^2}$$

The standard error of *p* is

$$se(p) = \sqrt{\left(\lambda_1 \, se(p_1)\right)^2 + \left((1 - \lambda_1) \, se(p_2)\right)^2}$$

Weighting: *Composite factor*



Benchmark Comparisons

Topics	Benchmarks
RSS-1	**48**
Health Behaviors	3
Health Status	28
Healthcare Access	8
Healthcare Utilization	8
Long COVID	1
RSS-2	**46**
Chronic conditions	3
Health Behaviors	3
Health Status	1
Healthcare Access	14
Healthcare Utilization	8
Mental health	10
Pain	3
Social Determinants of Health	2
Work days missed due to illness	2
RSS-3	**55**
Chronic conditions	5
Disability	9
Health Behaviors	6
Health Status	1
Healthcare Access	7
Healthcare Utilization	12
Social Determinants of Health	15

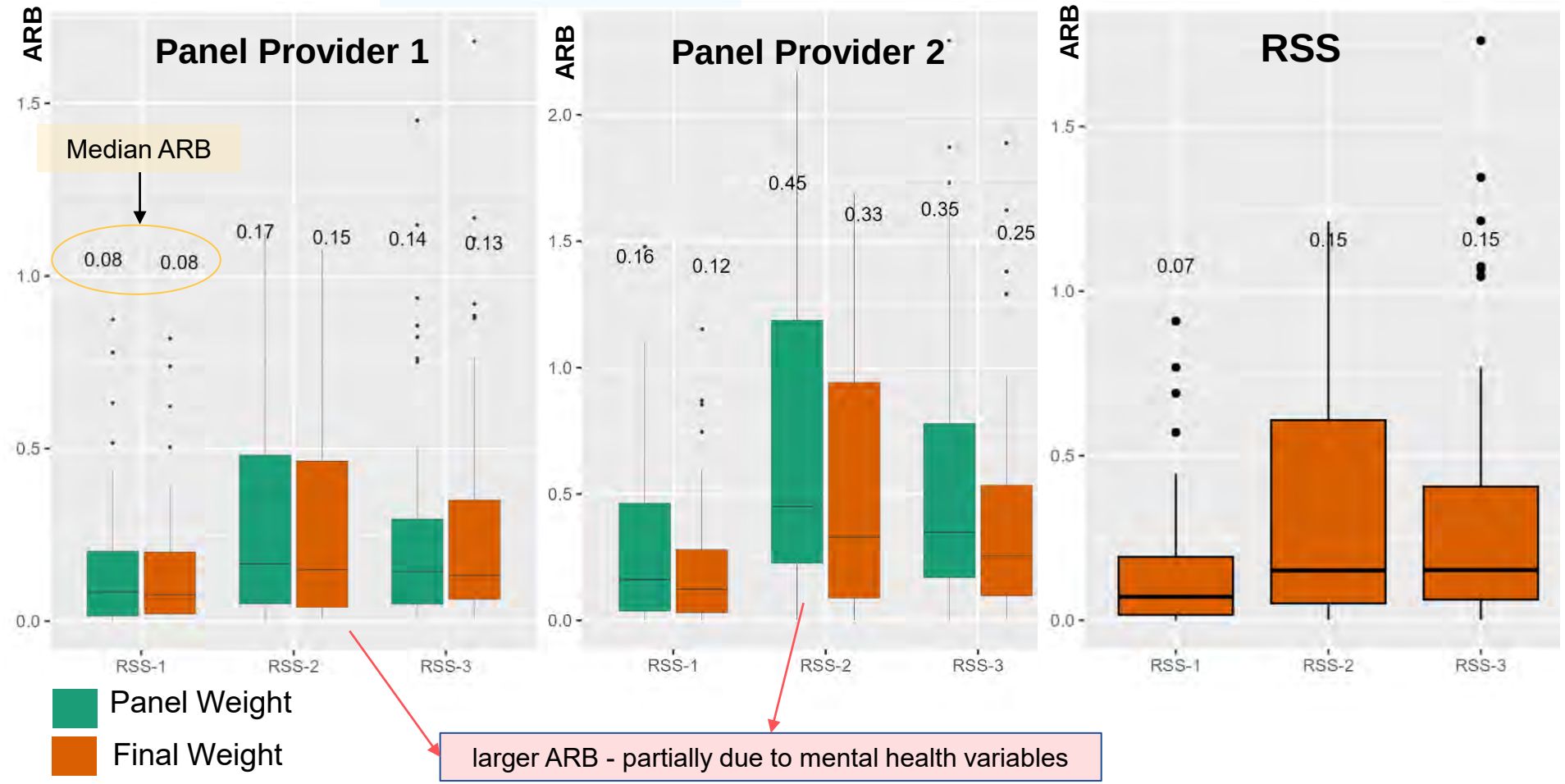
Common Benchmarks across RSS1-RSS3	
1	Excellent or very good health (self-rated)
2	Ever diagnosed with hypertension
3	Ever diagnosed with asthma
4	Ever diagnosed with cancer
5	Ever smoked 100 cigarettes
6	Currently smoke every day or some days
7	Current cigarette smoking
8	Place usually go to when sick and need health care
9	Doctor's office or health center
10	Urgent care center/clinic in drug store
11	All other kinds of places
12	Usual source of care
13	Hospitalized overnight in past 12 months
14	Saw doctor/other health professional in past 12 months

Benchmark Comparisons: *Absolute Relative Bias (ARB)*

RSS $\longleftarrow \frac{|\hat{y}_r - \hat{y}_B|}{\hat{y}_B} \longrightarrow$ benchmarks

Mean ARB (%)

RSS	Weight	Provider 1	Provider 2	RSS
1	Panel Weight	**11%**	**25%**	
1	Final Weight	10%	17%	**12%**
2	Panel Weight	**26%**	**68%**	
2	Final Weight	24%	51%	**31%**
3	Panel Weight	**18%**	**51%**	
3	Final Weight	22%	39%	**28%**

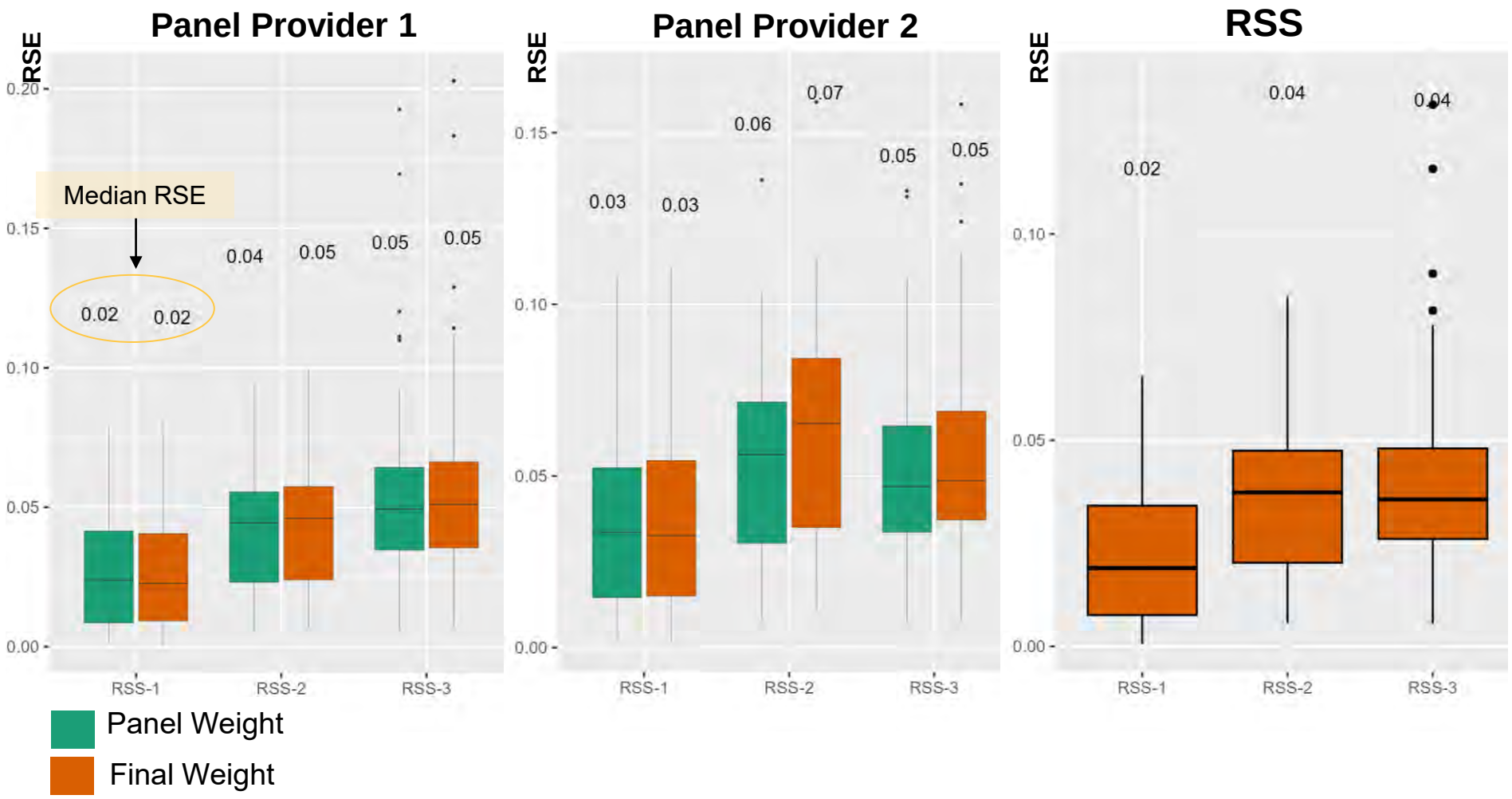


Benchmark Comparisons:
Absolute Relative Bias (ARB)

	p > .05			**.001 < p ≤ .05**			**p ≤ .001**		
RSS	Benchmarks	Mean |Differences|	Mean ARB	Benchmarks	Mean |Differences|	Mean ARB	Benchmarks	Mean |Differences|	Mean ARB
1	19	0.13	0%	9	0.41	4%	20	2.04	26%
2	18	0.04	0%	4	0.01	15%	24	4.74	56%
3	18	0.01	2%	12	0.92	17%	25	4.07	53%

Benchmark Comparisons:
Relative Standard Error

$$RSE = \frac{\widehat{se}_r}{\hat{y}_r}$$



Benchmark Comparisons:
Absolute Relative Bias – common benchmarks

Based on smokers only

Mode effect ??

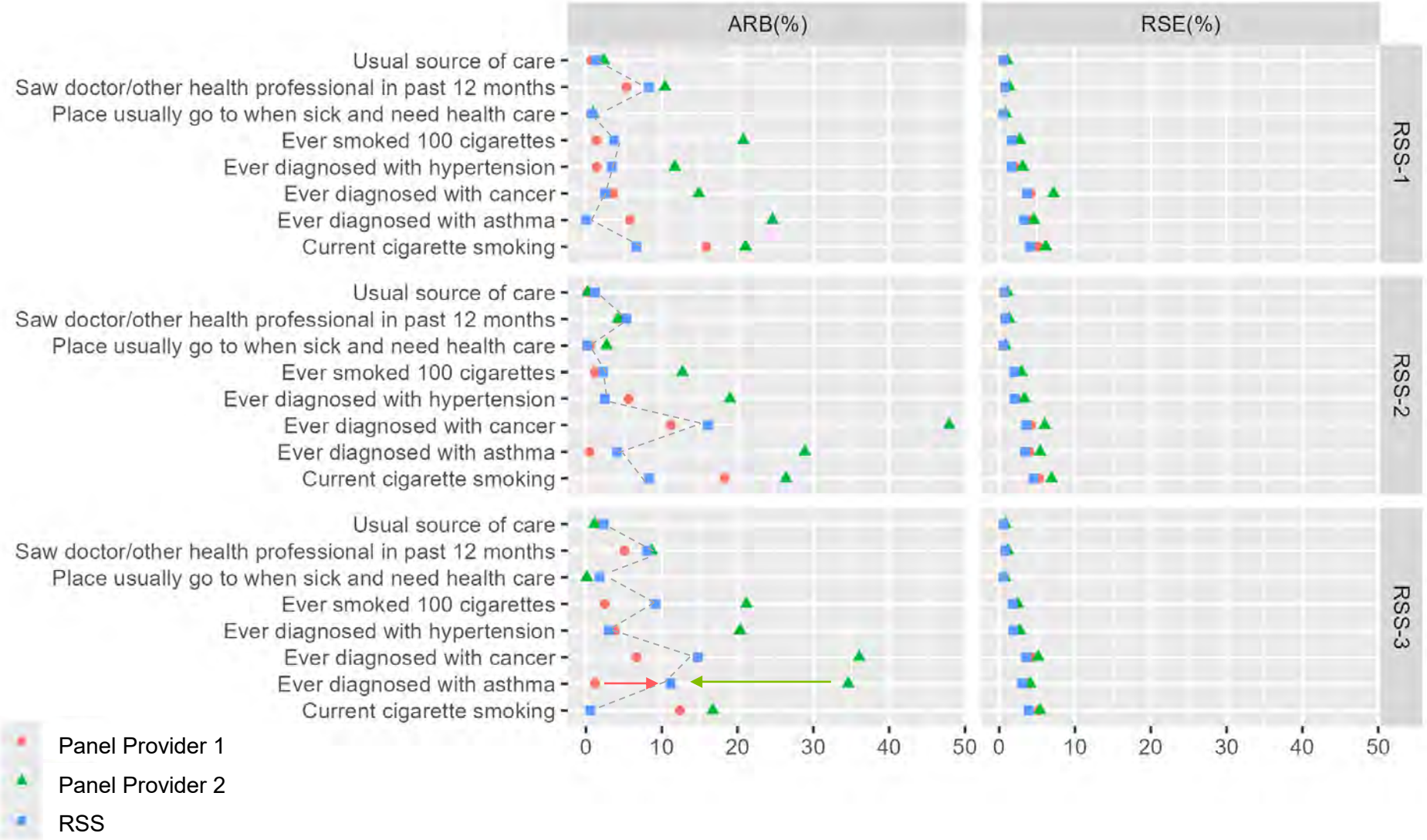
Low prevalence 3-8%

Benchmark	RSS-1	RSS-2	RSS-3
Ever smoked 100 cigarettes	3.71%	2.27%	9.18%
Current cigarette smoking	6.63%	8.33%	0.56%
Currently smoke every day or some days	9.71%	10.22%	7.88%
Ever diagnosed with asthma	0.02%	4.12%	11.15%
Ever diagnosed with cancer	2.51%	16.10%	14.78%
Ever diagnosed with hypertension	3.39%	2.47%	3.00%
Excellent or very good health (self-rated)	16.89%*	14.21%*	15.26%*
Hospitalized overnight in past 12 months	15.21%	11.11%	6.33%
Place usually go to when sick and need health care	0.84%	0.19%	1.82%
Saw doctor/other health professional in past 12 months	8.30%*	5.34%*	8.05%*
Usual source of care	1.35%	1.18%	2.34%
What kind of place: all other kinds	23.80%	63.53%*	17.08%
What kind of place: doctor's office or health center	7.30%*	4.84%*	5.38%*
What kind of place: urgent care center/clinic in drug store	44.56%*	36.51%*	29.69%*

Not significant increases

** p-value ≤ .001*

Benchmark Comparisons:
Absolute Relative Bias – common benchmarks



What is Next?

- Examine new calibration variables in next rounds.
- Examine the impact on more benchmarks.
- Keep tracking the impact on the common benchmarks.

Thank you

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