

NONRESPONSE BIAS ANALYSES FOR THE REDESIGNED NATIONAL HEALTH INTERVIEW SURVEY

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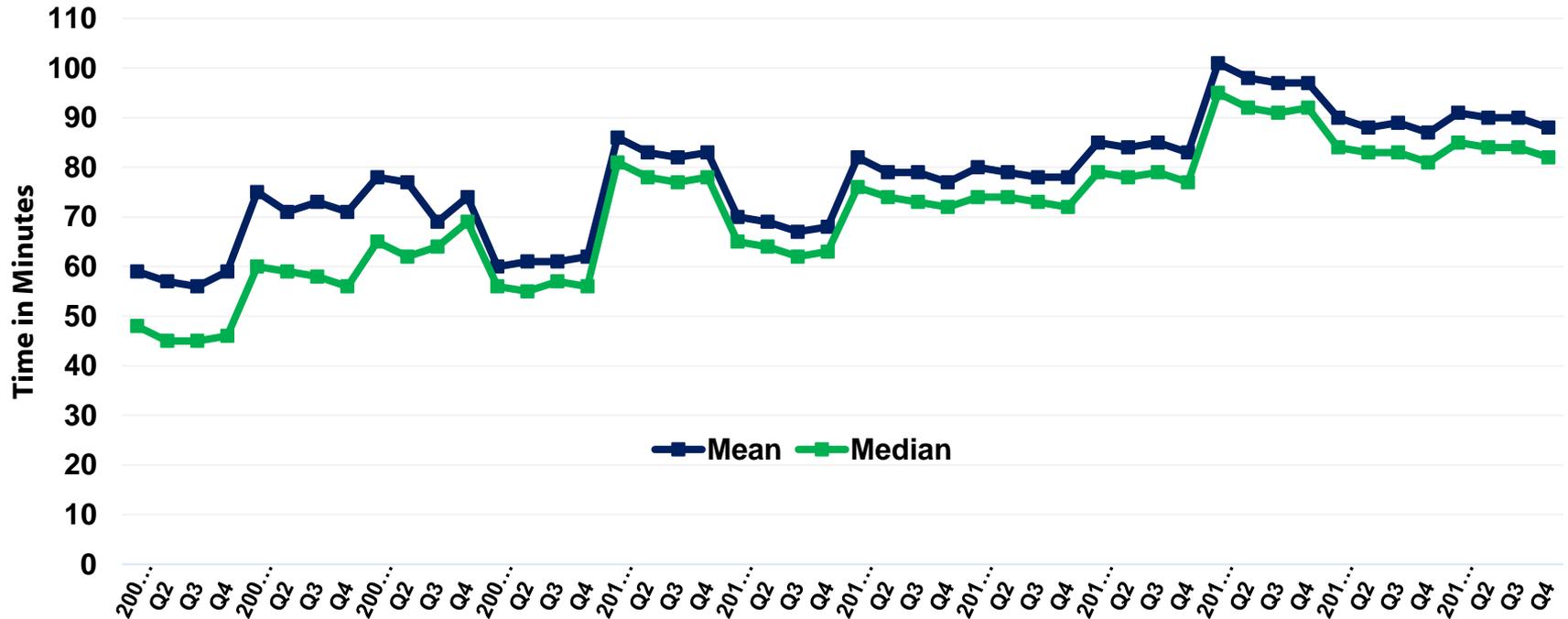
NCHS Board of Scientific Counselors Meeting

September 5, 2019

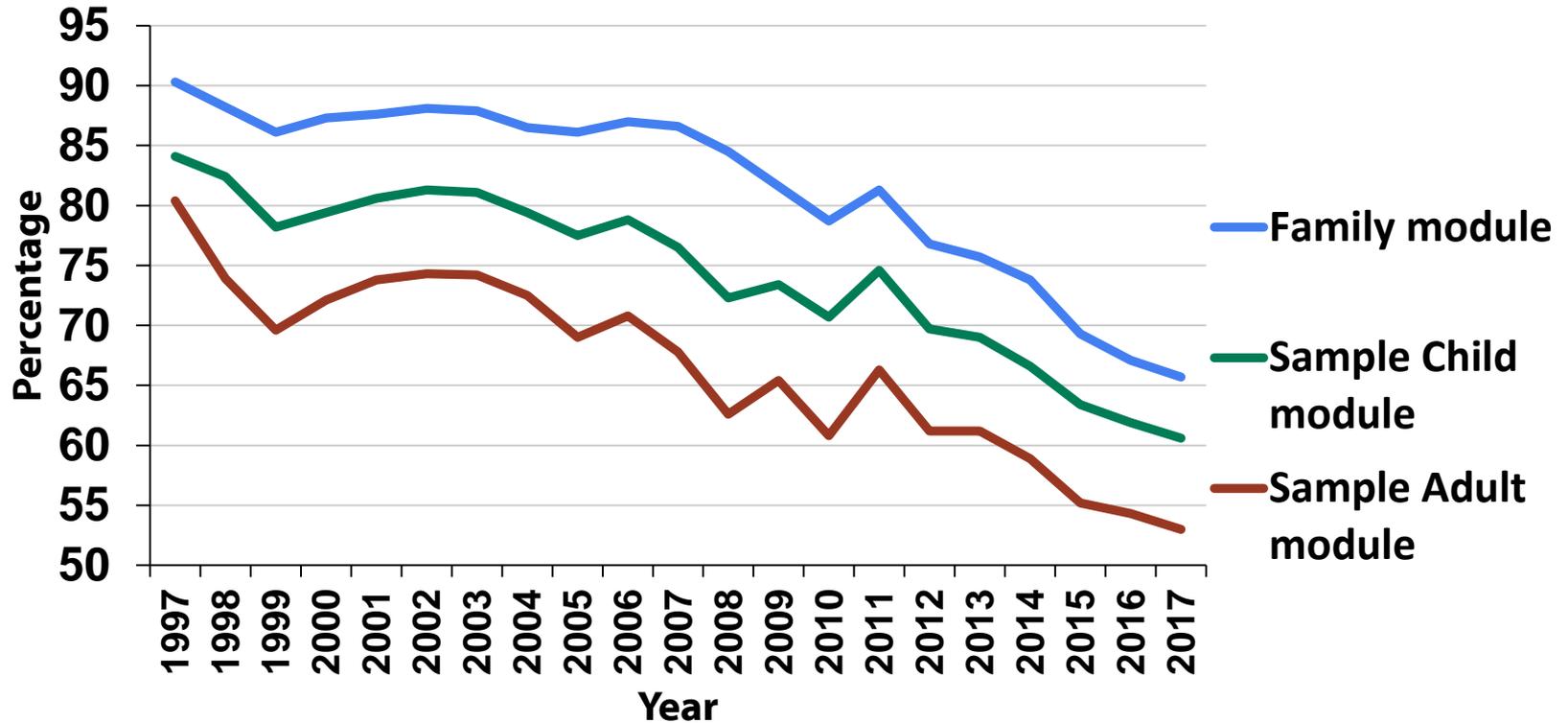
Why Did We Redesign the Questionnaire?

- Most recent major content redesign was 1997
- Respondent burden increasing and response rates decreasing

Length of Completed Interviews, by Quarter: NHIS, 2006, Q1 -- 2018, Q4 (October)



NHIS Family, Child, and Adult Response Rates, NHIS 1997-2017



Goals of the 2019 Questionnaire Redesign

- Improve the relevance of covered health topics, better meeting the needs of the Department of Health and Human Services and other data users
- Harmonize overlapping content with other federal health surveys
- Reduce respondent burden and improve data quality
- Shorten questionnaire and reduce variation in interview times
- Eliminate or reduce content better covered by other methods

Annual Content Plan 2019-2027

Annual core

- Key measures
- Sociodemographics

Rotating core

- Newer topic areas
- Expanded detail
- Varying periodicity

Sponsored supplements

- “Sustaining” sponsors
- 1- or 2-year modules
- 5 min or less

One adult and one child randomly selected from each household

- Demographics for all HH members
- Family info collected from sample adult and parent of sample child

	2019	2020	2021	2022	2023	2024	2025	2026	2027
Annual core	Household Roster - Selection of Sample Adult - Informed Consent								
	<p>Chronic Conditions: Hypertension; High Cholesterol; Cardiovascular Conditions; Asthma; Cancer; Diabetes; Other Chronic Conditions; Height and Weight</p> <p>Functioning and Disability: Vision; Hearing; Mobility; Communication; Cognition; Self-Care and Upper Body Limitations; Anxiety; Depression; Social Functioning</p> <p>Health Insurance: Coverage Status; Sources of Coverage; Characteristics of Coverage; Continuity of Coverage; Reasons for No Health Insurance</p> <p>Health Care Access and Use: Primary and Urgent Care; Financial Barriers to Care; Prescription Medication; Flu and Pneumonia Immunization</p> <p>Health-Related Behaviors: Cigarettes and E-cigarettes</p> <p>Demographics: Marital Status; Sexual Orientation; Veterans Status; Nativity; Schooling; Employment; Family Income; Food-Related Program Participation; Housing; Telephone Use</p>								
Rotating core	Service Utilization: Dental Care; Mental Health Care; Other Services		Allegies and Other Conditions	Service Utilization: Dental Care; Mental Health Care; Other Services		Allegies and Other Conditions	Service Utilization: Dental Care; Mental Health Care; Other Services		Allegies and Other Conditions
			Psychological Distress			Psychological Distress			Psychological Distress
	Mental Health Assessment [†]	Industry and Occupation		Mental Health Assessment [†]	Industry and Occupation		Mental Health Assessment [†]	Industry and Occupation	
			Injuries			Injuries			Injuries
Chronic Pain: Severity and Impact; Locations		Health-Related Behaviors: Physical Activity; Walking; Sleep;	Chronic Pain: Severity and Impact; Locations	Health-Related Behaviors: Physical Activity; Walking; Sleep;	Chronic Pain: Severity and Impact; Locations	Health-Related Behaviors: Physical Activity; Walking; Sleep;	Chronic Pain: Severity and Impact; Locations	Health-Related Behaviors: Physical Activity; Walking; Sleep;	Chronic Pain: Severity and Impact; Locations
Preventive Services: Screening Tests; Aspirin Use		Fatigue; Smoking History and Cessation; Alcohol Use	Preventive Services: Screening Tests; Aspirin Use	Fatigue; Smoking History and Cessation; Alcohol Use	Preventive Services: Screening Tests; Aspirin Use	Fatigue; Smoking History and Cessation; Alcohol Use	Preventive Services: Screening Tests; Aspirin Use	Fatigue; Smoking History and Cessation; Alcohol Use	Preventive Services: Screening Tests; Aspirin Use
Sponsored content	Sustaining sponsors* add content every year. Annual sponsored content will include cancer control and prevention (NCI and NCCDPHP), immunizations (NCIRD), non-cigarette tobacco product use (FDA), and food security (USDA).								
	Other sponsors* add content in selected years. Anticipated sponsorships include expanded content on arthritis in 2019 (NCCDPHP and NIAMS), insulin use in 2019 (NIDDK and NCCDPHP), diabetes in 2020 (NCCDPHP), and complementary and integrative health in 2022 (NCCIH).								
Emerging topics	New topics of growing interest may be added by NCHS, generally for one year. In 2019, the topics are prescription opioid use and pain management.								

Impact on Response and Nonresponse

- Average length of a household interview now less than 60 minutes
- Sample adult response rates are up by about 6 percentage points
- Nonresponse to the family interview is no longer a factor
- Less information available for nonresponse adjustments at the Sample Adult and Sample Child level

Current (Pre-Redesign) NHIS Weighting

- Weighting class adjustment approach to correct for nonresponse
 - Applied at the geographic area unit
- Ratio adjustment to independent population estimates
 - Applied by sex, age groups, and race/ethnicity groups
- Does not employ any nonresponse prediction or use any appended data that could provide correlates of nonresponse and nonresponse bias

NHIS Nonresponse Bias Analysis Goals

- Quantify nonresponse bias present in the redesigned NHIS
- Evaluate current NHIS weighting against other weighting methods
 - Focus on bias reduction in key health indicators
 - Take advantage of improvements in:
 - Auxiliary data and paradata
 - Machine learning methods and other advanced statistical models
- Obtain evidence for whether to implement a new weighting approach

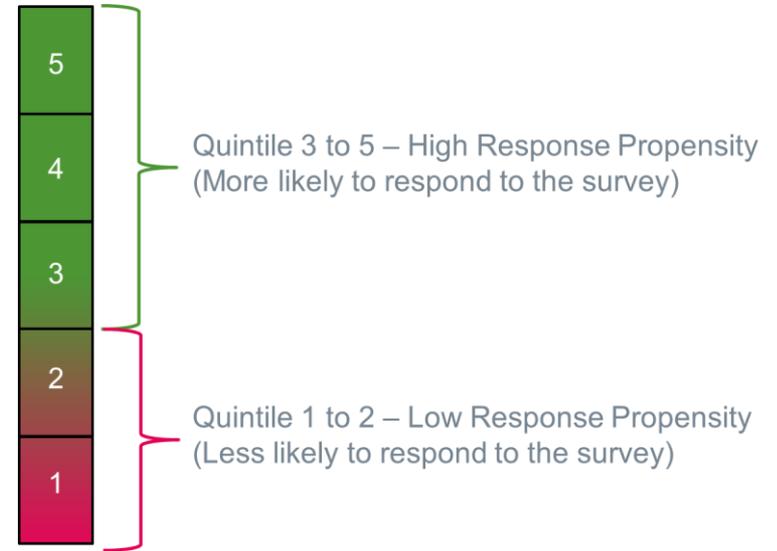
➤ Contract awarded to ICF 

Stage 1: Nonresponse Bias Modeling

- Separate prediction models for household, adult and child response
- Data sources included:
 - Contact History Instrument, Neighborhood Observations Instrument
 - Census Planning Database, Area Health Resources Files
- Predictors selected based on:
 - Bivariate relationship with response in Q1/2019
 - Significant association with key health indicators
- Models selected based on performance metrics (AUC and Brier score)
 - Moved forward with best logistic model and machine learning model

Stage 2: Nonresponse Bias Estimates

- Propensity scores based on the models were divided into quintiles
- Estimates for key health indicators compared between two groups defined by response quintiles
- Significant difference indicates nonresponse bias



Stage 3: Development of Alternative Weights

- Explored modifications to the NHIS weighting procedures designed to reduce the potential for nonresponse bias
 - Adjusting for nonresponse by using predictive models for the response propensity
 - Calibrating to additional population estimates: education, employment, and MSA status (urban vs. non-urban)
- Assessed characteristics of the nonresponse adjustment weights and the final calibrated weights

Stage 4: Comparing Fully-Weighted NHIS Estimates

- Considered point estimates and standard errors for 28 health indicators

Health Construct	Adult or Child Sample	Inclusion Rationale
Health Insurance Coverage		
Public health insurance	Adult & Child	Past/Future NHIS Early Release Indicator
Private health insurance	Adult & Child	Past/Future NHIS Early Release Indicator
Uninsured	Adult & Child	Past/Future NHIS Early Release Indicator
Health Care Service Use		
Emergency dept. visit past year	Adult & Child	Future NHIS Early Release Indicator
Doctor visit past year	Adult & Child	Future NHIS Early Release Indicator
Influenza vaccination past year	Adult & Child	Past/Future NHIS Early Release Indicator
Mental health counseling or therapy past year	Adult & Child	Future NHIS Early Release Indicator
Health Status		
Disability	Adult & Child	Future NHIS Early Release Indicator
Asthma episode, past year	Adult & Child	Past/Future NHIS Early Release Indicator
Diagnosed Hypertension	Adult	Future NHIS Early Release Indicator
Obese	Adult	Past NHIS Early Release Indicator
Excellent or very good health	Adult & Child	Past NHIS Early Release Indicator
ADHD	Child	Child Health Indicator with Relatively High Prevalence
Health Care Access		
Usual source of care	Adult & Child	Past NHIS Early Release Indicator
Skipped prescription med doses to save money past year	Adult	Future NHIS Early Release Indicator
Health Behaviors		
Cigarette smoker	Adult	Past/Future NHIS Early Release Indicator
Stressful Life Events		
Stressful life events	Child	New NHIS Content

Stage 5: Evaluating Tradeoffs

- Substantial reduction in nonresponse bias comes at a cost
 - Increased variance and design effects
 - Decreased effective sample size and reduced power
 - Increased complexity of application and replication
 - Reduced transparency in weighting process

How the BSC Can Help

- **Review the results**

- What do the results suggest about the need for NCHS to implement a new weighting approach?
- Are the results sufficient to draw conclusions about the best weighting strategy?

- **Share your conclusions**

- Given these results, what advice do you have regarding weighting?
- Are there additional analyses that we should conduct?
- How should the results of those new analyses guide NCHS decision-making regarding weighting?

For More Information About the Redesign

https://www.cdc.gov/nchs/nhis/2019_quest_redesign.htm