The Impact of Questionnaire Mode on Estimates of Health Insurance Coverage and Vaccines for Children Program Eligibility in the National Immunization Survey

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Abstract

The National Immunization Surveys (NIS) monitor vaccination coverage and access to care in the United States among children ages 19-35 months (NIS-Child), adolescents ages 13-17 years (NIS-Teen), and for influenza vaccination, children ages 6 months-17 years (NIS-Flu). The NIS currently operates as a random digit dialing (RDD) mobile telephone survey. However, from January 19 through July 9, 2021, a pilot was conducted to assess the viability of using an address-based sampling (ABS) approach with multiple modes of data collection, including a self-administered web survey and self-administered paper-and-pencil interviewing (PAPI) in addition to telephone interviewing.

The NIS-ABS Pilot used modified versions of the current NIS-RDD questionnaires to accommodate multiple modes of data collection, with one of the most significant modifications related to the way health insurance coverage is assessed. In particular, the addition of self-administered questionnaire formats and space limitations of the PAPI component necessitated the consolidation of multiple health insurance questions from the RDD survey into a single health insurance question, and removal of interviewer help text and state-specific text that is automatically populated when using a computer-assisted telephone interviewing (CATI) system. We compared estimates of health insurance coverage and eligibility for the Vaccines for Children (VFC) program obtained from the RDD and ABS versions of the NIS questionnaires and found estimates from the NIS-ABS Pilot indicated higher rates of private insurance coverage and lower rates of coverage with Medicaid and other public insurance types compared to the NIS-RDD. Additionally, estimates of VFC eligibility were higher in the NIS-RDD compared with the NIS-ABS Pilot version. These differences were most prominent from web interviews and appear to be attributable to a combination of questionnaire differences and differences in the characteristics of the two sets of respondents by survey administration mode. In this paper, we discuss how questionnaire design and questionnaire administration mode may influence health insurance coverage reporting and estimation for VFC eligibility.

Key Words: Address-Based Sampling, Mode Effects, Health Insurance, Vaccines for Children Program

1. Introduction

A large body of research has demonstrated that survey administration mode and questionnaire wording can have a significant impact on survey responses and estimates (Roberts 2007; Lugtig et al., 2011), and adapting a telephone survey to multiple modes of data collection can be fraught with challenges (Olson et al., 2021). It is therefore critical to evaluate the potential impact of these factors before making any major changes to a survey's methodology to avoid introducing unforeseen biases into survey estimates.

The National Immunization Surveys (NIS) serve as an important source of national, state, and local estimates for vaccination coverage, health insurance coverage, and Vaccines for Children (VFC) program eligibility among children and adolescents in the United States. Since its inception in 1994, the NIS has operated as a random digit dialing (RDD) telephone survey consisting of a household interview by telephone, followed by a questionnaire mailed to providers (for more information about the methodology of the NIS, see Wolter et al., 2017). In 2021, a pilot project was conducted to assess the feasibility of conducting the NIS with an address-based sample (ABS) and multiple modes of household data collection. Administering an ABS design necessitated several modifications to the questionnaire, particularly to questions about health insurance coverage. This paper will examine the impact of these methodological changes by comparing health insurance and VFC eligibility rate estimates obtained from the NIS-ABS Pilot with those produced by NIS-RDD.

2. Methodology

The NIS-ABS Pilot was conducted between January 19 and July 9, 2021 in four geographic areas (Louisiana, Missouri, Nevada, and New York City) and ran concurrently to the main NIS-RDD survey using a separately-drawn sample of addresses. Whereas NIS-RDD is conducted entirely by telephone, the NIS-ABS Pilot used a sequential, multimode design featuring web, paper-and-pencil interviewing (PAPI), and computer-assisted telephone interviewing (CATI) modes for the household interview, as illustrated in Figure 1. This was followed by a mailed questionnaire to providers which was identical to that used for the RDD survey.

Detailed health insurance coverage information is collected in two component NIS surveys: the NIS-Child, which covers children aged 19-35 months, and the NIS-Teen, which covers adolescents aged 13-17 years. For NIS-RDD, this health insurance information is collected in a Health Insurance Module (HIM) which is administered at the end of each survey. The HIM consists of a series of yes-or-no questions which are used to determine if the target child or adolescent is covered by each of six types of health insurance, including private insurance, Medicaid, the Children's Health Insurance Program (CHIP), Indian Health Services (IHS), military insurance, or another form of health insurance. Follow-up questions are then asked to further classify any "other" forms of health insurance, or to confirm if the child or adolescent is currently uninsured.

Figure 1: Summary of Data Collection Protocols for the NIS-RDD and NIS-ABS Pilot
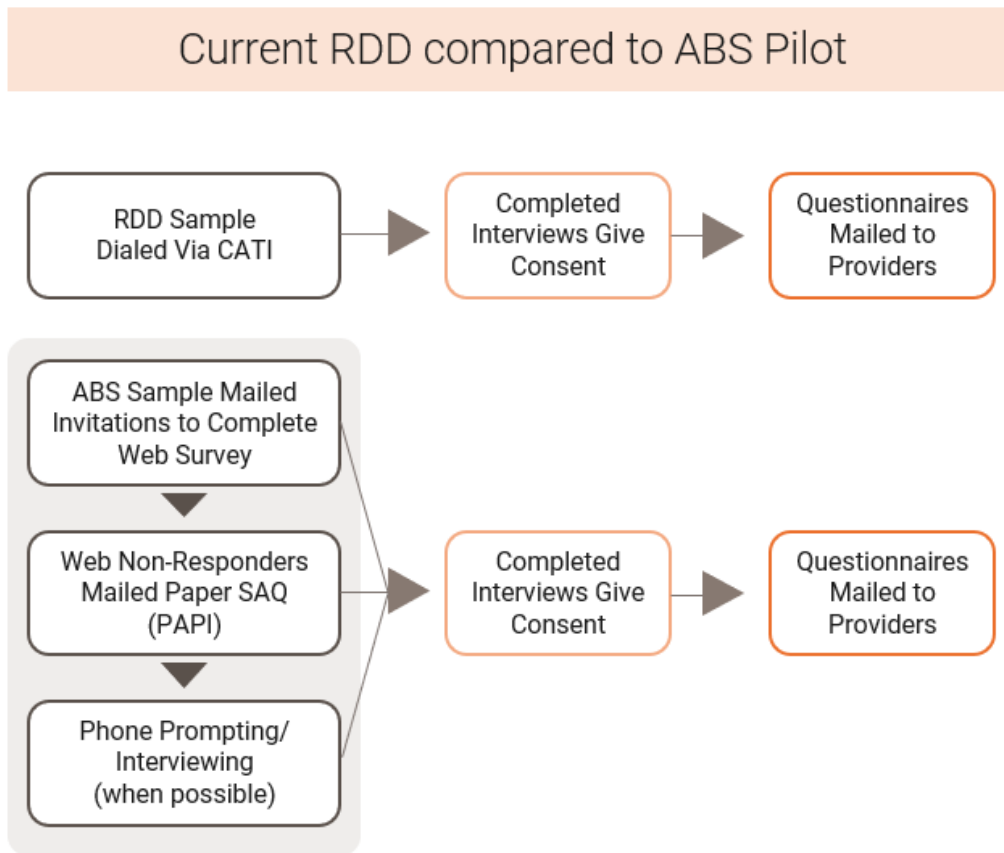
Figure 2 provides the question wording used to assess health insurance coverage in the NIS-RDD HIM. In addition to the main question text, telephone interviewers are provided with optional help text and probes to help respondents more accurately classify their child's health insurance type. When asking about state-based public programs like Medicaid and CHIP, the question text also includes a brief description of the program, and when applicable, provides the state-specific name of the program in the respondent's area of residence, which may be more familiar to the respondent than more generic terms like "Medicaid" or "CHIP."

Figure 2: Example NIS-RDD Health Insurance Module Questions

INS_1   Next I'm going to ask you a few questions about **CHILD**'s health insurance.

At this time, is **CHILD** covered by health insurance that is provided through an employer or union?

READ ONLY IF NECESSARY: These plans may be provided in part or fully by a current employer, a former employer, a union, or a professional organization.

IF ONLY PLAN NAME OFFERED, PROBE (READ IF NECESSARY): Is this insurance provided through an employer or union? Do not include dental, vision, school, or accident insurance.

IF NECESSARY, TO HELP THE RESPONDENT DETERMINE WHAT KIND OF INSURANCE THEY HAVE, PROBE (READ IF NECESSARY): Did you get that insurance through an employer? Does it help pay for both doctor visits and hospital stays?

INS_1A   [IF YES, ask:] Does this health insurance help pay for both doctor visits and hospital stays?

INS_2   [IF RESPONDENT LIVES IN A STATE WITH SEPARATE MEDICAID AND CHIP PROGRAMS, ask:] At this time, is **CHILD** covered by any Medicaid plan? Medicaid is a health insurance program for persons with certain income levels and persons with disabilities. [IF APPLICABLE: In this state, the program is sometimes called **STATE PROGRAM NAME**].

READ IF NECESSARY: Medicaid is a federal-state medical assistance program. It serves low-income people of every age. Medical bills are paid from federal, state and local tax funds. Patients usually pay no part of costs for covered medical expenses. It is run by state and local governments within federal guidelines.

IF NECESSARY, TO HELP THE RESPONDENT DETERMINE WHAT KIND OF INSURANCE THEY HAVE, PROBE (READ IF NECESSARY): Did you get that insurance through an employer? Does it help pay for both doctor visits and hospital stays?

INS_3   [IF RESPONDENT LIVES IN A STATE WITH SEPARATE MEDICAID AND CHIP PROGRAMS, ask:] At this time, is **CHILD** covered by the Children's Health Insurance Program or CHIP? In this state, the program is sometimes called **STATE PROGRAM NAME**.

READ IF NECESSARY: The Children's Health Insurance Program (CHIP), created under Title XXI of the Social Security Act, expands health coverage to uninsured children whose families earn too much for Medicaid but too little to afford private coverage.

IF NECESSARY, TO HELP THE RESPONDENT DETERMINE WHAT KIND OF INSURANCE THEY HAVE, PROBE (READ IF NECESSARY): Did you get that insurance through an employer? Does it help pay for both doctor visits and hospital stays?

INS_3A   [IF RESPONDENT LIVES IN A STATE WITH COMBINED MEDICAID AND CHIP PROGRAMS, ask:] At this time, is **CHILD** covered by any Medicaid plan or the Children's Health Insurance Program, which are health insurance programs for persons with certain income levels and persons with disabilities? In this state, it is sometimes called **STATE PROGRAM NAME**.

READ IF NECESSARY: Medicaid and CHIP are federal-state medical assistance programs. They serve low-income people of every age. Medical bills are paid from federal, state and local tax funds. Patients usually pay little or no part of costs for covered medical expenses. These programs are run by state and local governments within federal guidelines.

	IF NECESSARY, TO HELP THE RESPONDENT DETERMINE WHAT KIND OF INSURANCE THEY HAVE, PROBE (READ IF NECESSARY): Did you get that insurance through an employer? Does it help pay for both doctor visits and hospital stays?
INS_4	At this time, is **CHILD** covered by the Indian Health Service?
INS_5	At this time, is **CHILD** covered by military health care, TRICARE, CHAMPUS, OR CHAMP-VA? READ IF NECESSARY: CHAMPUS, CHAMP-V-A, and TRICARE are health care plans that are offered to persons in the military (and their dependents). TRICARE is a managed health care program for active duty and retired members of the uniformed services, their families, and survivors. CHAMPUS is a program of medical care for dependents of active or retired military personnel. CHAMP-VA is medical insurance for dependents or survivors of disabled veterans.
INS_6	Besides what you have already told me, is **CHILD** covered by any other health insurance or health care plan? [IF RESPONDENT REPORTS DENTAL, VISION, SCHOOL, OR ACCIDENT INSURANCE, MARK 'NO'.]
INS_6A	[IF YES, ask:] Does this health insurance help pay for both doctor visits and hospital stays?
INS_6B	[IF YES, ask:] Is this health insurance provided through an employer or union?
INS_6C	[IF NO, ask:] Is this health insurance purchased directly from an insurance company?
INS_6D	[IF NO, ask:] I recorded that **CHILD** was covered by some other health insurance. What is the name of the plan?
INS_7	[IF NO HEALTH INSURANCE TYPES WERE REPORTED THAT COVER HOSPITAL STAYS AND DOCTORS VISITS, ask:] It appears that **CHILD** does not have any health insurance coverage to pay for both hospitals and doctors and other health professionals. Is that correct?
INS_7A	[IF NO, ask:] At this time, what kind of health coverage does **CHILD** have? Any other kind? SELECT ALL THAT APPLY: (1) MEDICAID (2) MEDICARE (3) CHIP (4) MEDIGAP (5) MILITARY (6) INDIAN HEALTH SERVICE (7) PRIVATE INSURANCE (8) SINGLE SERVICE PLAN (DENTAL, VISION, PRESCRIPTIONS, ETC.) (9) OTHER
INS_7B	[IF MEDICARE, MEDIGAP, PRIVATE INSURANCE, OR OTHER SELECTED, ask:] Does this health insurance help pay for both doctor visits and hospital stays?

For the NIS-ABS Pilot, several modifications were made to these questions to accommodate the additional self-administered modes of data collection. In particular, the separate insurance type questions included in the HIM were consolidated into a single select-all-that-apply question. Insurance type definitions, interviewer help text, and custom text fills for state-specific Medicaid and CHIP program names were removed. These changes were made primarily due to space and printing constraints associated with the

PAPI mail component of the survey, but were made uniformly across all three modes of data collection to ensure consistency. The resulting health insurance question used in the NIS-ABS Pilot is presented in Figure 3.

Figure 3: Example NIS-ABS Pilot Health Insurance Question

Despite questionnaire differences, both versions of the survey collected sufficient data to produce population-level estimates of health insurance coverage for each insurance type, as well as estimated eligibility rates for the Vaccines for Children (VFC) program, a federally-funded program which provides vaccines at no cost to children who might not otherwise be vaccinated because of inability to pay. Children under 18 years of age are considered eligible for the VFC program if they are eligible for Medicaid, uninsured, underinsured[1] and attending a Federally-Qualified Health Center (FQHC) or Rural Health Clinic (RHC), or if they are an American Indian or Alaska Native.

In order to assess the impact of the methodological changes associated with the NIS-ABS Pilot, weighted estimates of health insurance coverage and VFC eligibility produced from NIS-ABS were compared with those produced from the 2020 NIS-RDD survey[2] for the

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[1] A child or adolescent is considered underinsured if he or she has health insurance, but it either doesn't cover vaccines, doesn't cover certain vaccines, or covers vaccines but has a fixed dollar limit or cap for vaccines (in which case, once the insurance fixed dollar amount is reached, the child is then VFC-eligible. Follow-up questions were asked for children with only private and/or "other" insurance types to determine whether they meet this definition of "underinsured". Underinsured children are eligible to receive VFC vaccines only at Federally Qualified Health Centers (FQHC) or Rural Health Clinics (RHC). An FQHC is a type of provider clinic that meets certain criteria under Medicare and Medicaid programs.

[2] While the NIS-ABS Pilot was conducted in the first half of 2021, the most recent NIS-RDD estimates available at the time of the analysis were from the 2020 calendar year, so these were used as the comparison point. While the time periods were not identical, NIS-RDD estimates of health insurance coverage typically do not exhibit large year-to-year changes, so the impact is expected to be minimal.

combined four geographic areas included in the NIS-ABS Pilot. The weights used to produce the estimates were adjusted for the survey design and nonresponse and calibrated to demographic population control totals. Estimates and Taylor Series standard errors were produced using PROC SURVEYFREQ in SAS 9.4. NIS-ABS estimates were then compared to NIS-RDD estimates separately for NIS-Child and NIS-Teen using independent, two-sample z-tests with normal approximations. This activity was reviewed by CDC and was conducted consistent with applicable federal law and CDC policy (e.g., 45 C.F.R. part 46.102(l)(2), 21 C.F.R. part 56; 42 U.S.C. §241(d); 5 U.S.C. §552a; 44 U.S.C. §3501 et seq.).

3. Results

Overall Comparison
Table 1 presents an overall comparison of weighted estimates for each health insurance type and VFC eligibility for the NIS-Child sample. Highlighted rows indicate a statistically significant difference between the two estimates (p<0.05). Large and statistically significant differences between the NIS-ABS Pilot and NIS-RDD were found across most health insurance estimates. Most notably, the NIS-ABS Pilot estimated higher rates of private insurance coverage, lower rates of Medicaid and any public insurance, and lower rates of VFC eligibility compared to NIS-RDD. Very similar results were found for the NIS-Teen sample, which are presented in Table 2.

Table 1. NIS-Child Insurance Coverage and VFC Eligibility Estimates, 2021 NIS-ABS Pilot vs. 2020 NIS-RDD

	NIS-ABS		NIS-RDD		Difference		P-value for Test
	%	SE	%	SE	%	SE	of No Difference
Covered by private insurance	60.7	3.0	52.5	1.7	+ 8.2	3.4	0.016 *
Covered by Medicaid	33.7	3.0	49.9	1.7	- 16.2	3.4	0.000 **
Covered by any public insurance (Medicaid or CHIP)	37.1	3.0	54.2	1.7	- 17.1	3.4	0.000 **
Covered by Indian Health Service	0.1	0.1	1.8	0.4	- 1.7	0.4	0.000 **
Covered by military insurance	2.8	0.9	2.7	0.6	+ 0.1	1.1	0.935
Covered by other type of health insurance	0.2	0.2	1.8	0.5	- 1.6	0.5	0.003 **
Uninsured	0.9	0.4	2.7	0.5	- 1.8	0.6	0.004 **
Underinsured	6.8	1.3	3.4	0.5	+ 3.4	1.4	0.017 *
Eligible for Vaccines for Children (VFC)	35.2	3.0	55.3	1.6	- 20.1	3.4	0.000 **

**Significant at the 1% level. *Significant at the 5% level.

Table 2. NIS-Teen Insurance Coverage and VFC Eligibility Estimates, 2021 NIS-ABS Pilot vs. 2020 NIS-RDD

	NIS-ABS		NIS-RDD		Difference		P-value for Test of No Difference
	%	SE	%	SE	%	SE	
Covered by private insurance	68.0	2.7	60.6	1.7	+ 7.4	3.2	0.019 *
Covered by Medicaid	26.1	2.6	39.6	1.8	- 13.5	3.1	0.000 **
Covered by any public insurance (Medicaid or CHIP)	30.6	2.7	43.8	1.8	- 13.3	3.2	0.000 **
Covered by Indian Health Service	0.1	0.0	1.8	0.5	- 1.8	0.5	0.000 **
Covered by military insurance	1.2	0.5	2.8	0.6	- 1.6	0.8	0.037 *
Covered by other type of health insurance	0.2	0.1	1.6	0.5	- 1.4	0.5	0.005 **
Uninsured	2.1	0.6	4.3	0.7	- 2.3	0.9	0.010 **
Underinsured	10.7	1.6	7.9	1.0	+ 2.7	1.9	0.149
Eligible for Vaccines for Children (VFC)	29.3	2.6	48.4	1.8	- 19.1	3.2	0.000 **

**Significant at the 1% level. *Significant at the 5% level.

Mode Effects

Differences in estimates of health insurance type by survey completion mode were next examined to better understand the source of the overall differences, as one of the key methodological changes introduced in the NIS-ABS Pilot was that respondents were given the option to complete the survey in one of three modes (web, PAPI, or phone), whereas all NIS-RDD respondents completed the survey by phone. The number and percentage of respondents who completed the survey by each mode are presented in Table 3.

Table 3. Number and Percentage of Household Survey Completes by Mode, 2021 NIS-ABS Pilot vs. 2020 NIS-RDD

	NIS-ABS Pilot			NIS-RDD
	Web	PAPI	Phone	Phone
NIS-Child	552 (76.7%)	51 (7.1%)	117 (16.3%)	1,684 (100%)
NIS-Teen	594 (79.9%)	40 (5.4%)	109 (14.7%)	1,503 (100%)

Tables 4 and 5 present weighted health insurance coverage estimates by survey completion mode for the NIS-Child and NIS-Teen samples, respectively, with each mode-specific NIS-ABS Pilot estimate compared with the corresponding NIS-RDD estimate. For both NIS-Child and NIS-Teen, differences were most apparent for the NIS-ABS self-administered modes, particularly for web respondents, whereas estimates produced from NIS-ABS telephone completes were largely similar to those produced from NIS-RDD telephone completes.

Table 4. NIS-Child Insurance Coverage and VFC Eligibility Estimates by Survey Completion Mode, 2021 NIS-ABS Pilot vs. 2020 NIS-RDD*

	NIS-RDD	NIS-ABS Pilot								
	Phone	Web			PAPI			Phone		
	%	%	Diff.	P	%	Diff.	P	%	Diff.	P
Covered by private insurance	52.5	65.0	+ 12.5	0.001	68.8	+ 16.3	0.027	34.5	- 17.9	0.011
Covered by Medicaid	49.9	31.9	- 18.0	0.000	25.2	- 24.7	0.001	50.3	+ 0.4	0.960
Covered by any public insurance (Medicaid or CHIP)	54.2	35.1	- 19.1	0.000	27.7	- 26.5	0.000	55.7	+ 1.5	0.847
Covered by Indian Health Service	1.8	0.1	- 1.7	0.000	0	--	--	0	--	--
Covered by military insurance	2.7	1.2	- 1.4	0.092	1.9	- 0.7	0.583	9.8	+ 7.1	0.158
Covered by other type of health insurance	1.8	0.4	- 1.4	0.011	0	--	--	0	--	--
Uninsured	2.7	0.8	- 1.9	0.005	1.6	- 1.2	0.354	0.6	- 2.2	0.002
Underinsured	3.4	6.5	+ 3.1	0.072	7.6	+ 4.2	0.179	6.9	+ 3.5	0.289
Eligible for Vaccines for Children (VFC)	55.3	33.1	- 22.2	0.000	28.2	- 27.1	0.000	51.6	- 3.7	0.636

Each mode-specific NIS-ABS Pilot estimate is compared with the corresponding NIS-RDD estimate.

Table 5. NIS-Teen Insurance Coverage and VFC Eligibility Estimates by Survey Completion Mode, 2021 NIS-ABS Pilot vs. 2020 NIS-RDD*

	NIS-RDD	NIS-ABS Pilot								
	Phone	Web			PAPI			Phone		
	%	%	Diff.	P	%	Diff.	P	%	Diff.	P
Covered by private insurance	60.6	70.8	+ 10.2	0.002	67.6	+ 7.0	0.375	55.6	- 5.0	0.530
Covered by Medicaid	39.6	24.4	- 15.3	0.000	26.8	- 12.9	0.091	33.5	- 6.2	0.422
Covered by any public insurance (Medicaid or CHIP)	43.8	28.9	- 14.9	0.000	30.4	- 13.4	0.092	38.5	- 5.3	0.497
Covered by Indian Health Service	1.8	0.1	- 1.8	0.000	0.0	--	--	0.0	--	--
Covered by military insurance	2.8	1.5	- 1.3	0.144	1.1	- 1.7	0.151	0.0	--	--
Covered by other type of health insurance	1.6	0.3	- 1.4	0.011	0.0	--	--	0.0	--	--
Uninsured	4.3	1.6	- 2.7	0.003	0.9	- 3.5	0.001	5.9	+ 1.5	0.557
Underinsured	7.9	10.2	+ 2.3	0.241	10.1	+ 2.2	0.635	13.7	+ 5.8	0.301
Eligible for Vaccines for Children (VFC)	48.4	27.2	- 21.2	0.000	28.6	- 19.8	0.010	40.1	- 8.4	0.281

Each mode-specific NIS-ABS Pilot estimate is compared with the corresponding NIS-RDD estimate.

Impact of Demographic Factors
The above results suggest that the additional self-administered survey modes introduced in the NIS-ABS Pilot may have contributed to differences in estimates of health insurance type compared to the NIS-RDD. However, survey mode was not randomly assigned in the NIS-ABS Pilot but was instead self-selected by respondents, so differences in estimates by mode could reflect either direct mode effects or demographic differences between respondents in each group that are correlated with health insurance coverage status. To further investigate these two possibilities, we next compared estimates with varying levels of controls for demographic differences between the samples.

As a baseline, we first looked at overall design-weighted Medicaid coverage estimates, which were adjusted only for sample selection probabilities and include no adjustment for demographic differences between the respondent sets. We next compared these to the final-weighted Medicaid coverage estimates, which include adjustments for differential nonresponse and calibration to demographic population control totals by child's race/ethnicity, age, sex, and mother's education. Finally, we looked at final-weighted comparisons within income/poverty status groups, as income level and poverty status were not directly controlled for in weighting but serve as a primary determinant of Medicaid eligibility and therefore are likely to be highly correlated with Medicaid coverage. As shown in Tables 6 and 7, income level and poverty status varied considerably between the NIS-RDD and NIS-ABS samples for both NIS-Child and NIS-Teen, with the NIS-ABS sample generally skewing more affluent than the NIS-RDD sample, and these differences remained after weighting adjustments to population control totals on other demographic factors.

Table 6. NIS-Child Design-Weighted and Final-Weighted Income Level and Poverty Status Distribution, 2021 NIS-ABS Pilot vs. 2020 NIS-RDD

	NIS-RDD		NIS-ABS		Difference		P-value for Test of No Difference
	%	SE	%	SE	%	SE	
Design-Weighted							
Above Poverty > $75K	37.7	1.6	62.5	7.3	+ 24.8	7.4	0.001 **
Above Poverty ≤ $75K	31.9	1.6	17.6	4.8	- 14.2	5.1	0.005 **
Below Poverty	30.4	1.9	19.8	7.0	- 10.6	7.2	0.142
Final-Weighted							
Above Poverty > $75K	34.9	1.1	54.8	3.0	+ 19.9	3.2	0.000 **
Above Poverty ≤ $75K	32.2	1.1	25.7	2.6	- 6.4	2.8	0.023 *
Below Poverty	32.9	1.2	19.5	2.6	- 13.5	2.9	0.000 **

**Significant at the 1% level. *Significant at the 5% level.

Table 7. NIS-Teen Design-Weighted and Final-Weighted Income Level and Poverty Status Distribution, 2021 NIS-ABS Pilot vs. 2020 NIS-RDD

	NIS-RDD		NIS-ABS		Difference		P-value for Test of No Difference
	%	SE	%	SE	%	SE	
Design-Weighted							
Above Poverty > $75K	41.1	1.5	68.5	4.1	+ 27.4	4.3	0.000**
Above Poverty ≤ $75K	34.0	1.5	20.7	3.6	- 13.3	3.9	0.001**
Below Poverty	24.9	1.5	10.8	2.3	- 14.2	2.7	0.000**
Final-Weighted							
Above Poverty > $75K	40.9	1.1	53.7	2.7	+ 12.9	3.0	0.000 **
Above Poverty ≤ $75K	34.2	1.1	26.7	2.5	- 7.5	2.7	0.006 **
Below Poverty	24.9	1.1	19.5	2.4	- 5.4	2.6	0.041 *

**Significant at the 1% level. *Significant at the 5% level.

Tables 8 and 9 present overall design-weighted and final-weighted comparisons of Medicaid coverage estimates, as well as final-weighted comparisons within income/poverty status groups, for NIS-Child and NIS-Teen, respectively. For NIS-Child, the difference between NIS-ABS and NIS-RDD Medicaid coverage rate estimates was not mitigated by the demographic adjustments included in the weighting process. However, the difference was largely eliminated when comparing estimates within income categories, suggesting that a residual difference in the income distribution between the NIS-ABS and NIS-RDD samples which remained after weighting largely accounts for the difference in Medicaid coverage estimates produced from the two versions of the survey.

Table 8. NIS-Child Medicaid Coverage Estimates by Demographic Controls, 2021 NIS-ABS Pilot vs. 2020 NIS-RDD

	NIS-ABS		NIS-RDD		Difference		P-value for Test of No Difference
	%	SE	%	SE	%	SE	
Design-Weighted	26.2	6.8	41.7	2.0	- 15.5	7.1	0.030 *
Final-Weighted to Population Totals	33.7	3.0	49.9	1.7	- 16.2	3.4	0.000 **
Final-Weighted by Income Bracket							
Above Poverty > $75K	7.3	2.0	7.9	1.6	- 0.6	2.6	0.836
Above Poverty ≤ $75K	50.7	5.9	54.2	3.0	- 3.5	6.6	0.598
Below Poverty	85.2	5.2	88.1	2.1	- 2.9	5.6	0.602

**Significant at the 1% level. *Significant at the 5% level.

Similar results were found for NIS-Teen, except that even when comparing estimates within income strata, the NIS-ABS Pilot still produced significantly lower estimates of Medicaid coverage within the "Below Poverty" income group. This suggests that for the NIS-Teen age group, demographic differences between the respondent sets do not fully account for the observed differences in health insurance estimates, and other differences

between the NIS-ABS and NIS-RDD survey methodologies, such as survey mode or questionnaire effects, likely also had an influence.

Table 9. NIS-Teen Medicaid Coverage Estimates by Demographic Controls, 2021 NIS-ABS Pilot vs. 2020 NIS-RDD

	NIS-ABS		NIS-RDD		Difference		P-value for Test of No Difference
	%	SE	%	SE	%	SE	
Design-Weighted	19.6	3.6	39.0	2.4	- 19.4	4.3	0.000 **
Final-Weighted to Population Totals	26.1	2.6	39.6	1.8	- 13.5	3.1	0.000 **
Final-Weighted by Income Bracket							
Above Poverty > $75K	4.9	1.6	4.2	0.9	+ 0.7	1.8	0.713
Above Poverty ≤ $75K	39.6	5.6	46.2	3.1	- 6.6	6.4	0.302
Below Poverty	66.1	6.9	85.5	2.6	- 19.4	7.3	0.008 **

**Significant at the 1% level. *Significant at the 5% level.

Interaction Between Mode Effects and Income Category
Finally, the potential interaction between mode effects and demographic differences among respondent sets in producing different Medicaid coverage estimates was examined. Tables 10 and 11 present final-weighted Medicaid coverage estimates within each income category by survey completion mode for the NIS-Child and NIS-Teen samples, respectively. Note that cells based on fewer than 30 cases are marked in grey due to insufficient sample size.

Table 10. NIS-Child Medicaid Coverage Estimates Within Income Brackets by Survey Completion Mode, 2021 NIS-ABS Pilot vs. 2020 NIS-RDD

	NIS-RDD	NIS-ABS Pilot								
	Phone	Web			PAPI			Phone		
	%	%	Diff.	P	%.	Diff.	P	%	Diff.	P
Above Poverty > $75K	7.9	7.9	+ 0.1	0.986	6.4	- 1.4	0.721	5.5	- 2.4	0.524
Above Poverty ≤ $75K	54.2	46.4	- 7.8	0.310	55.2	+ 1.0	0.951	63.4	+ 9.1	0.465
Below Poverty	88.1	87.4	- 0.7	0.921	68.0	- 20.1	0.341	85.3	- 2.8	0.759

Table 11. NIS-Teen Medicaid Coverage Estimates Within Income Brackets by Survey Completion Mode, 2021 NIS-ABS Pilot vs. 2020 NIS-RDD

	NIS-RDD	NIS-ABS Pilot								
	Phone	Web			PAPI			Phone		
	%	%	Diff.	P	%	Diff.	P	%	Diff.	P
Above Poverty > $75K	4.2	5.6	+ 1.4	0.491	0.0	--	--	7.7	+ 3.5	0.639
Above Poverty ≤ $75K	46.2	35.7	- 10.6	0.107	45.8	- 0.4	0.978	45.3	- 0.9	0.954
Below Poverty	85.5	83.3	- 2.2	0.733	51.0	- 34.6	0.069	49.0	- 36.5	0.004

For NIS-Child, controlling for income largely eliminated the mode effects observed in the overall sample, suggesting that these were mainly a result of demographic differences between the respondents who chose to complete the survey in each mode, rather than direct effects of mode on survey responses.

This was also largely the case for NIS-Teen, with one exception: NIS-ABS telephone completes in the "Below Poverty" income group still had significantly lower Medicaid coverage estimates than NIS-RDD sample within the same income group (49.0% compared to 85.5%). This suggests that even after controlling for differences in the demographic distribution of the two samples, the NIS-ABS still underestimated Medicaid coverage among low-income adolescents compared to the NIS-RDD. Further, this cannot be explained simply by mode effects, since the difference was observed primarily between the two groups of telephone respondents, nor can it be explained solely by the questionnaire changes made for the NIS-ABS Pilot, since these changes were made uniformly across all three survey modes, yet Medicaid estimates were only impacted among telephone completes. Rather, these findings suggest a more complex interaction between demographic factors, survey mode, and questionnaire language which requires further investigation.

4. Discussion

In summary, we found that conducting the NIS using an ABS multimode design resulted in significant differences in estimates of type of health insurance coverage and VFC eligibility estimates among children and adolescents, with the NIS-ABS Pilot estimating higher percentages with private insurance, and lower percentages with Medicaid and other public health insurance coverage and VFC eligibility. These differences appear to be largely due to demographic differences between the two sets of respondents by survey administrative mode which remained after weighting adjustments, with the NIS-ABS Pilot sample skewing more affluent than the NIS-RDD sample, and thus less likely to be eligible for government programs. However, demographic factors alone did not fully account for the differences observed among adolescents, suggesting that survey mode and questionnaire factors likely also played a role. Our findings indicate that estimates of health insurance type may be particularly sensitive to changes in data collection protocol and highlight the importance of conducting further research and operational evaluations to better understand the impact of methodological changes on health insurance coverage estimates and identify ways to ameliorate potential biases in future ABS or multimode survey designs.

5. Limitations and Future Research

Several important limitations of this work should be noted. First, sample sizes for the NIS-ABS Pilot were relatively small, limiting statistical power especially for subgroup analyses. Second, the data collection periods being compared were not identical, with the NIS-RDD data collected during the 2020 calendar year and the NIS-ABS Pilot data collected in the first half of 2021. Revisions to variables used in the weighting process may change findings regarding differences in estimates between NIS-ABS Pilot and NIS-RDD. Finally, survey completion mode was not randomly assigned, making it difficult to isolate mode effects.

However, despite these limitations, our preliminary findings do raise important issues that must be better understood and addressed before making any major methodological changes to the sampling method, data collection mode, or questionnaire language of a complex

survey like the NIS and suggest useful directions for future research. These include (1) conducting operational evaluations with random assignment of both questionnaire mode and health insurance question type (for example, the presence or absence of help text or state text fills) to better isolate the impact of each of these factors on survey estimates, (2) exploring ways to increase response rates and recruit a more diverse and representative sample using an ABS multimode design to help reduce the sample imbalances observed in the NIS-ABS Pilot, particularly with regards to income level, and (3) developing a modified weighting methodology specifically tailored to an ABS design which would better adjust for these sample imbalances.

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