Data Analysis of National Vaccination Coverage Estimates of Adolescents Aged 13-17 years

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Data: National Vaccination Coverage Estimates of Adolescents Aged 13-17 years by Selected Demographic and Access to Healthcare Characteristics Using National Immunization Survey – Teen (NIS-Teen), 2021 Public User Files (PUF).

I. Introduction.

The National Immunization Surveys (NIS) are a group of telephone surveys used to monitor vaccination coverage among teens. In NIS-Teen surveys, they dial random digit numbers in all 50 states, the District of Columbia, selected local areas, and some U.S. territories to ask Parents or guardians of eligible adolescents for having an interview to gain sociodemographic information about the household, and to get permission to contact the adolescent's vaccination provider. Then, they will send a questionnaire to the providers to receive the adolescent's vaccination record. By receiving the immunization records, vaccination coverage estimates will be provided which include any vaccines administered before the 2021 NIS-Teen interview date. The report contains vaccination coverage estimates for 18002 adolescents aged 13–17 years. The analysis of weighted data for the complex survey design has been presented and T-tests were used to compare differences in vaccination coverage by survey year (2021) and among sociodemographic groups. Moreover, based on the p-value we can conclude that the data provide significant evidence that there is a different between each category for the demographic information. So, if p value is less than 0.05, we can say that the test is statistically significant. In this project, all the data analysis has been conducted in SAS 9.4 Version. Also, the 2021 NIS-Teen data is included of 45036 teens with completed household interviews. Besides, we have used data for 18006 teens to determine the coverage estimates of the vaccine 1+ HUMAN PAPILLOMAVIRUS SHOT.

II. Methods

In this project, data analysis of the 2021 National Immunization Survey–Teen (NIS–Teen) have been performed based on the total sample size which is equal to 18,002. The goal of this survey is to provide information about vaccination coverage for all adolescents aged 13-17 years with adequate provider data (ADP) and to investigate the demographic information. In this survey, the families with adolescents aged 13-17 years have been identified by conducting the random digit dial telephone interview. Also, demographic information from the parent of each family have been collected. The questions in the interview is about the adolescent vaccination history. If the adolescent received the HPV vaccine, then the interviewer will ask about the type of place where the adolescent received an HPV shot. Next, the interview needs to contact the vaccination provider after obtaining the parents' consent. Then, they will send a questionnaire to the vaccination provider to obtain the required vaccination history for each recommended adolescent vaccine to determine the vaccination coverage estimates. All the data analysis has been conducted in **SAS 9.4** Version.

Study Cohort:

- Inclusion criteria:

  All adolescents aged 13-17 years with adequate provider data (ADP) in the NIS-Teen 2021 PUF.

- Exclusion criteria:

  Adolescents in the U.S. Territories (i.e., Guam, Puerto Rico, and U.S. Virgin Islands.)

The total sample size is equal to 18,002.

Analysis:

A sub-data set from the NIS-Teen 2021 survey year to include the following variables has been created:

SEQNUMT (UNIQUE TEEN IDENTIFIER),

PDAT2 (ADEQUATE PROVIDER DATA FLAG),

PROVWT_C (FINAL SINGLE-FRAME CELL-PHONE PROVIDER-PHASE WEIGHT (EXCLUDES TERRITORIES)),

STRATUM (STRATUM VARIABLE FOR VARIANCE ESTIMATION),

YEAR (SAMPLING YEAR),

AGE (AGE IN YEARS OF SELECTED TEEN),

SEX (SEX OF TEEN),

RACEETHK (RACE/ETHNICITY OF TEEN WITH MULTIRACE CATEGORY (RECODE)),

EDUC1 (EDUCATION LEVEL OF MOTHER WITH 4 CATEGORIES (RECODE)),

AGEGRP_M_I (MOTHER'S AGE CATEGORIES (RECODE)),

MARITAL2 (MARITAL STATUS OF MOTHER (RECODE)),

INCPORAR_I (INCOME TO POVERTY RATIO: IMPUTED (RECODE)),

INS_STAT2_I (INSURANCE STATUS (PRIVATE ONLY/ANY MEDICAID/OTHER INSURANCE/UNINSURED): IMPUTED),

CKUP_11_12 (DID TEEN HAVE AN 11-12 YEAR OLD WELL-CHILD EXAM OR CHECK-UP?), **CEN_REG** (CENSUS REGION BASED ON TRUE STATE OF RESIDENCE),

FACILITY (FACILITY TYPES FOR TEEN'S PROVIDERS),

STATE (TRUE STATE OF RESIDENCE (STATE FIPS CODE)),

P_UTDHPV (UP-TO-DATE FLAG (PROV INFO): 1+ HUMAN PAPILLOMAVIRUS SHOT, EXCLUDING ANY VACCINATIONS AFTER THE RDD INTERVIEW DATE.),

P_UTDHPV2 (UP-TO-DATE FLAG (PROV INFO): 2+ HUMAN PAPILLOMAVIRUS SHOT, EXCLUDING ANY VACCINATIONS AFTER THE RDD INTERVIEW DATE.),

P_UTDHPV_15INT (UP-TO-DATE FLAG (PROV INFO): 3+ HUMAN PAPILLOMAVIRUS SHOTS, OR 2+ HUMAN PAPILLOMAVIRUS SHOTS WITH FIRST SHOT RECEIVED BEFORE AGE 15 AND INTERVAL BETWEEN 1ST AND 2ND SHOTS AT LEAST 5 MONTHS-4 DAYS, EXCLUDING ANY VACCINATIONS AFTER THE RDD INTERVIEW DATE.),

P_UTDMEN (UP-TO-DATE FLAG (PROV INFO): 1+ MENINGOCOCCAL SEROGROUP ACWY SHOT, EXCLUDING ANY VACCINATIONS AFTER THE RDD INTERVIEW DATE.),

P_UTDMENACWY (UP-TO-DATE FLAG (PROV INFO): 1+ MENINGOCOCCAL SEROGROUP ACWY-CONJUGATE SHOT OR MENINGOCOCCAL SEROGROUP ACWY-UNKNOWN TYPE SHOT, EXCLUDING ANY VACCINATIONS AFTER THE RDD INTERVIEW DATE.),

P_UTDTD (UP-TO-DATE FLAG (PROV INFO): 1+ TD/TDAP-ONLY SHOT, EXCLUDING ANY VACCINATIONS AFTER THE RDD INTERVIEW DATE.),

P_UTDTDAP (UP-TO-DATE FLAG (PROV INFO): 1+ TDAP-ONLY SHOT SINCE AGE 10 YEARS, EXCLUDING ANY VACCINATIONS AFTER THE RDD INTERVIEW DATE.),

P_UTDTDAP7 (UP-TO-DATE FLAG (PROV INFO): 1+ TDAP-ONLY SHOT SINCE AGE 7 YEARS, EXCLUDING ANY VACCINATIONS AFTER THE RDD INTERVIEW DATE.)

P_UTDHEPA1 (UP-TO-DATE FLAG (PROV INFO): 1+ HEPATITIS A-CONTAINING SHOT, EXCLUDING ANY VACCINATIONS AFTER THE RDD INTERVIEW DATE)

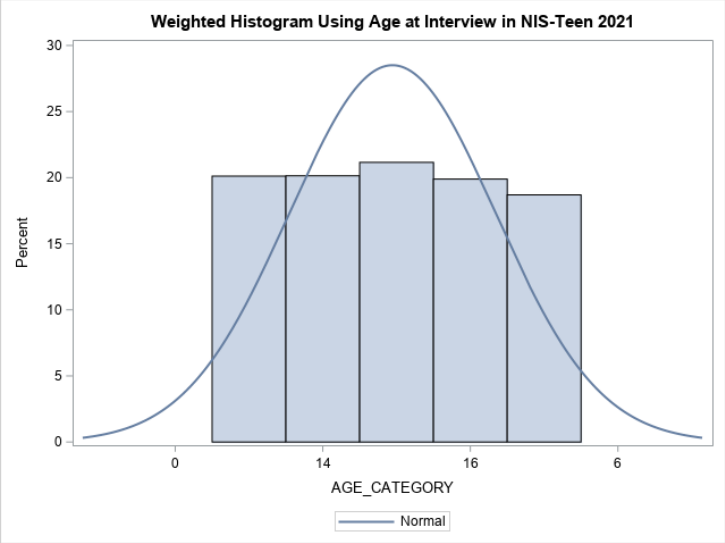
P_UTDVRC (UP-TO-DATE FLAG (PROV INFO): 1+ VARICELLA-CONTAINING SHOT AT 12+ MONTHS OF AGE, EXCLUDING ANY VACCINATIONS AFTER THE RDD INTERVIEW DATE).

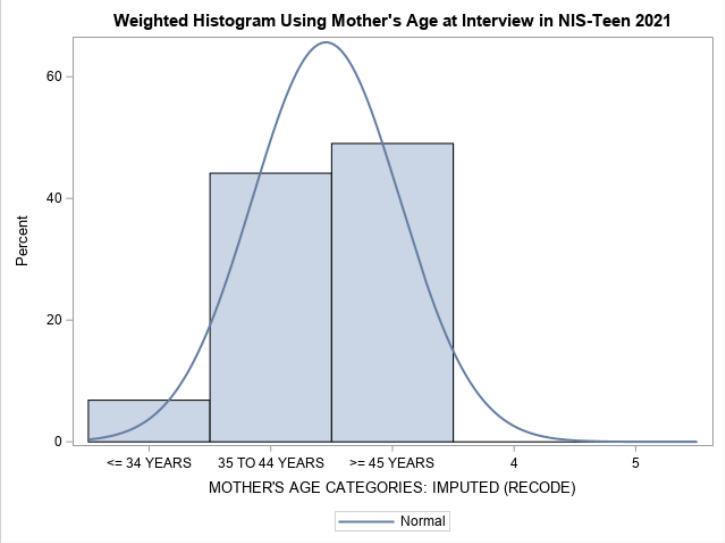
- All weighted percentages to 1 decimal place have been reported.
- Histogram for the following variables: Age (years), Mother's Age, and Income to Poverty Ratio include weights have been presented.

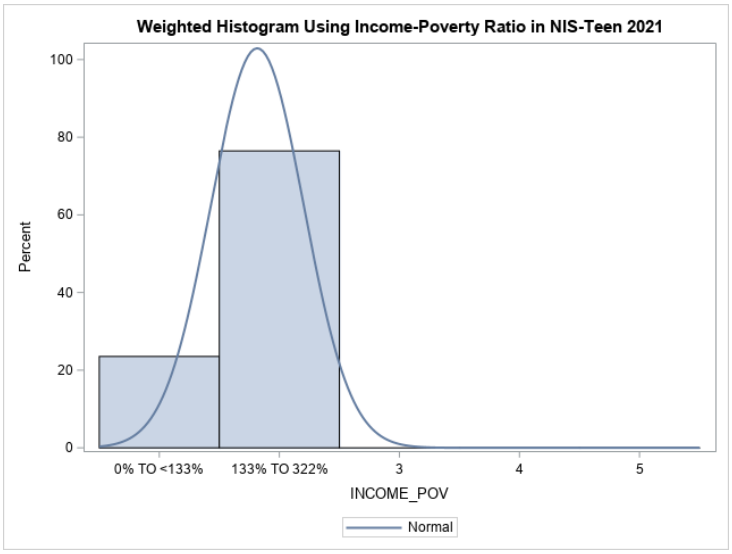
- Vertical Bar-Graphs for the following variables: Sex of Adolescent, Race/Ethnicity, Mother's educational level and Mother's marital status include weights have been presented.
- Pie-Charts for the following variables: Medical insurance, Well Child visit at age 11-12 years, Census Region based on true state of residence and Vaccination Facility Type include weights have been presented.
- All chi-square test statistics and their corresponding p-values to 2 decimal places in Table 2 have been reported.
- We Indicated which variable or variables are associated with the type of vaccination for your group.
- Unweighted sample sizes and weighted percentage to 1 decimal place in Table 3 have been reported.
- Table 4 has been provided by using PROC SURVEYFREQ.
- Unadjusted weighted vaccination coverage estimates for all the selected variables in Table 5 have been presented by using PROC SURVEYMEANS.
- Unadjusted ODDS RATIOS to 2 decimal places for all the selected variables in Table 5 have been presented by using PROC SURVEYLOGISTIC.
- Adjusted ODDS RATIOS to 2 decimal places for all the selected variables in Table 5 have been presented by using PROC SURVEYLOGISTIC.
- Adjusted ODDS RATIOS to 2 decimal places for all the significant selected variables in Table 5 have been presented by using PROC SURVEYLOGISTIC.
- Type III test of effect for models 3, 4, and 5 in Table 6 has been reported. All Wald Chi-Square test statistics to 3 decimal places and their corresponding p-values to 2 decimal places have been reported.

III. Results

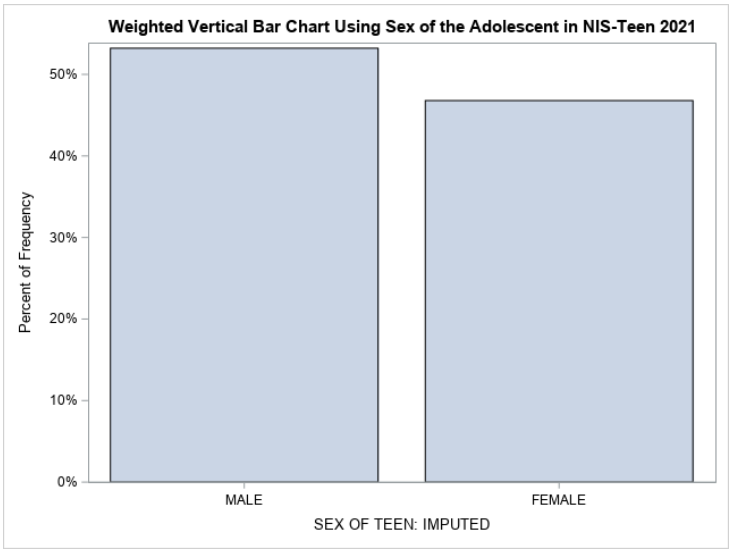
The required graphs based on the results from the analysis have been presented. First, the Histogram for the variables, Age (years), mother's age, and Income to Poverty Ratio have been provided.

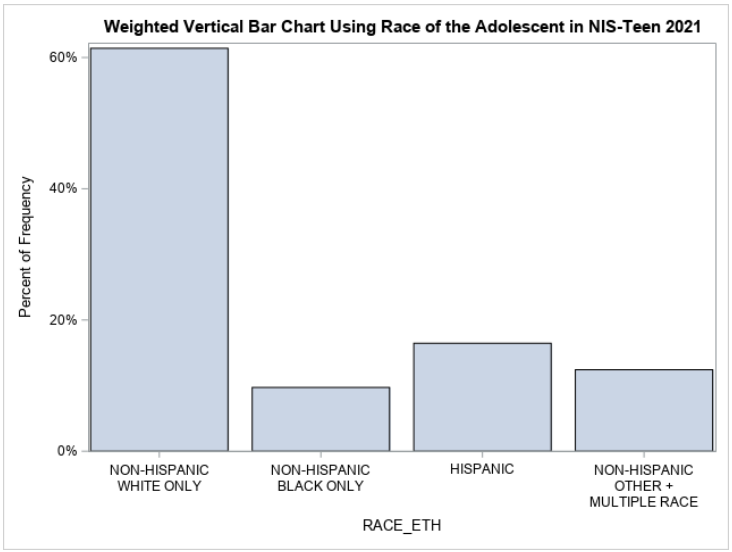


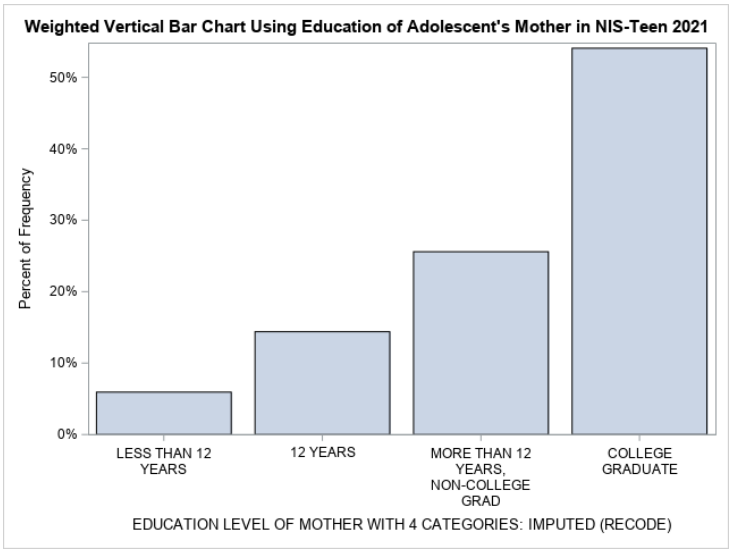


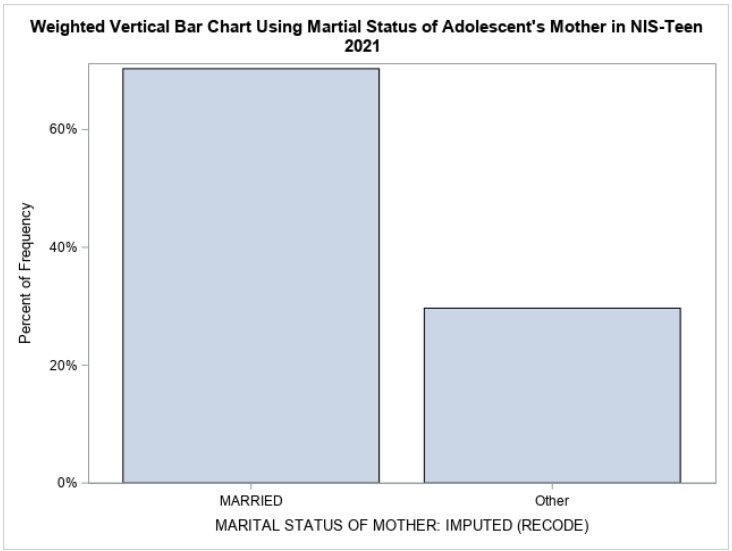


Vertical Bar-Graphs for the variables: Sex of Adolescent, Race/Ethnicity, Mother's educational level and Mother's marital status are as following:

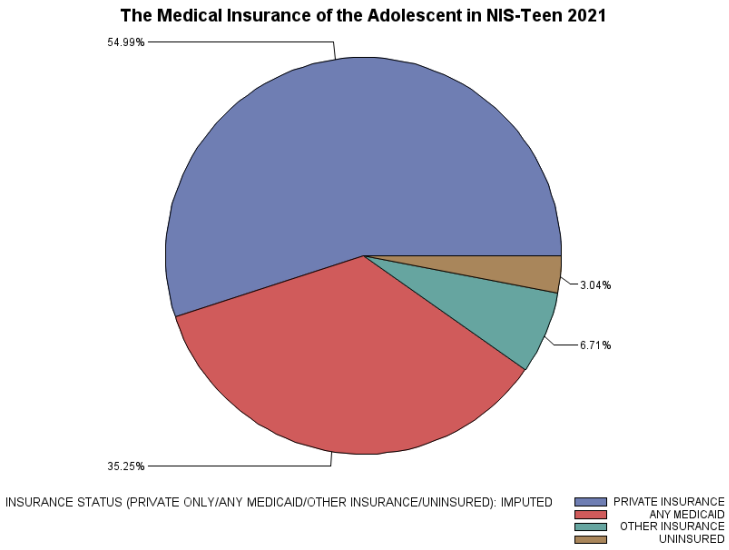


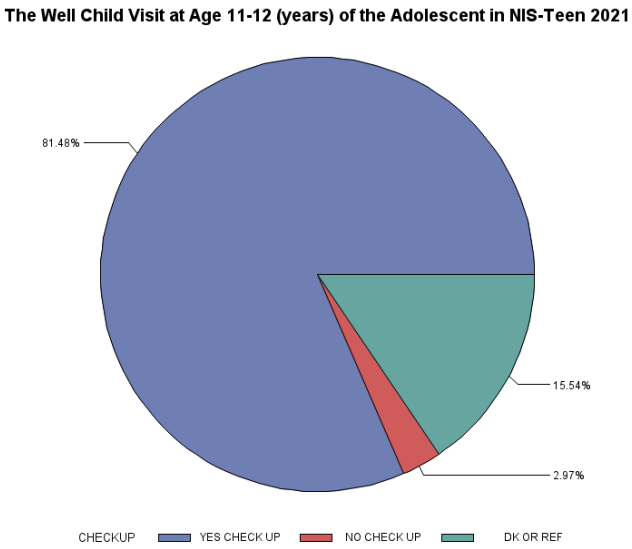

Weighted Vertical Bar Chart Using Race of the Adolescent in NIS-Teen 2021
Percent of Frequency
60%
40%
20%
0%
NON-HISPANIC WHITE ONLY
NON-HISPANIC BLACK ONLY
HISPANIC
NON-HISPANIC OTHER + MULTIPLE RACE
RACE_ETH


Weighted Vertical Bar Chart Using Education of Adolescent's Mother in NIS-Teen 2021
Percent of Frequency
50%
40%
30%
20%
10%
0%
LESS THAN 12 YEARS
12 YEARS
MORE THAN 12 YEARS, NON-COLLEGE GRAD
COLLEGE GRADUATE
EDUCATION LEVEL OF MOTHER WITH 4 CATEGORIES: IMPUTED (RECODE)

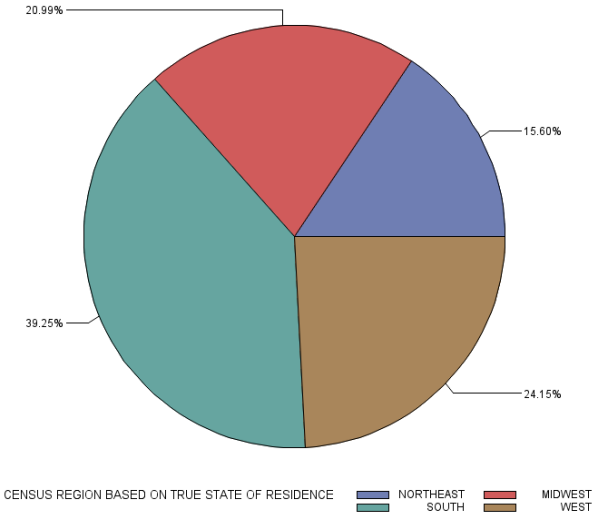

Weighted Vertical Bar Chart Using Martial Status of Adolescent's Mother in NIS-Teen 2021
Percent of Frequency
60%
40%
20%
0%
MARRIED
Other
MARITAL STATUS OF MOTHER: IMPUTED (RECODE)

Pie-Charts for the variables: Medical insurance, Well Child visit at age 11-12 years, Census Region based on true state of residence and Vaccination Facility Type have been provided as below:

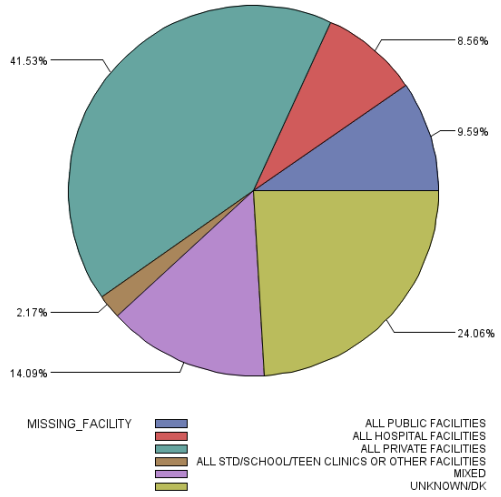




The Census Region of the Adolescent in NIS-Teen 2021



The Vaccination Facility of the Adolescent in NIS-Teen 2021



IV. Tables Summary

Summary tables and all figures based on the results from the analysis has been presented as following:

TABLE 1. Sample Characteristics of Adolescents Aged 13-17 Years in the United States, by Selected Demographic and Access-To-Care Variables--NIS-Teen 2021

Characteristic		Overall	
		Sample Size	Weighted %
Total		**18,002**	**100.0**
Age (years)			
	13	3,691	20.1
	14	3,789	20.1
	15	3,681	21.2
	16	3,548	19.9
	17*	3,293	18.7
Age Group (in years)			
	13-15*	11,161	61.4
	16-17	6,841	38.6
Sex of Adolescent			
	Male	9,579	51.0
	Female*	8,423	49.0
Race/Ethnicity			
	Non-Hispanic White*	11,054	48.7
	Non-Hispanic Black	1,750	13.3
	Hispanic	2,962	25.4
	Non-Hispanic Other	2,236	12.6
Mother's Educational Level			
	<High School*	1,069	12.2
	High School	2,591	20.7
	Some college or college graduate	4,607	22.8
	>College graduate	9,735	44.3
Mother's Marital Status			
	Married*	12,660	62.5
	Never married/Widowed/divorced/separated	5,342	37.5
Mother's Age			
	≤34 years*	1,083	6.8
	35-44 years	7,627	44.1
	≥45 years	9,292	49.0

TABLE 1. Sample Characteristics of Adolescents Aged 13-17 Years in the United States, by Selected Demographic and Access-To-Care Variables--NIS-Teen 2021

Characteristic		Overall	
		Sample Size	Weighted %
Income to Poverty Ratio			
	<133%*	3,173	23.5
	133% - <322%	14,829	76.5
Medical Insurance[§]			
	Private only*	11,146	55.0
	Any Medicaid	5,162	35.3
	Other[‖]	1,290	6.7
	Uninsured	404	3.0
Well Child Visit at Age 11-12 Years**			
	Yes*	14,993	81.5
	No	439	3.0
	Don't know/Refused/ Missing	2,570	15.5
Census Region			
	Northeast*	3,725	15.6
	Midwest	3,850	21.0
	South	6,519	39.3
	West	3,908	24.2
Vaccination Facility Type			
	All private facilities*	7,147	41.5
	All public facilities	1,701	9.6
	All hospital facilities	2,105	8.6
	All STD/school/teen clinics or other facilities	412	2.2
	Mixed††	3,056	14.1
	Unknown/Don't Know[‡‡]	3,581	24.1

* Reference level.

[§]Insurance categories are mutually exclusive.

[‖] Includes IHS, military, CHIP, and some private.

** Status of health-care visit at age 11-12 years based on provider reported data.

†† Mixed indicates that the facility is identified to be in more than one of the facility categories such as private, public, hospital, STD/school/teen clinics.

[‡‡] Includes military, WIC clinics, pharmacies, unknown, and missing.

TABLE 2. Vaccination Coverage Estimates Amongst Adolescents Aged 13-17 Years in the United States, by Selected Demographic and Access-To-Care Variables--NIS-Teen 2021

Characteristic		1+ HUMAN PAPILLOMAVIRUS SHOT			
		Sample Size	**Weighted % (95% C.I.)**	**Chi-Square Statistic**	**P-value**
Total		**18002**	**76.9(76.3 – 77.6)**		
Age (years)				112,360.28	**0**
	13	3,691	72.5 (71.0 - 73.9)		
	14	3,789	74.1 (73.1 - 75.1)		
	15	3,681	79.0 (78.3 - 79.8)		
	16	3,548	78.9 (78.2 - 79.6)		
	17*	3,293	80.4 (79.8 - 81.0)		
Age Group (in years)				53,115.18	**0**
	13-15*	11,161	75.3 (74.5 - 76.1)		
	16-17	6,841	79.6 (78.9 - 80.3)		
Sex of Adolescent				28,571.75	**0**
	Male	9,579	75.4 (74.6 - 76.3)		
	Female*	8,423	78.5 (77.9 - 79.2)		
Race/Ethnicity				88,778.34	**0**

TABLE 2. Vaccination Coverage Estimates Amongst Adolescents Aged 13-17 Years in the United States, by Selected Demographic and Access-To-Care Variables--NIS-Teen 2021

Characteristic		1+ HUMAN PAPILLOMAVIRUS SHOT			
		Sample Size	**Weighted % (95% C.I.)**	**Chi-Square Statistic**	**P-value**
	Non-Hispanic White*	11,054	74.4 (73.6 - 75.2)		
	Non-Hispanic Black	1,750	81.7 (80.4 - 83.0)		
	Hispanic	2,962	77.8 (77.0 - 78.7)		
	Non-Hispanic Other	2,236	80.0 (79.2 - 80.8)		
Mother's Educational Level				62,287.95	**0**
	<High School*	1,069	80.1 (77.7 - 82.5)		
	High School	2,591	75.4 (74.2 - 76.5)		
	Some college or college graduate	4,607	73.7 (72.9 - 74.4)		
	>College graduate	9,735	78.5 (78.1 - 78.9)		
Mother's Marital Status				41,254.84	**0**
	Married*	12,660	75.5 (74.7 - 76.2)		
	Never married/Widowed/divorced/separated	5,342	79.4 (78.6 - 80.1)		
Mother's Age				20,590.90	**0**
	≤34 years*	1,083	75.9 (73.3 - 78.4)		

TABLE 2. Vaccination Coverage Estimates Amongst Adolescents Aged 13-17 Years in the United States, by Selected Demographic and Access-To-Care Variables--NIS-Teen 2021

Characteristic		1+ HUMAN PAPILLOMAVIRUS SHOT			
		Sample Size	**Weighted % (95% C.I.)**	**Chi-Square Statistic**	**P-value**
	35-44 years	7,627	75.6 (74.9 - 76.3)		
	≥45 years	9,292	78.3 (77.8 - 78.8)		
Income to Poverty Ratio				83,749.09	**0**
	<133%*	3,173	81.7 (80.4 - 83.1)		
	133% - <322%	14,829	75.5 (75.0 - 76.0)		
Medical Insurance[§]				127,539.67	**0**
	Private only*	11,146	75.9 (75.1 - 76.7)		
	Any Medicaid	5,162	80.5 (79.7 - 81.2)		
	Other[‖]	1,290	73.1 (71.7 - 74.5)		
	Uninsured	404	64.4 (62.1 - 66.8)		
Well Child Visit at Age 11-12 Years**				342,822.37	**0**
	Yes*	14,993	79.5 (78.9 - 80.2)		
	No	439	63.8 (60.6 - 66.9)		
	Don't know/Refused/ Missing	2,570	66.0 (65.0 - 67.1)		

TABLE 2. Vaccination Coverage Estimates Amongst Adolescents Aged 13-17 Years in the United States, by Selected Demographic and Access-To-Care Variables--NIS-Teen 2021

Characteristic		1+ HUMAN PAPILLOMAVIRUS SHOT			
		Sample Size	**Weighted % (95% C.I.)**	**Chi-Square Statistic**	**P-value**
Census Region				63,698.32	**0**
	Northeast*	3,725	76.8 (75.5 - 78.2)		
	Midwest	3,850	77.0 (76.1 - 78.0)		
	South	6,519	74.7 (74.1 - 75.3)		
	West	3,908	80.7 (80.0 - 81.3)		
Vaccination Facility Type				127,982.78	**0**
	All private facilities*	7,147	77.3 (76.7 - 77.8)		
	All public facilities	1,701	78.3 (76.4 - 80.3)		
	All hospital facilities	2,105	78.5 (77.2 - 79.7)		
	All STD/school/teen clinics or other facilities	412	58.3 (55.9 - 60.6)		
	Mixed††	3,056	80.5 (79.9 - 81.2)		
	Unknown/Don't Know‡‡	3,581	74.9 (74.3 - 75.5)		

TABLE 2. Vaccination Coverage Estimates Amongst Adolescents Aged 13-17 Years in the United States, by Selected Demographic and Access-To-Care Variables--NIS-Teen 2021

Characteristic	1+ HUMAN PAPILLOMAVIRUS SHOT			
	Sample Size	**Weighted % (95% C.I.)**	**Chi-Square Statistic**	**P-value**

* Reference leve
† $p < 0.05$ by chi-square test.
[§]Insurance categories are mutually exclusive.
[||] Includes IHS, military, CHIP, and some private.
** Status of health-care visit at age 11-12 years based on provider reported data.
†† Mixed indicates that the facility is identified to be in more than one of the facility categories such as private, public, hospital, STD/school/teen clinics.
[‡‡] Includes military, WIC clinics, pharmacies, unknown, and missing.

TABLE 3. Vaccination Coverage Estimates Amongst Adolescents Aged 13-17 Years in the United States and by States --NIS-Teen 2021		
U.S. National and States	1+ HUMAN PAPILLOMAVIRUS SHOT	
	Sample Size	**Weighted % (95% C.I.)**
National	**18002**	**76.9(76.3 – 77.6)**
Alabama	304	78.5 (73.9 - 83.2)
Alaska	268	70.3 (66.4 - 74.1)
Arizona	296	81.3 (79.1 - 83.5)
Arkansas	314	73.2 (71.0 - 75.4)
California	286	81.7 (79.9 - 83.5)
Colorado	298	80.0 (78.4 - 81.6)
Connecticut	340	77.9 (76.4 - 79.3)
Delaware	310	83.5 (82.2 - 84.8)
District of Columbia	409	89.6 (88.7 - 90.5)
Florida	312	67.7 (66.2 - 69.2)
Georgia	260	78.6 (77.3 - 80.0)
Hawaii	258	83.8 (82.6 - 84.9)
Idaho	334	78.8 (77.7 - 79.9)
Illinois	578	76.6 (75.7 - 77.4)
Indiana	268	72.1 (70.8 - 73.3)
Iowa	199	79.2 (77.9 - 80.5)
Kansas	300	76.5 (75.5 - 77.6)
Kentucky	240	70.3 (69.0 - 71.5)
Louisiana	303	81.1 (80.2 - 82.1)
Maine	293	77.5 (76.5 - 78.5)
Maryland	857	85.5 (85.0 - 86.0)
Massachusetts	266	89.3 (88.6 - 90.0)
Michigan	358	79.0 (78.1 - 79.8)
Minnesota	296	79.9 (79.0 - 80.7)
Mississippi	303	56.2 (55.2 - 57.3)
Missouri	340	76.2 (75.4 - 77.0)
Montana	290	75.3 (74.4 - 76.2)
Nebraska	315	82.7 (81.9 - 83.4)
Nevada	333	76.1 (75.3 - 76.9)
New Hampshire	282	84.6 (83.9 - 85.3)
New Jersey	292	65.4 (64.5 - 66.3)
New Mexico	337	80.9 (80.2 - 81.6)
New York	581	75.9 (75.4 - 76.5)
North Carolina	266	85.0 (84.3 - 85.7)
North Dakota	191	83.8 (83.0 - 84.7)
Ohio	254	72.4 (71.5 - 73.3)

Oklahoma	240	72.4 (71.5 - 73.3)
Oregon	294	82.3 (81.6 - 83.0)
Pennsylvania	929	77.7 (77.3 - 78.1)
Rhode Island	254	90.1 (89.5 - 90.6)
South Carolina	263	81.8 (81.1 - 82.5)
South Dakota	445	87.4 (86.9 - 87.9)
Tennessee	315	75.3 (74.6 - 76.0)
Texas	990	71.3 (70.9 - 71.7)
Utah	304	80.9 (80.3 - 81.6)
Vermont	488	83.4 (83.0 - 83.9)
Virginia	566	77.3 (76.8 - 77.8)
Washington	349	79.0 (78.4 - 79.6)
West Virginia	267	70.5 (69.7 - 71.2)
Wisconsin	306	82.4 (81.8 - 83.0)
Wyoming	261	64.8 (64.0 - 65.6)

TABLE 4. Sample Characteristics of Adolescents Aged 13-17 Years in the United States, by Selected Demographic and Access-To-Care Variables--NIS-Teen 2021

Characteristic		**Overall**	
		Sample Size (n)	**Weighted % (95% C.I.)**
Total		**18,002**	**100.0**
Age (years)			
	13	3,691	20.1 (18.9-21.4)
	14	3,789	20.1 (18.9-21.5)
	15	3,681	21.2 (19.9-22.5)
	16	3,548	19.9 (18.6-21.2)
	17*	3,293	18.7 (17.5-19.9)
Sex of Adolescent			
	Male	9,579	51.0 (49.5-52.6)
	Female*	8,423	49.0 (47.4-50.5)
Race/Ethnicity			
	Non-Hispanic White*	11,054	48.7 (47.2-50.2)

	Non-Hispanic Black	1,750	13.3 (12.3-14.3)
	Hispanic	2,962	25.4 (23.8-27.0)
	Non-Hispanic Other	2,236	12.6 (11.5-13.8)
Mother's Educational Level			
	<High School*	1,069	12.2 (10.9-13.6)
	High School	2,591	20.7 (19.4-22.2)
	Some college or college graduate	4,607	44.3 (42.7-45.8)
	>College graduate	9,735	22.8 (21.6-24.0)
Mother's Marital Status			
	Married*	12,660	62.5 (60.8-64.0)
	Never married/Widowed/divorced/separated	5,342	37.5 (36.0-39.2)
Mother's Age			
	≤34 years*	1,083	6.8 (5.9-7.9)
	35-44 years	7,627	44.1 (42.6-45.7)
	≥45 years	9,292	49.0 (47.4-50.6)
Income to Poverty Ratio			
	<133%*	3,173	23.5 (22.1-25.0)
	133% - <322%	14,829	76.5 (75.0-77.9)
Medical Insurance[§]			
	Private only*	11,146	55.0 (53.4-56.6)
	Any Medicaid	5,162	35.3 (33.7-36.9)
	Other[||]	1,290	6.7 (6.0-7.5)
	Uninsured	404	3.0 (2.5-3.7)
Well Child Visit at Age 11-12 Years**			
	Yes*	14,993	81.5 (80.1-82.8)
	No	439	3.0 (2.3-3.7)
	Don't know/Refused/ Missing	2,570	15.5 (14.3-16.8)
Census Region			
	Northeast*	3,725	15.6 (15.0-16.2)
	Midwest	3,850	21.0 (20.3-21.7)
	South	6,519	39.3 (38.2-40.3)

	West	3,908	24.2 (22.9-25.5)
Vaccination Facility Type			
	All private facilities*	7,147	41.5 (40.0-43.1)
	All public facilities	1,701	9.6 (8.6-10.6)
	All hospital facilities	2,105	8.6 (7.9-9.3)
	All STD/school/teen clinics or other facilities	412	2.2 (1.8-2.6)
	Mixed††	3,056	14.1 (13.1-15.1)
	Unknown/Don't Know‡‡	3,581	24.1 (22.7-25.5)

* Reference level.

§Insurance categories are mutually exclusive.

|| Includes IHS, military, CHIP, and some private.

** Status of health-care visit at age 11-12 years based on provider reported data.

†† Mixed indicates that the facility is identified to be in more than one of the facility categories such as private, public, hospital, STD/school/teen clinics.

‡‡ Includes military, WIC clinics, pharmacies, unknown, and missing.

TABLE 5. Vaccination Coverage Estimates Amongst Adolescents Aged 13-17 Years in the United States, by Selected Demographic and Access-To-Care Variables--NIS-Teen 2021

Characteristic		Overall Vaccinated Against 1+ HUMAN PAPILLOMAVIRUS SHOT			
		Weighted Estimates % (95% C.I.)	Unadjusted Odds Ratio Estimate (95% C.I.)	Adjusted Odds Ratio Estimate (95% C.I.)	Significant Variables Adjusted Odds Ratio Estimate (95% C.I.)
Total		**76.9(76.3 – 77.6)**			
Age (years)					
	13	72.5(69.7-75.3)	0.64 (0.52-0.80)	0.86 (0.67-1.11)	
	14	74.1(70.8-77.4)	0.70 (0.55-0.88)	0.75 (0.59-0.94)	
	15	79.0(76.0-82.0)	0.92 (0.72-1.17)	0.93 (0.73-1.18)	
	16	78.9(75.8-82.0)	0.91 (0.72-1.17)	0.94 (0.74-1.20)	
	17*	80.4(77.8-82.9)	Ref	Ref	Ref
Sex of Adolescent					0.81 (0.70-0.94)
	Male	75.4(73.6-77.3)	0.84 (0.72-0.98)	0.81 (0.70-0.94)	
	Female*	78.5(76.6-80.4)	Ref	Ref	Ref
Race/Ethnicity					
	Non-Hispanic White*	74.4(72.9-75.9)	Ref	Ref	Ref
	Non-Hispanic Black	81.7(78.4-85.0)	1.53 (1.22-1.94)	1.57 (1.23-2.01)	1.62 (1.27-2.05)
	Hispanic	77.8(74.3-81.3)	1.21 (0.97-1.50)	1.13 (0.90-1.41)	1.11 (0.89-1.39)
	Non-Hispanic Other	80.0(76.2-83.8)	1.37 (1.07-1.77)	1.31 (1.03-1.68)	1.31 (1.03-1.67)
Mother's Educational Level					
	<High School*	80.1(75.3-84.9)	Ref	Ref	Ref

	High School	75.4(72.0-78.8)	0.76 (0.53-1.08)	0.80 (0.57-1.14)	0.81 (0.56-1.15)
	Some college or college graduate	73.7(70.8-76.5)	0.70 (0.50-0.97)	0.77 (0.55-1.09)	0.77 (0.55-1.08)
	>College graduate	78.5(76.9-80.1)	0.91 (0.66-1.25)	1.09 (0.77-1.55)	1.07 (0.76-1.51)
Mother's Marital Status					
	Married*	75.5(73.9-77.1)	Ref	Ref	Ref
	Never married/Widowed/divorced/separated	79.4(77.1-81.6)	1.25 (1.06-1.47)	1.17 (0.98-1.40)	
Mother's Age					
	≤34 years*	75.9(69.2-82.5)	Ref	Ref	Ref
	35-44 years	75.6(73.5-77.7)	0.99 (0.68-1.43)	1.00 (0.67-1.50)	
	≥45 years	78.3(76.6-80.0)	1.15 (0.79-1.66)	1.17 (0.78-1.77)	
Income to Poverty Ratio					
	<133%*	81.7(79.3-84.1)	Ref	Ref	Ref
	133% - <322%	75.5(73.9-77.0)	0.69 (0.57-0.83)	0.71 (0.56-0.90)	0.64 (0.51-0.80)
Medical Insurance[§]					
	Private only*	75.9(74.1-77.6)	Ref	Ref	Ref
	Any Medicaid	80.5(78.4-82.6)	1.31 (1.11-1.55)	1.18 (0.94-1.48)	
	Other[‖]	73.1(67.1-79.0)	0.86 (0.63-1.18)	0.94 (0.67-1.33)	
	Uninsured	64.4(54.8-74.1)	0.58 (0.37-0.89)	0.68 (0.43-1.08)	
Well Child Visit at Age 11-12 Years**					
	Yes*	79.5(78.2-80.8)	Ref	Ref	Ref
	No	63.8(51.6-75.9)	0.45 (0.27-0.77)	0.46 (0.28-0.77)	0.42 (0.25-0.71)
	Don't know/Refused/ Missing	66.0(61.8-70.3)	0.50 (0.41-0.62)	0.50 (0.39-0.64)	0.47 (0.38-0.58)

Census Region					
	Northeast*	76.8(74.5-79.2)	Ref	Ref	
	Midwest	77.0(74.9-79.2)	1.01 (0.84-1.21)	1.07 (0.88-1.29)	1.06 (0.88-1.28)
	South	74.7(72.6-76.7)	0.89 (0.75-1.06)	0.90 (0.76-1.08)	0.89 (0.74-1.06)
	West	80.7(77.1-84.3)	1.26 (0.96-1.64)	1.40 (1.09-1.81)	1.40 (1.09-1.80)
Vaccination Facility Type					
	All private facilities*	77.3(75.1-79.4)	Ref	Ref	Ref
	All public facilities	78.3(74.1-82.5)	1.01 (0.73-1.39)	0.99 (0.72-1.38)	1.00 (0.72-1.37)
	All hospital facilities	78.5(74.9-82.0)	0.94 (0.71-1.24)	0.94 (0.70-1.25)	0.93 (0.70-1.24)
	All STD/school/teen clinics or other facilities	58.3(48.9-67.6)	0.39 (0.24-0.61)	0.42 (0.26-0.68)	0.40 (0.24-0.66)
	Mixed††	80.5(77.8-83.3)	1.15 (0.85-1.55)	1.19 (0.88-1.60)	1.17 (0.87-1.57)
	Unknown/Don't Know‡‡	74.9(72.0-77.8)	0.83 (0.62-1.11)	0.81 (0.61-1.09)	0.80 (0.60-1.07)

`* Reference level.

† $p < 0.05$ by chi-square test.

[§]Insurance categories are mutually exclusive.

[||] Includes IHS, military, CHIP, and some private.

** Status of health-care visit at age 11-12 years based on provider reported data.

†† Mixed indicates that the facility is identified to be in more than one of the facility categories such as private, public, hospital, STD/school/teen clinics.

[‡‡] Includes military, WIC clinics, pharmacies, unknown, and missing.

TABLE 6. Type III Test of Effect for Models Using NIS-Teen 2021.						
Characteristic	Wald Chi-Squares					
	Model 2		Model 3		Model 4	
	Statistic	P-Value	Statistic	P-Value	Statistic	P-Value
Age (years)	22.802	0.00	6.951	0.14		
Sex of Adolescent	5.180	0.02	8.170	0.00	7.783	0.01
Race/Ethnicity	18.494	0.00	16.174	0.00	18.178	0.00
Mother's Educational Level	11.462	0.01	16.248	0.00	15.681	0.00
Mother's Marital Status	7.066	0.01	3.116	0.08		
Mother's Age	3.907	0.14	3.986	0.14		
Income to Poverty Ratio	15.868	0.00	7.722	0.01	14.941	0.00
Medical Insurance	20.719	0.00	7.352	0.06		
Well Child Visit at Age 11-12 Years	49.503	0.00	36.665	0.00	60.944	0.00
Census Region	7.921	0.05	13.151	0.00	14.131	0.00
Vaccination Facility Type	27.795	0.00	25.232	0.00	25.597	0.00

V. Conclusion

In this project, the analysis of (NIS-Teen) 2021 data with the focus vaccine as 1+ HUMAN PAPILLOMAVIRUS SHOT(P_UTDHPV) and with a total of 18002 participants has been presented. Also, the histograms, bar charts, pie charts and tables have been provided. First, we presented the histograms of the percentage of participants at interview by age, by adolescent mother's age, and income poverty ratio. As can be seen from the graphs, we can conclude that most of the mothers' age at interview are greater than 35 years and just 6.8 % of the mothers who responded are less than 34 years old. Moreover, there is a significant difference between the two income-poverty ratio categories (0% to <133% and 133% to 322%). We can say that high-income respondents are more than two times higher in percentage than lower-income families, so it means that the low-income mothers did not respond very often at the interview. Also, the histogram using age at the interview shows that the teens' age which has been equally distributed.

Based on the bar charts, we can see that the number of the male respondents (51.0%) is larger than female (49.0%) with a narrow margin. Also, we can conclude that non-Hispanic white responses to vaccination interview are more than 3 times of other races which means that non-Hispanic white people preferred to have the interview rather than other races (non-Hispanic black only, Hispanic and non-Hispanic other plus Multiple race). Besides, we can see that the education has a huge effect on the number of people who responded to the interview. As can be seen, the more educated the mothers are, the more interested in having the vaccination interview. Also, the percentage of

married mothers (62.5%) is twice larger than others (never married/ widowed/ divorced/ separated/ deceased/ living with partner (37.5%)).
The first pie chart that has been presented is about the medical insurance of the adolescent which shows that private insurance (55.0%) and any medicate (35.3%) have the larger portion compared to other categories. It is clear from the information given in the pie chart of the well child visit at age 11-12 years old of the adolescent that 81.5% of the adolescent age 11-12 like to do the check up which is significantly higher percentage compared to the ones who do not checkup. The evidence from the third pie chart (the census region of the adolescent) indicates that the most frequent census region is the south (39.3%) of the United State and the second most frequent is the west (24.2%). On the other hand, the northeast is the least frequent census region with 15.6%. The last pie chart is about the vaccination facility of the adolescent which shows that 41.5% of the vaccination facility is related to the private facilities. However, the vaccination facility in the school/teen clinic section was just 2.2% which is very low compared to others. Overall, we can conclude that most of the participants in this survey were more to be male, white, with higher household income, with health insurance, and with more educated mothers.

In this project, we presented 6 tables. Table 1 provides information about the sample sizes and the weighted percentages for each demographic category which have been interpreted by graphs. From the information shown in the table 2, we presented the vaccination coverage estimates amongst adolescents aged 13-17 years in the United States, by selected demographic and we considered the 1+ HUMAN PAPILLOMAVIRUS SHOT as the vaccine type. In this table, the sample size, the weighted 95% confidence intervals, chi square statistics and p value for every demographic category have been presented. As can be seen from the results, in every demographic, P-value are 0 (which are less than 0.05), so we got significant confidence intervals. As shown in the table 3, vaccination coverage estimates amongst adolescents aged 13-17 years in the United States and by States have been presented by considering TDAP Vaccine as 1+ HUMAN PAPILLOMAVIRUS SHOT. Based on the results, we can conclude that the confidence intervals for each state of the US are significant.

Table 4 presented information about the sample sizes and 95% weighted confidence interval of each sample characteristics of adolescents aged 13-17 years in the United States in 2021. Besides, vaccination coverage estimates amongst adolescents aged 13-17 years in the United States has been provided in Table 5 which includes unadjusted weighted vaccination coverage estimates for all the selected variables from model 1, model 2 and model 3 based on the vaccine type of "1+ HUMAN PAPILLOMAVIRUS SHOT". According to the table 6, the type III test of effect for models using NIS-Teen 2021 for the vaccine type of "1+ HUMAN PAPILLOMAVIRUS SHOT" has been presented for model 2, 3 and 4. In model 2, Age (years), Sex of Adolescent, Race/Ethnicity, Mother's Educational Level, Mother's Marital Status, Income to Poverty Ratio, Medical Insurance, Well Child Visit at Age 11-12 Years, Census Region and Vaccination Facility Type are the variables that were significant. But, mother's age was not significant. In model 3, only

Sex of Adolescent, Race/Ethnicity, Mother's Educational Level, Income to Poverty Ratio, Well Child Visit at Age 11-12 Years, Census Region and Vaccination Facility Type were significant.

Based on the results of the Wald chi-squares test in model 3, the p value for the variables Sex of Adolescent, Race/Ethnicity, Mother's Educational Level, Income to Poverty Ratio, Well Child Visit at Age 11-12 Years, Census Region and Vaccination Facility Type are less than 0.05. So, we conclude that these variables have significant effect on this survey and these variables will remain in the model. Finally, as can be seen from the model 4 results, all the 7 variables in model 4 were significant.

In this project, we have performed data analysis of the 2021 National Immunization Survey–Teen (NIS–Teen) on the total sample size which is equal to 18,002 to determine the coverage estimates of the vaccine 1+ HUMAN PAPILLOMAVIRUS SHOT. Descriptive statistics has been presented by providing graphs and report tables of weighted and unweighted percentages. Also, chi-square test statistics and confidence intervals have been presented to find significant variables. Moreover, we compared 4 different models based on the Wald Chi-Square test statistics to Indicate which variable or variables are associated with the selected type of vaccination which was 1+ HUMAN PAPILLOMAVIRUS SHOT and according to the final result, the best model has been presented.

VI. References

1. https://www.cdc.gov/vaccines/imz-managers/coverage/teenvaxview/pubs-presentations.html

2. https://www.cdc.gov/mmwr/volumes/67/wr/mm6733a1.htm

3. Centers for Disease Control and Prevention (CDC). National and state vaccination coverage among adolescents aged 13-17 years--United States, 2012. MMWR Morb Mortal Wkly Rep. 2013;62(34):685-693.

4. Centers for Disease Control and Prevention (CDC). National and state vaccination coverage among adolescents aged 13-17 years--United States, 2011 [published correction appears in MMWR Morb Mortal Wkly Rep. 2012 Oct 19;61(41):844]. MMWR Morb Mortal Wkly Rep. 2012;61(34):671-677.

5. Lu PJ, Yankey D, Fredua B, et al. National and State-Specific estimates of settings of receiving human papillomavirus vaccination among adolescents in the United States. J Adolesc Health. 2021;69(4):597–603.

6. P.J. Lu, D. Yankey, J. Jeyarajah, et al. Association of health insurance status and vaccination coverage among adolescents 13-17 years of age J Pediatr, 195 (2018), pp. 256-262

VII. Appendix

```
LIBNAME PUF "C:\Users\mkhalilzadeh1\Documents\NISTEEN2021";
OPTIONS FMTSEARCH = (PUF WORK LIBRARY);

%LET MYPATH = C:\Users\mkhalilzadeh1\Documents\NISTEEN2021\RESULTS;

DATA MID_NEW_PROJECT;
      SET PUF.NISTEENPUF21(KEEP = SEQNUMT PDAT2 PROVWT_C STRATUM YEAR AGE SEX
RACEETHK EDUC1 AGEGRP_M_I
                                          MARITAL2 INCPORAR_I INS_STAT2_I
CKUP_11_12 CEN_REG FACILITY STATE P_UTDHPV
                                          P_UTDHPV2 P_UTDHPV_15INT P_UTDMEN
P_UTDMENACWY P_UTDTD P_UTDTDAP P_UTDTDAP7
                                          P_UTDHEPA1 P_UTDVRC);

      AGE_CATEGORY = .;
      IF AGE IN (13) THEN AGE_CATEGORY = 1;
      IF AGE IN (14) THEN AGE_CATEGORY = 2;
      IF AGE IN (15) THEN AGE_CATEGORY = 3;
      IF AGE IN (16) THEN AGE_CATEGORY = 4;
      IF AGE IN (17) THEN AGE_CATEGORY = 5;

      RACE_ETH = .;
      IF RACEETHK = 1 THEN RACE_ETH = 3;
      IF RACEETHK = 2 THEN RACE_ETH = 1;
      IF RACEETHK = 3 THEN RACE_ETH = 2;
      IF RACEETHK = 4 THEN RACE_ETH = 4;

      CHECKUP = CKUP_11_12;
      IF  CKUP_11_12 IN (., 77, 99) THEN CHECKUP = 3;

      TEENAGE_GROUP = .;
      IF AGE IN (13, 14, 15) THEN TEENAGE_GROUP = 1;
      IF AGE IN (16, 17) THEN TEENAGE_GROUP = 2;

    IF 0 <= INCPORAR_I < 1.33162 THEN INCOME_POV = 1;
      IF 1.33162 <= INCPORAR_I < 3.22046 THEN INCOME_POV = 2;

      MISSING_FACILITY = FACILITY;
      IF  FACILITY IN (.) THEN MISSING_FACILITY = 6;
RUN;

PROC CONTENTS DATA = MID_NEW_PROJECT VARNUM;
RUN;
```

```
DATA NEW_PROJECT;
      SET MID_NEW_PROJECT;
      FORMAT _ALL_;
RUN;

PROC FORMAT;
      VALUE AGE_FORMAT 1 = "13"
                       2 = "14"
                       3 = "15"
                       4 = "16"
                       5 = "17"
                       ;
      VALUE AGEGP_FORMAT 1 = "13 - 15"
                         2   = "16 - 17"
                         ;
      VALUE SEX_FORMAT  1 = "MALE  "
                        2 = "FEMALE"
                        ;
      VALUE RACE_FORMAT   1 = "NON-HISPANIC WHITE ONLY           "
                            2 = "NON-HISPANIC BLACK ONLY           "
                            3 = "HISPANIC                          "
                            4 = "NON-HISPANIC OTHER + MULTIPLE RACE"
                            ;
      VALUE CHECKUP_FORMAT 1 = "YES CHECK UP"
                           2 = "NO CHECK UP "
                           3 = "DK OR REF   "
                           ;
      VALUE INSUR_FORMAT    1 = "PRIVATE INSURANCE"
                            2 = "ANY MEDICAID     "
                            3 = "OTHER INSURANCE  "
                            4 = "UNINSURED        "
                            ;
      VALUE MOAGE_FORMAT  1 = "<= 34 YEARS   "
                            2 = "35 TO 44 YEARS"
                            3 = ">= 45 YEARS   "
                            ;
      VALUE MARTIAL_FORMAT  1 = "MARRIED
"
                            2 = "Other"
                            ;
      VALUE EDUCATION_FORMAT   1 = "LESS THAN 12 YEARS                  "
                               2 = "12 YEARS                           "
                               3 = "MORE THAN 12 YEARS, NON-COLLEGE GRAD"
                               4 = "COLLEGE GRADUATE                   "
                               ;
      VALUE INCPR_FORMAT  1 = " 0% TO <133% "
                          2 = " 133% TO 322%"
                  ;

      VALUE FACILITY_FORMAT  1 = "ALL PRIVATE FACILITIES
"
                             2 = "ALL PUBLIC FACILITIES
"
                             3 = "ALL HOSPITAL FACILITIES
"
```

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                              4 = "ALL STD/SCHOOL/TEEN CLINICS OR OTHER
FACILITIES"
                              5 = "MIXED
"
                              6 = "UNKNOWN/DK
"
                              ;
      VALUE CENREG_FORMAT 1 = "NORTHEAST"
                              2 = "MIDWEST  "
                              3 = "SOUTH    "
                              4 = "WEST     "
                              ;
      VALUE UTD_FORMAT    0 = "NOT UTD"
                              1 = "UTD    "
                              ;

      VALUE STATE_FORMAT      . = "MISSING             "
                              1 = "ALABAMA             "
                              2 = "ALASKA              "
                              3 = "                    "
                              4 = "ARIZONA             "
                              5 = "ARKANSAS            "
                              6 = "CALIFORNIA          "
                              7 = "                    "
                              8 = "COLORADO            "
                              9 = "CONNECTICUT         "
                             10 = "DELAWARE            "
                             11 = "DISTRICT OF COLUMBIA"
                             12 = "FLORIDA             "
                             13 = "GEORGIA             "
                             14 = "                    "
                             15 = "HAWAII              "
                             16 = "IDAHO               "
                             17 = "ILLINOIS            "
                             18 = "INDIANA             "
                             19 = "IOWA                "
                             20 = "KANSAS              "
                             21 = "KENTUCKY            "
                             22 = "LOUISIANA           "
                             23 = "MAINE               "
                             24 = "MARYLAND            "
                             25 = "MASSACHUSETTS       "
                             26 = "MICHIGAN            "
                             27 = "MINNESOTA           "
                             28 = "MISSISSIPPI         "
                             29 = "MISSOURI            "
                             30 = "MONTANA             "
                             31 = "NEBRASKA            "
                             32 = "NEVADA              "
                             33 = "NEW HAMPSHIRE       "
                             34 = "NEW JERSEY          "
                             35 = "NEW MEXICO          "
                             36 = "NEW YORK            "
                             37 = "NORTH CAROLINA      "
                             38 = "NORTH DAKOTA        "
                             39 = "OHIO                "
                             40 = "OKLAHOMA            "
```

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                                41 = "OREGON              "
                                42 = "PENNSYLVANIA        "
                                43 = "                    "
                                44 = "RHODE ISLAND        "
                                45 = "SOUTH CAROLINA      "
                                46 = "SOUTH DAKOTA        "
                                47 = "TENNESSEE           "
                                48 = "TEXAS               "
                                49 = "UTAH                "
                                50 = "VERMONT             "
                                51 = "VIRGINIA            "
                                52 = "                    "
                                53 = "WASHINGTON          "
                                54 = "WEST VIRGINIA       "
                                55 = "WISCONSIN           "
                                56 = "WYOMING             "
                                ;
RUN;

ODS OUTPUT ONEWAYFREQS = TABLE_RESPONSE;
PROC FREQ DATA = NEW_PROJECT;
      WHERE PDAT2 = 1  AND PROVWT_C NE .;
      TABLES  AGE_CATEGORY TEENAGE_GROUP SEX RACE_ETH EDUC1 MARITAL2
AGEGRP_M_I INCOME_POV INS_STAT2_I CHECKUP CEN_REG MISSING_FACILITY STATE/
NOCUM NOPERCENT;
    TITLE2 'UNWEIGHTED ONEWAYFREQS OF CHARACTERISTICS';

      FORMAT AGE_CATEGORY AGE_FORMAT.;
      FORMAT TEENAGE_GROUP AGEGP_FORMAT.;
      FORMAT SEX SEX_FORMAT.;
      FORMAT RACE_ETH RACE_FORMAT.;
      FORMAT EDUC1 EDUCATION_FORMAT.;
      FORMAT MARITAL2 MARTIAL_FORMAT.;
      FORMAT AGEGRP_M_I MOAGE_FORMAT.;
      FORMAT INCOME_POV INCPR_FORMAT.;
      FORMAT INS_STAT2_I INSUR_FORMAT.;
      FORMAT CHECKUP CHECKUP_FORMAT.;
      FORMAT CEN_REG CENREG_FORMAT.;
      FORMAT MISSING_FACILITY FACILITY_FORMAT.;
      FORMAT STATE STATE_FORMAT.;
RUN;

PROC CONTENTS DATA = TABLE_RESPONSE  SHORT;
RUN;

DATA NEW_TABLE;
      RETAIN TABLE VARIABLE_LABEL VARIABLE_COUNT VARIABLE_VALUE FREQUENCY;
      LENGTH VARIABLE_LABEL $40.;

      SET TABLE_RESPONSE (KEEP = AGEGRP_M_I CEN_REG EDUC1 FREQUENCY
INS_STAT2_I MARITAL2 CHECKUP MISSING_FACILITY INCOME_POV
                                      RACE_ETH AGE_CATEGORY SEX STATE
TEENAGE_GROUP TABLE);

      IF AGE_CATEGORY NE . THEN DO;
            VARIABLE_LABEL = PUT(AGE_CATEGORY, AGE_FORMAT.);
            VARIABLE_COUNT = 1;
```

```
        VARIABLE_VALUE = AGE_CATEGORY;
    END;
    IF TEENAGE_GROUP NE . THEN DO;
        VARIABLE_LABEL = PUT(TEENAGE_GROUP, AGEGP_FORMAT.);
        VARIABLE_COUNT = 2;
        VARIABLE_VALUE = TEENAGE_GROUP;
    END;
    IF SEX NE . THEN DO;
        VARIABLE_LABEL = PUT(SEX, SEX_FORMAT.);
        VARIABLE_COUNT = 3;
        VARIABLE_VALUE = SEX;
    END;
    IF RACE_ETH NE . THEN DO;
        VARIABLE_LABEL = PUT(RACE_ETH, RACE_FORMAT.);
        VARIABLE_COUNT = 4;
        VARIABLE_VALUE = RACE_ETH;
    END;
    IF EDUC1 NE . THEN DO;
        VARIABLE_LABEL = PUT(EDUC1, EDUCATION_FORMAT.);
        VARIABLE_COUNT = 5;
        VARIABLE_VALUE = EDUC1;
    END;
    IF MARITAL2 NE . THEN DO;
        VARIABLE_LABEL = PUT(MARITAL2, MARTIAL_FORMAT.);
        VARIABLE_COUNT = 6;
        VARIABLE_VALUE = MARITAL2;
    END;
  IF AGEGRP_M_I NE . THEN DO;
        VARIABLE_LABEL = PUT(AGEGRP_M_I, MOAGE_FORMAT.);
        VARIABLE_COUNT = 7;
        VARIABLE_VALUE = AGEGRP_M_I;
    END;
    IF INCOME_POV NE . THEN DO;
        VARIABLE_LABEL = PUT(INCOME_POV, INCPR_FORMAT.);
        VARIABLE_COUNT = 8;
        VARIABLE_VALUE = INCOME_POV;
    END;
    IF INS_STAT2_I NE . THEN DO;
        VARIABLE_LABEL = PUT(INS_STAT2_I, INSUR_FORMAT.);
        VARIABLE_COUNT = 9;
        VARIABLE_VALUE = INS_STAT2_I;
    END;
    IF CHECKUP NE . THEN DO;
        VARIABLE_LABEL = PUT(CHECKUP, CHECKUP_FORMAT.);
        VARIABLE_COUNT = 10;
        VARIABLE_VALUE = CHECKUP;
    END;
    IF CEN_REG NE . THEN DO;
        VARIABLE_LABEL = PUT(CEN_REG, CENREG_FORMAT.);
        VARIABLE_COUNT = 11;
        VARIABLE_VALUE = CEN_REG;
    END;
    IF MISSING_FACILITY NE . THEN DO;
        VARIABLE_LABEL = PUT(MISSING_FACILITY, FACILITY_FORMAT.);
        VARIABLE_COUNT = 12;
        VARIABLE_VALUE = MISSING_FACILITY;
    END;
```

```
      IF STATE NE . THEN DO;
            VARIABLE_LABEL = PUT(STATE, STATE_FORMAT.);
            VARIABLE_COUNT = 13;
            VARIABLE_VALUE = STATE;
      END;

      KEEP TABLE VARIABLE_LABEL VARIABLE_COUNT VARIABLE_VALUE FREQUENCY;
RUN;

PROC EXPORT DATA = NEW_TABLE OUTFILE ="&MYPATH.\TABLE1\SAMPLESIZES.xlsx"
DBMS=XLSX REPLACE;
RUN;

ODS OUTPUT ONEWAYFREQS = TABLE_RESPONSE_WT ;
PROC FREQ DATA = NEW_PROJECT;
      WHERE PDAT2 = 1;
      WEIGHT PROVWT_C;
      TABLES AGE_CATEGORY TEENAGE_GROUP SEX RACE_ETH EDUC1 MARITAL2
AGEGRP_M_I INCOME_POV INS_STAT2_I CHECKUP CEN_REG MISSING_FACILITY STATE/
NOCUM;

      TITLE 'RESULT OF CHI-SQUARE TEST FOR WEIGHTED VACCINATION BASED ON EACH
SELECTED VARIABLES';

      FORMAT AGE_CATEGORY AGE_FORMAT.;
      FORMAT TEENAGE_GROUP AGEGP_FORMAT.;
      FORMAT SEX SEX_FORMAT.;
      FORMAT RACE_ETH RACE_FORMAT.;
      FORMAT EDUC1 EDUCATION_FORMAT.;
      FORMAT MARITAL2 MARTIAL_FORMAT.;
      FORMAT AGEGRP_M_I MOAGE_FORMAT.;
      FORMAT INCOME_POV INCPR_FORMAT.;
      FORMAT INS_STAT2_I INSUR_FORMAT.;
      FORMAT CHECKUP CHECKUP_FORMAT.;
      FORMAT CEN_REG CENREG_FORMAT.;
      FORMAT MISSING_FACILITY FACILITY_FORMAT.;
      FORMAT STATE STATE_FORMAT.;
RUN;

PROC CONTENTS DATA = TABLE_RESPONSE_WT  SHORT;
RUN;

DATA NEW_TABLE_WT;
      RETAIN TABLE VARIABLE_LABEL VARIABLE_COUNT VARIABLE_VALUE PERCENT
NEW_PERCENT;
      LENGTH VARIABLE_LABEL $40.;

      SET TABLE_RESPONSE_WT (KEEP =  TABLE PERCENT AGE_CATEGORY TEENAGE_GROUP
SEX RACE_ETH EDUC1 MARITAL2 AGEGRP_M_I INCOME_POV INS_STAT2_I CHECKUP CEN_REG
                                    MISSING_FACILITY STATE);

      NEW_PERCENT = PUT(PERCENT, 8.1);

      IF AGE_CATEGORY NE . THEN DO;
            VARIABLE_LABEL = PUT(AGE_CATEGORY, AGE_FORMAT.);
            VARIABLE_COUNT = 1;
            VARIABLE_VALUE = AGE_CATEGORY;
```

```
END;
IF TEENAGE_GROUP NE . THEN DO;
      VARIABLE_LABEL = PUT(TEENAGE_GROUP, AGEGP_FORMAT.);
      VARIABLE_COUNT = 2;
      VARIABLE_VALUE = TEENAGE_GROUP;
END;
IF SEX NE . THEN DO;
      VARIABLE_LABEL = PUT(SEX, SEX_FORMAT.);
      VARIABLE_COUNT = 3;
      VARIABLE_VALUE = SEX;
END;
IF RACE_ETH NE . THEN DO;
      VARIABLE_LABEL = PUT(RACE_ETH, RACE_FORMAT.);
      VARIABLE_COUNT = 4;
      VARIABLE_VALUE = RACE_ETH;
END;
IF EDUC1 NE . THEN DO;
      VARIABLE_LABEL = PUT(EDUC1, EDUCATION_FORMAT.);
      VARIABLE_COUNT = 5;
      VARIABLE_VALUE = EDUC1;
END;
IF MARITAL2 NE . THEN DO;
      VARIABLE_LABEL = PUT(MARITAL2, MARTIAL_FORMAT.);
      VARIABLE_COUNT = 6;
      VARIABLE_VALUE = MARITAL2;
END;
IF AGEGRP_M_I NE . THEN DO;
      VARIABLE_LABEL = PUT(AGEGRP_M_I, MOAGE_FORMAT.);
      VARIABLE_COUNT = 7;
      VARIABLE_VALUE = AGEGRP_M_I;
END;
IF INCOME_POV NE . THEN DO;
      VARIABLE_LABEL = PUT(INCOME_POV, INCPR_FORMAT.);
      VARIABLE_COUNT = 8;
      VARIABLE_VALUE = INCOME_POV;
END;
IF INS_STAT2_I NE . THEN DO;
      VARIABLE_LABEL = PUT(INS_STAT2_I, INSUR_FORMAT.);
      VARIABLE_COUNT = 9;
      VARIABLE_VALUE = INS_STAT2_I;
END;
IF CHECKUP NE . THEN DO;
      VARIABLE_LABEL = PUT(CHECKUP, CHECKUP_FORMAT.);
      VARIABLE_COUNT = 10;
      VARIABLE_VALUE = CHECKUP;
END;
IF CEN_REG NE . THEN DO;
      VARIABLE_LABEL = PUT(CEN_REG, CENREG_FORMAT.);
      VARIABLE_COUNT = 11;
      VARIABLE_VALUE = CEN_REG;
END;
IF MISSING_FACILITY NE . THEN DO;
      VARIABLE_LABEL = PUT(MISSING_FACILITY, FACILITY_FORMAT.);
      VARIABLE_COUNT = 12;
      VARIABLE_VALUE = MISSING_FACILITY;
END;
IF STATE NE . THEN DO;
```

```
            VARIABLE_LABEL = PUT(STATE, STATE_FORMAT.);
            VARIABLE_COUNT = 13;
            VARIABLE_VALUE = STATE;
      END;

      KEEP TABLE VARIABLE_LABEL VARIABLE_COUNT VARIABLE_VALUE PERCENT
NEW_PERCENT;
RUN;

PROC EXPORT DATA = NEW_TABLE_WT OUTFILE
="&MYPATH.\TABLE1\WEIGHTED_PERCENTAGES.xlsx" DBMS=XLSX REPLACE;
RUN;

ODS OUTPUT CHISQ = CHISQ_TEST;
PROC FREQ DATA = NEW_PROJECT;
      WHERE PDAT2 = 1;
      WEIGHT PROVWT_C;
      TABLE_RESPONSE  (AGE_CATEGORY TEENAGE_GROUP SEX RACE_ETH EDUC1 MARITAL2
AGEGRP_M_I INCOME_POV INS_STAT2_I CHECKUP CEN_REG MISSING_FACILITY)*P_UTDHPV
/ CHISQ;
    TITLE 'RESULTS of CHI-SQUARE TEST FOR WEIGHTED VACCINATION of SELECTED
VARIABLES';

      FORMAT AGE_CATEGORY AGE_FORMAT.;
      FORMAT TEENAGE_GROUP AGEGP_FORMAT.;
      FORMAT SEX SEX_FORMAT.;
      FORMAT RACE_ETH RACE_FORMAT.;
      FORMAT EDUC1 EDUCATION_FORMAT.;
      FORMAT MARITAL2 MARTIAL_FORMAT.;
      FORMAT AGEGRP_M_I MOAGE_FORMAT.;
      FORMAT INCOME_POV INCPR_FORMAT.;
      FORMAT INS_STAT2_I INSUR_FORMAT.;
      FORMAT CHECKUP CHECKUP_FORMAT.;
      FORMAT CEN_REG CENREG_FORMAT.;
      FORMAT MISSING_FACILITY FACILITY_FORMAT.;
      FORMAT P_UTDHPV UTD_FORMAT.;
RUN;

PROC CONTENTS DATA = CHISQ_TEST SHORT;
RUN;

DATA NEWCHISQ_TEST;
      RETAIN TABLE STATISTIC NEW_VALUE NEW_PROP DF VALUE PROB;
      LENGTH NEW_VALUE NEW_PROP $15.;
      SET CHISQ_TEST;

      WHERE STATISTIC IN ("Chi-Square");
    NEW_VALUE = PUT(VALUE, 10.2);
      NEW_PROP = PUT(PROB, 8.2);
RUN;

PROC EXPORT DATA = NEWCHISQ_TEST OUTFILE ="&MYPATH.\TABLE2\CHISQUARE.xlsx"
DBMS=XLSX REPLACE;
RUN;

PROC SGPLOT DATA=NEW_PROJECT;
      WHERE PDAT2 = 1;
```

```
    TITLE "Weighted Histogram Using Age at Interview in NIS-Teen 2021";
    HISTOGRAM AGE_CATEGORY /BINSTART = 1 BINWIDTH = 1 NBINS = 5 WEIGHT =
PROVWT_C;
    DENSITY AGE_CATEGORY;
      FORMAT AGE_CATEGORY AGE_FORMAT.;
RUN;

PROC SGPLOT DATA=NEW_PROJECT;
      WHERE PDAT2 = 1;
    TITLE "Weighted Histogram Using Mother's Age at Interview in NIS-Teen
2021";
    HISTOGRAM AGEGRP_M_I / BINSTART = 1 BINWIDTH = 1 NBINS = 5 WEIGHT =
PROVWT_C;
    DENSITY AGEGRP_M_I;
      FORMAT AGEGRP_M_I MOAGE_FORMAT.;
RUN;

PROC SGPLOT DATA=NEW_PROJECT;
      WHERE PDAT2 = 1;
    TITLE "Weighted Histogram Using Income-Poverty Ratio in NIS-Teen 2021";
    HISTOGRAM INCOME_POV / BINSTART = 1 BINWIDTH = 1 NBINS = 5 WEIGHT =
PROVWT_C;
    DENSITY INCOME_POV;
      FORMAT INCOME_POV INCPR_FORMAT.;
RUN;

PROC SGPLOT DATA=NEW_PROJECT;
      WHERE PDAT2 = 1;
    TITLE "Weighted Vertical Bar Chart Using Sex of the Adolescent in NIS-
Teen 2021";
    VBAR SEX / WEIGHT = PROVWT_C STAT = PERCENT;
    FORMAT SEX SEX_FORMAT.;
RUN;

PROC SGPLOT DATA=NEW_PROJECT;
      WHERE PDAT2 = 1;
    TITLE "Weighted Vertical Bar Chart Using Race of the Adolescent in NIS-
Teen 2021";
    VBAR RACE_ETH / WEIGHT = PROVWT_C STAT = PERCENT;
    FORMAT RACE_ETH RACE_FORMAT.;
RUN;

PROC SGPLOT DATA=NEW_PROJECT;
      WHERE PDAT2 = 1;
    TITLE "Weighted Vertical Bar Chart Using Education of Adolescent's Mother
in NIS-Teen 2021";
    VBAR EDUC1 / WEIGHT = PROVWT_C STAT = PERCENT;
    FORMAT EDUC1 EDUCATION_FORMAT.;
RUN;

PROC SGPLOT DATA=NEW_PROJECT;
      WHERE PDAT2 = 1;
    TITLE "Weighted Vertical Bar Chart Using Martial Status of Adolescent's
Mother in NIS-Teen 2021";
    VBAR MARITAL2 / WEIGHT = PROVWT_C STAT = PERCENT;
    FORMAT MARITAL2 MARTIAL_FORMAT.;
RUN;
```

```
PROC SGPLOT DATA=NEW_PROJECT;
      WHERE PDAT2 = 1;
    TITLE "Weighted Vertical Bar Chart Using Sex of the Adolescent in NIS-
Teen 2021";
    HBAR SEX / WEIGHT = PROVWT_C STAT = PERCENT;
    FORMAT SEX SEX_FORMAT.;
RUN;


PROC GCHART DATA=NEW_PROJECT;
   TITLE "Unweighted Pie-Chart";
   TITLE "The Census Region of the Adolescent in NIS-Teen 2021";
   WHERE PDAT2 = 1  AND PROVWT_C NE .;
   PIE CEN_REG / SUMVAR = PROVWT_C TYPE=SUM PERCENT = ARROW NOHEADING LEGEND
DISCRETE;
   FORMAT CEN_REG CENREG_FORMAT.;
RUN;
QUIT;

PROC GCHART DATA=NEW_PROJECT;
   TITLE "Unweighted Pie-Chart";
   TITLE "The Medical Insurance of the Adolescent in NIS-Teen 2021";
   WHERE PDAT2 = 1  AND PROVWT_C NE .;
   PIE INS_STAT2_I / SUMVAR = PROVWT_C TYPE=SUM PERCENT = ARROW NOHEADING
LEGEND DISCRETE;
   FORMAT INS_STAT2_I INSUR_FORMAT.;
RUN;
QUIT;

PROC GCHART DATA=NEW_PROJECT;
   TITLE "Unweighted Pie-Chart";
   TITLE "The Well Child Visit at Age 11-12 (years) of the Adolescent in NIS-
Teen 2021";
   WHERE PDAT2 = 1  AND PROVWT_C NE .;
   PIE CHECKUP / SUMVAR = PROVWT_C TYPE=SUM PERCENT = ARROW NOHEADING LEGEND
DISCRETE;
   FORMAT CHECKUP CHECKUP_FORMAT.;
RUN;
QUIT;

PROC GCHART DATA=NEW_PROJECT;
   TITLE "Unweighted Pie-Chart";
   TITLE "The Census Region of the Adolescent in NIS-Teen 2021";
   WHERE PDAT2 = 1  AND PROVWT_C NE .;
   PIE CEN_REG / SUMVAR = PROVWT_C TYPE=SUM PERCENT = ARROW NOHEADING LEGEND
DISCRETE;
   FORMAT CEN_REG CENREG_FORMAT.;
RUN;
QUIT;

PROC GCHART DATA=NEW_PROJECT;
   TITLE "Unweighted Pie-Chart";
   TITLE "The Vaccination Facility of the Adolescent in NIS-Teen 2021";
   WHERE PDAT2 = 1  AND PROVWT_C NE .;
   PIE MISSING_FACILITY / SUMVAR = PROVWT_C TYPE=SUM PERCENT = ARROW
NOHEADING LEGEND DISCRETE;
   FORMAT MISSING_FACILITY FACILITY_FORMAT.;
```

```
RUN;
QUIT;

PROC MEANS DATA=NEW_PROJECT MEAN CLM MAXDEC = 3;
      TITLE "NIS-TEEN VACCINATION COVERAGE ESTIMATES BY DESCRIPTION - 2021";
      WHERE PDAT2 = 1  AND PROVWT_C NE .;
      WEIGHT PROVWT_C;
      VAR P_UTDHPV;
      FORMAT P_UTDHPV UTD_FORMAT.;
RUN;



%MACRO MYESTIMATE(VAR1, VAR2, VAR3, VAR4, DESCRIPTION);
ODS OUTPUT SUMMARY = MYMEANS&VAR1.;
PROC MEANS DATA=NEW_PROJECT MEAN CLM MAXDEC = 3;
      TITLE "2021 NIS-TEEN PUBLIC-USE FILE VACCINATION COVERAGE ESTIMATES BY
DESCRIPTION";
      WHERE PDAT2 = 1  AND PROVWT_C NE .;
      CLASS &VAR1.;
      WEIGHT PROVWT_C;
      FREQ &VAR1.;
      VAR &VAR2.;
      FORMAT &VAR1. &VAR3.;
      FORMAT &VAR2. UTD_FORMAT.;
RUN;

PROC CONTENTS DATA = MYMEANS&VAR1. SHORT;
RUN;

DATA MYMEANS&VAR1.V1;
      RETAIN MYCHARACT VARIABLE_LABEL VARIABLE_VALUE MYRESULTS FINALESTIMATE
&VAR2._MEAN &VAR2._LCLM &VAR2._UCLM;
      LENGTH MYRESULTS FINALESTIMATE $20. VARIABLE_LABEL $40.;
      SET MYMEANS&VAR1.;

      MYESTIMATE  = PUT(ROUND(&VAR2._MEAN*100,0.1), 4.1);
      CONINTEL = '('||PUT(ROUND(&VAR2._LCLM*100,0.1), 4.1)||' -
'||PUT(ROUND(&VAR2._UCLM*100,0.1), 4.1)||')';
      FINALESTIMATE = CATX(" ",MYESTIMATE ," ",CONINTEL);
      MYCIDIFF = (&VAR2._UCLM*100) - (&VAR2._LCLM*100);
      IF (MYCIDIFF > 20) THEN MYRESULTS = FINALESTIMATE||"**";
      ELSE MYRESULTS = FINALESTIMATE;

      VARIABLE_LABEL = PUT(&VAR1.,&VAR3.);
      VARIABLE_VALUE = &VAR1.;
      MYCHARACT = &VAR4.;

      KEEP MYCHARACT VARIABLE_LABEL VARIABLE_VALUE MYRESULTS FINALESTIMATE
&VAR2._MEAN &VAR2._LCLM &VAR2._UCLM;
RUN;

PROC EXPORT DATA = MYMEANS&VAR1.V1 OUTFILE
="&MYPATH.\TABLE2\TABLE2VAX&VAR1..xlsx" DBMS=XLSX REPLACE;
RUN;

PROC APPEND BASE = ALLESTIMATES DATA = MYMEANS&VAR1.V1 FORCE;
```

```
RUN;

%MEND MYESTIMATE ;

%MYESTIMATE (AGE_CATEGORY, P_UTDHPV, AGE_FORMAT., 1, "Age (years) at
Interview");
%MYESTIMATE (TEENAGE_GROUP, P_UTDHPV, AGEGP_FORMAT., 2, "Age Group (in years)
at Interview");
%MYESTIMATE (SEX, P_UTDHPV, SEX_FORMAT., 3, "Sex of Adolescent at
Interview");
%MYESTIMATE (RACE_ETH, P_UTDHPV, RACE_FORMAT., 4, "Sex of Adolescent at
Interview");
%MYESTIMATE (EDUC1, P_UTDHPV, EDUCATION_FORMAT., 5, "Sex of Adolescent at
Interview");
%MYESTIMATE (MARITAL2, P_UTDHPV, MARTIAL_FORMAT., 6, "Sex of Adolescent at
Interview");
%MYESTIMATE (AGEGRP_M_I, P_UTDHPV, MOAGE_FORMAT., 7, "Sex of Adolescent at
Interview");
%MYESTIMATE (INCOME_POV, P_UTDHPV, INCPR_FORMAT., 8, "Sex of Adolescent at
Interview");
%MYESTIMATE (INS_STAT2_I, P_UTDHPV, INSUR_FORMAT., 9, "Sex of Adolescent at
Interview");
%MYESTIMATE (CHECKUP, P_UTDHPV, CHECKUP_FORMAT., 10, "Sex of Adolescent at
Interview");
%MYESTIMATE (CEN_REG, P_UTDHPV, CENREG_FORMAT., 11, "Sex of Adolescent at
Interview");
%MYESTIMATE (MISSING_FACILITY, P_UTDHPV, FACILITY_FORMAT., 12, "Sex of
Adolescent at Interview");
%MYESTIMATE (STATE, P_UTDHPV, STATE_FORMAT., 13, "Sex of Adolescent at
Interview");

DATA PUF.ALLESTIMATES;
      SET ALLESTIMATES;
RUN;

PROC EXPORT DATA = ALLESTIMATES OUTFILE ="&MYPATH.\TABLE2\TABLE2.xlsx"
DBMS=XLSX REPLACE;
RUN;



TITLE1 "FREQUENCY ANALYSIS - PUF FOR NIS-TEEN 2021";
TITLE2 'UNIVARIATE ONEWAYFREQS ON VARIOUS VARIABLES';

ODS OUTPUT CROSSTABS = FINALSTABLE1;
PROC SURVEYFREQ DATA = NEW_PROJECT;
    STRATA  STRATUM;
    CLUSTER SEQNUMT;
    WEIGHT  PROVWT_C;

    TABLES PDAT2*(P_UTDHPV AGE_CATEGORY SEX RACE_ETH EDUC1 MARITAL2
AGEGRP_M_I INCOME_POV INS_STAT2_I CHECKUP CEN_REG MISSING_FACILITY)/ CL
(TYPE=CP) NOWT NOSTD;
RUN;
```

```
PROC CONTENTS DATA = FINALSTABLE1 SHORT;
RUN;

DATA FINALSTABLE1V1;
      LENGTH FNLESTIMATE MYRESULTS $20.;
      SET FINALSTABLE1(KEEP = AGEGRP_M_I CEN_REG EDUC1 FREQUENCY INS_STAT2_I
LOWERCL MARITAL2 CHECKUP MISSING_FACILITY INCOME_POV
                              RACE_ETH AGE_CATEGORY PDAT2 P_UTDHPV PERCENT
SEX TABLE UPPERCL _SKIPLINE);

      IF  _SKIPLINE IN (1) THEN DELETE;

      MYESTMATE = PUT(ROUND(PERCENT,0.1), 5.1);
      CONINTEL = '('||PUT(ROUND(LOWERCL,0.1), 5.1)||' -
'||PUT(ROUND(UPPERCL,0.1), 5.1)||')';
      CONINTELFL = COMPRESS(CONINTEL);
      FNLESTIMATE = CATX(" ",MYESTMATE," ",CONINTELFL);
      MYCIDIFF = UPPERCL - LOWERCL;
      IF (MYCIDIFF > 20) THEN MYRESULTS = FNLESTIMATE||"**";
      ELSE MYRESULTS = FNLESTIMATE;
RUN;

DATA FINALSTABLE1V2;
      RETAIN TABLE VARIABLE_LABEL VARIABLE_COUNT VARIABLE_VALUE FREQUENCY
FNLESTIMATE MYRESULTS;
      SET FINALSTABLE1V1;


      IF P_UTDHPV NE . THEN DO;
            VARIABLE_LABEL = PUT(P_UTDHPV, UTD_FORMAT.);
            VARIABLE_COUNT = 0;
            VARIABLE_VALUE = P_UTDHPV;
      END;
    IF AGE_CATEGORY NE . THEN DO;
            VARIABLE_LABEL = PUT(AGE_CATEGORY, AGE_FORMAT.);
            VARIABLE_COUNT = 1;
            VARIABLE_VALUE = AGE_CATEGORY;
      END;
      ELSE IF TEENAGE_GROUP NE . THEN DO;
            VARIABLE_LABEL = PUT(TEENAGE_GROUP, AGEGP_FORMAT.);
            VARIABLE_COUNT = 2;
            VARIABLE_VALUE = TEENAGE_GROUP;
      END;
      ELSE IF SEX NE . THEN DO;
            VARIABLE_LABEL = PUT(SEX, SEX_FORMAT.);
            VARIABLE_COUNT = 3;
            VARIABLE_VALUE = SEX;
      END;
      ELSE IF RACE_ETH NE . THEN DO;
            VARIABLE_LABEL = PUT(RACE_ETH, RACE_FORMAT.);
            VARIABLE_COUNT = 4;
            VARIABLE_VALUE = RACE_ETH;
      END;
      ELSE IF EDUC1 NE . THEN DO;
            VARIABLE_LABEL = PUT(EDUC1, EDUCATION_FORMAT.);
            VARIABLE_COUNT = 5;
            VARIABLE_VALUE = EDUC1;
```

```
      END;
      ELSE IF MARITAL2 NE . THEN DO;
            VARIABLE_LABEL = PUT(MARITAL2, MARTIAL_FORMAT.);
            VARIABLE_COUNT = 6;
            VARIABLE_VALUE = MARITAL2;
      END;
      ELSE IF AGEGRP_M_I NE . THEN DO;
            VARIABLE_LABEL = PUT(AGEGRP_M_I, MOAGE_FORMAT.);
            VARIABLE_COUNT = 7;
            VARIABLE_VALUE = AGEGRP_M_I;
      END;
      ELSE IF INCOME_POV NE . THEN DO;
            VARIABLE_LABEL = PUT(INCOME_POV, INCPR_FORMAT.);
            VARIABLE_COUNT = 8;
            VARIABLE_VALUE = INCOME_POV;
      END;
      ELSE IF INS_STAT2_I NE . THEN DO;
            VARIABLE_LABEL = PUT(INS_STAT2_I, INSUR_FORMAT.);
            VARIABLE_COUNT = 9;
            VARIABLE_VALUE = INS_STAT2_I;
      END;
      ELSE IF CHECKUP NE . THEN DO;
            VARIABLE_LABEL = PUT(CHECKUP, CHECKUP_FORMAT.);
            VARIABLE_COUNT = 10;
            VARIABLE_VALUE = CHECKUP;
      END;
      ELSE IF CEN_REG NE . THEN DO;
            VARIABLE_LABEL = PUT(CEN_REG, CENREG_FORMAT.);
            VARIABLE_COUNT = 11;
            VARIABLE_VALUE = CEN_REG;
      END;
      ELSE IF MISSING_FACILITY NE . THEN DO;
            VARIABLE_LABEL = PUT(MISSING_FACILITY, FACILITY_FORMAT.);
            VARIABLE_COUNT = 12;
            VARIABLE_VALUE = MISSING_FACILITY;
      END;

      KEEP TABLE VARIABLE_LABEL VARIABLE_COUNT VARIABLE_VALUE FREQUENCY
FNLESTIMATE MYRESULTS;
RUN;

PROC EXPORT DATA = FINALSTABLE1V2 OUTFILE ="&MYPATH.\SURVEYTABLE1.xlsx"
DBMS=XLSX REPLACE;
RUN;



/****             UNADJUSTED   MODEL 1                                  ****/

%MACRO MYESTIMATES(VAR1, VAR2, VAR3, VAR4, DESCRIPTION);


DATA FLPRJTDATA&VAR2.;
      SET NEW_PROJECT(KEEP = SEQNUMT STRATUM PROVWT_C &VAR1. &VAR2.);
RUN;

PROC SORT DATA = FLPRJTDATA&VAR2.;
```

```
      BY &VAR2.;
RUN;


ODS OUTPUT STATISTICS=SAS_EST&VAR2.;


PROC SURVEYMEANS DATA = FLPRJTDATA&VAR2. NOBS SUM MEAN STDERR CLM;
      STRATUM STRATUM;
      CLUSTER SEQNUMT;
      WEIGHT PROVWT_C;
      CLASS &VAR1.;
      VAR &VAR1.;
      BY &VAR2.;
RUN;


PROC CONTENTS DATA = SAS_EST&VAR2. SHORT;
RUN;

DATA SAS_ESTV1&VAR2.;
      SET SAS_EST&VAR2.;
      MEAN = MEAN*100;
      STDERR = STDERR*100;
      LOWERCLMEAN = LOWERCLMEAN*100;
      UPPERCLMEAN = UPPERCLMEAN*100;

      MYESTMATE = PUT(ROUND(MEAN,0.1), 5.1);
      CONINTEL = '('||PUT(ROUND(LOWERCLMEAN,0.1), 5.1)||' -
'||PUT(ROUND(UPPERCLMEAN,0.1), 5.1)||')';
      CONINTELFL = COMPRESS(CONINTEL);
      FNLESTIMATE = COMPRESS(CATX(" ",MYESTMATE," ",CONINTELFL));
      MYCIDIFF = UPPERCL - LOWERCL;
      IF (MYCIDIFF > 20) THEN MYRESULTS = COMPRESS(FNLESTIMATE||"**");
      ELSE MYRESULTS = COMPRESS(FNLESTIMATE);
RUN;

DATA SAS_ESTV2&VAR2.;
      RETAIN VARNAME VARLEVEL VARIABLE_COUNT VARIABLE_VALUE VARIABLE_LABEL
MEAN STDERR LOWERCLMEAN UPPERCLMEAN MYRESULTS;
      LENGTH VARIABLE_LABEL $30.0 ;
      SET SAS_ESTV1&VAR2.;
      WHERE VARLEVEL IN ("1");

      VARIABLE_COUNT = &VAR4.;
      VARIABLE_VALUE = &VAR2.;
      VARIABLE_LABEL = PUT(&VAR2.,&VAR3.);



      KEEP VARNAME VARLEVEL VARIABLE_COUNT VARIABLE_VALUE VARIABLE_LABEL MEAN
STDERR LOWERCLMEAN UPPERCLMEAN MYRESULTS;
RUN;

PROC PRINT DATA=SAS_ESTV2&VAR2. NOOBS LABEL;
      FORMAT VARIABLE_VALUE &VAR3.;
      FORMAT MEAN STDERR 5.2;
```

```
      VAR VARIABLE_VALUE MEAN STDERR MYRESULTS;
      LABEL
      MEAN='PERCENT UP-TO-DATE'
      STDERR='STANDARD ERROR'
      MYRESULTS = "WEIGHTED PERCENT AND 95% C.L.";
      TITLE "&VAR1. ESTIMATES BY MYESTIMATE  DEMOGRAPHIC VARIABLE";
RUN;

PROC APPEND BASE = FINALTABLE2 DATA=SAS_ESTV2&VAR2. FORCE;
RUN;

%MEND MYESTIMATE S;

%MYESTIMATES(P_UTDHPV, AGE_CATEGORY, AGE_FORMAT., 1, "AGE IN YEARS OF
SELECTED TEEN");
%MYESTIMATES(P_UTDHPV, SEX, SEX_FORMAT., 2, "SEX OF TEEN");
%MYESTIMATES(P_UTDHPV, RACE_ETH, RACE_FORMAT., 3, "RACE/ETHNICITY OF TEEN
WITH MULTIRACE CATEGORY (RECODE)");
%MYESTIMATES(P_UTDHPV, EDUC1, EDUCATION_FORMAT., 4, "EDUCATION LEVEL OF
MOTHER WITH 4 CATEGORIES (RECODE)");
%MYESTIMATES(P_UTDHPV, MARITAL2, MARTIAL_FORMAT., 5, "MARITAL STATUS OF
MOTHER (RECODE)");
%MYESTIMATES(P_UTDHPV, AGEGRP_M_I, MOAGE_FORMAT., 6, "MOTHER'S AGE CATEGORIES
(RECODE)");
%MYESTIMATES(P_UTDHPV, INCOME_POV, INCPR_FORMAT., 7, "(INCOME TO POVERTY
RATIO: IMPUTED (RECODE)");
%MYESTIMATES(P_UTDHPV, INS_STAT2_I, INSUR_FORMAT., 8, "INSURANCE STATUS
(PRIVATE ONLY/ANY MEDICAID/OTHER INSURANCE/UNINSURED): IMPUTED");
%MYESTIMATES(P_UTDHPV, CHECKUP, CHECKUP_FORMAT., 9, "DID TEEN HAVE AN 11-12
YEAR OLD WELL-CHILD EXAM OR CHECK-UP?");
%MYESTIMATES(P_UTDHPV, CEN_REG, CENREG_FORMAT., 10, "CENSUS REGION BASED ON
TRUE STATE OF RESIDENCE");
%MYESTIMATES(P_UTDHPV, MISSING_FACILITY, FACILITY_FORMAT., 11, "FACILITY
TYPES FOR TEEN'S PROVIDERS");


DATA PUF.FINALTABLE2;
      SET FINALTABLE2;
RUN;
PROC EXPORT DATA = FINALTABLE2 OUTFILE= "&MYPATH.\TABLE2\FINALTABLE2.xlsx"
DBMS=XLSX REPLACE;
RUN;



/****             UNADJUSTED   MODEL 2  ODDS RATIOS                ****/


%MACRO MYODDSRATIO(VAR1, VAR2, VAR3, VAR4, DESCRIPTION);
PROC SURVEYLOGISTIC DATA = NEW_PROJECT;
    STRATA  STRATUM;
    CLUSTER SEQNUMT;
    WEIGHT PROVWT_C;
      DOMAIN PDAT2;

      CLASS &VAR3.;
```

```
    MODEL  P_UTDHPV(EVENT = "1") = &VAR1.;

      ODS OUTPUT PARAMETERESTIMATES=MYUNADJPARAEST&VAR1.;
      ODS OUTPUT ODDSRATIOS=MYOREST&VAR1.;
      ODS OUTPUT MODELANOVA=MYTYPE3TEST&VAR1.;
RUN;



DATA MYORESTV1&VAR1.;
      RETAIN NEWEFFECT MYRESULTS MYESTMATE CONINTELFL;
      LENGTH MYRESULTS NEWEFFECT $20.;
      SET MYOREST&VAR1.;
      WHERE PDAT2 = 1;

      NEWEFFECT = EFFECT;

      MYESTMATE = PUT(ROUND(ODDSRATIOEST,0.01), 5.2);
      CONINTEL = '('||PUT(ROUND(LOWERCL,0.01), 5.2)||' -
'||PUT(ROUND(UPPERCL,0.01), 5.2)||')';
      CONINTELFL = COMPRESS(CONINTEL);
      MYRESULTS = CATX(" ",MYESTMATE," ",CONINTELFL);

RUN;

DATA MYORESTV2&VAR1.;
      RETAIN VARIABLE_COUNT NEWEFFECT MYRESULTS MYESTMATE CONINTELFL;
      LENGTH VARIABLE_LABEL NEWEFFECT $20.;
      SET MYORESTV1&VAR1.;

      VARIABLE_COUNT = &VAR4.;

      KEEP VARIABLE_COUNT NEWEFFECT MYRESULTS MYESTMATE CONINTELFL;
RUN;

PROC APPEND BASE = ODDSRATIOSTABLE3 DATA=MYORESTV2&VAR1. FORCE;
RUN;



PROC CONTENTS DATA = MYUNADJPARAEST&VAR1. SHORT;
RUN;

DATA MYUNADJPARAESTV1&VAR1.;
      RETAIN VARIABLE_VALUE VARIABLE EFFECT VARIABLE_LABEL MYTVALUE MYPROBT;
      LENGTH VARIABLE_LABEL $40.;
      SET MYUNADJPARAEST&VAR1.(KEEP = PDAT2 VARIABLE CLASSVAL0 TVALUE PROBT);
      WHERE PDAT2 = 1;

      IF VARIABLE IN ("Intercept") THEN DELETE;

      EFFECT = INPUT(CLASSVAL0, 8.);

      IF VARIABLE IN ("&VAR1.") THEN DO;
            VARIABLE_LABEL = PUT(EFFECT, &VAR2.);
            VARIABLE_VALUE = &VAR4.;
```

```
      END;

      MYTVALUE = PUT(ROUND(TVALUE, 0.001), 8.3);
      MYPROBT = PUT(ROUND(PROBT, 0.01), 8.2);

      KEEP VARIABLE_VALUE VARIABLE EFFECT VARIABLE_LABEL MYTVALUE MYPROBT;
RUN;

PROC APPEND BASE = MYUNADJPARATTEST DATA=MYUNADJPARAESTV1&VAR1. FORCE;
RUN;



DATA MYTYPE3TESTV1&VAR1.;
      RETAIN VARIABLE_COUNT NEWEFFECT VARIABLE_LABEL MYWALDCHISQ MYPROBCHISQ;
      LENGTH VARIABLE_LABEL NEWEFFECT $20.;
      SET MYTYPE3TEST&VAR1.;
      WHERE PDAT2 = 1;

      VARIABLE_COUNT = &VAR4.;

      NEWEFFECT = EFFECT;

      MYWALDCHISQ = PUT(ROUND(WALDCHISQ, 0.001), 8.3);
      MYPROBCHISQ = PUT(ROUND(PROBCHISQ, 0.01), 8.2);

      KEEP VARIABLE_COUNT NEWEFFECT MYWALDCHISQ MYPROBCHISQ;
RUN;

PROC APPEND BASE = MYTYPE3TEST DATA=MYTYPE3TESTV1&VAR1. FORCE;
RUN;

%MEND MYODDSRATIO;

%MYODDSRATIO(AGE_CATEGORY, AGE_FORMAT., AGE_CATEGORY(PARAM=REF REF="5"), 1,
"AGE IN YEARS OF SELECTED TEEN");
%MYODDSRATIO(SEX, SEX_FORMAT., SEX(PARAM=REF REF="2"), 2, "SEX OF TEEN");
%MYODDSRATIO(RACE_ETH, RACE_FORMAT., RACE_ETH(PARAM=REF REF="1"), 3,
"RACE/ETHNICITY OF TEEN WITH MULTIRACE CATEGORY (RECODE)");
%MYODDSRATIO(EDUC1, EDUCATION_FORMAT., EDUC1(PARAM=REF REF="1"), 4,
"EDUCATION LEVEL OF MOTHER WITH 4 CATEGORIES (RECODE)");
%MYODDSRATIO(MARITAL2, MARTIAL_FORMAT., MARITAL2(PARAM=REF REF="1"), 5,
"MARITAL STATUS OF MOTHER (RECODE)");
%MYODDSRATIO(AGEGRP_M_I, MOAGE_FORMAT., AGEGRP_M_I(PARAM=REF REF="1"), 6,
"MOTHER'S AGE CATEGORIES (RECODE)");
%MYODDSRATIO(INCOME_POV, INCPR_FORMAT., INCOME_POV(PARAM=REF REF="1"), 7,
"(INCOME TO POVERTY RATIO: IMPUTED (RECODE)");
%MYODDSRATIO(INS_STAT2_I, INSUR_FORMAT., INS_STAT2_I(PARAM=REF REF="1"), 8,
"INSURANCE STATUS (PRIVATE ONLY/ANY MEDICAID/OTHER INSURANCE/UNINSURED):
IMPUTED");
%MYODDSRATIO(CHECKUP, CHECKUP_FORMAT., CHECKUP(PARAM=REF REF="1"), 9, "DID
TEEN HAVE AN 11-12 YEAR OLD WELL-CHILD EXAM OR CHECK-UP?");
%MYODDSRATIO(CEN_REG, CENREG_FORMAT., CEN_REG(PARAM=REF REF="1"), 10, "CENSUS
REGION BASED ON TRUE STATE OF RESIDENCE");
%MYODDSRATIO(MISSING_FACILITY, FACILITY_FORMAT., MISSING_FACILITY(PARAM=REF
REF="1"), 11, "FACILITY TYPES FOR TEEN'S PROVIDERS");
```

```
DATA PUF.ODDSRATIOSTABLE3;
      SET ODDSRATIOSTABLE3;
RUN;

PROC EXPORT DATA = ODDSRATIOSTABLE3 OUTFILE
="&MYPATH.\TABLE2\ODDSRATIOSTABLE3.xlsx" DBMS=XLSX REPLACE;
RUN;

DATA PUF.MYUNADJPARATTEST;
      SET MYUNADJPARATTEST;
RUN;

PROC EXPORT DATA = MYUNADJPARATTEST OUTFILE
="&MYPATH.\TABLE3\MYUNADJPARATTESTTABLE3.xlsx" DBMS=XLSX REPLACE;
RUN;

DATA PUF.MYTYPE3TEST;
      SET MYTYPE3TEST;
RUN;

PROC EXPORT DATA = MYTYPE3TEST OUTFILE
="&MYPATH.\TABLE3\MYTYPE3TESTTABLE3.xlsx" DBMS=XLSX REPLACE;
RUN;


/****                  ADJUSTED MODEL 3  ODDS RATIOS                  ****/

TITLE1 "FITTING A LOGISTIC REGRESSION MODEL ACCOUNTING FOR COMPLEX SURVEY
DESIGN FEATURES";
TITLE2 'USING NIS-TEEN PUBLIC USER FILES 2021 AND UNGROUPED AGES (13 TO 17
YEARS) AT INTERVIEW';

PROC SURVEYLOGISTIC DATA = NEW_PROJECT;
    STRATA  STRATUM;
    CLUSTER SEQNUMT;
    WEIGHT PROVWT_C;
      DOMAIN PDAT2;

      CLASS AGE_CATEGORY(PARAM=REF REF="5") SEX(PARAM=REF REF="2")
RACE_ETH(PARAM=REF REF="1") EDUC1(PARAM=REF REF="1") MARITAL2(PARAM=REF
REF="1") AGEGRP_M_I(PARAM=REF REF="1")
          INCOME_POV(PARAM=REF REF="1") INS_STAT2_I(PARAM=REF REF="1")
CHECKUP(PARAM=REF REF="1") CEN_REG(PARAM=REF REF="1")
MISSING_FACILITY(PARAM=REF REF="1");

    MODEL  P_UTDHPV(EVENT = "1") = AGE_CATEGORY SEX RACE_ETH EDUC1 MARITAL2
AGEGRP_M_I INCOME_POV INS_STAT2_I CHECKUP CEN_REG MISSING_FACILITY;

      ODS OUTPUT PARAMETERESTIMATES=MYADJPARAEST;
      ODS OUTPUT ODDSRATIOS=MYADJOREST;
      ODS OUTPUT MODELANOVA=MYADJTYPE3TEST;
RUN;



DATA MYADJORESTV1;
      RETAIN NEWEFFECT MYRESULTS MYESTMATE CONINTELFL;
```

```
      LENGTH MYRESULTS NEWEFFECT $20.;
      SET MYADJOREST;
      WHERE PDAT2 = 1;

      NEWEFFECT = EFFECT;

      MYESTMATE = PUT(ROUND(ODDSRATIOEST,0.01), 5.2);
      CONINTEL = '('||PUT(ROUND(LOWERCL,0.01), 5.2)||' -
'||PUT(ROUND(UPPERCL,0.01), 5.2)||')';
      CONINTELFL = COMPRESS(CONINTEL);
      MYRESULTS = CATX(" ",MYESTMATE," ",CONINTELFL);

RUN;

DATA MYADJORESTV2;
      RETAIN NEWEFFECT MYRESULTS MYESTMATE CONINTELFL;
      SET MYADJORESTV1;

      KEEP NEWEFFECT MYRESULTS MYESTMATE CONINTELFL;
RUN;

PROC EXPORT DATA = MYADJORESTV2 OUTFILE
="&MYPATH.\TABLE2\MULTILOGODDSRATIOTABLE3.xlsx" DBMS=XLSX REPLACE;
RUN;


PROC CONTENTS DATA = MYADJPARAEST SHORT;
RUN;

DATA MYADJPARAESTV1;
      RETAIN VARIABLE_VALUE VARIABLE EFFECT VARIABLE_LABEL MYTVALUE MYPROBT;
      LENGTH VARIABLE_LABEL $40.;
      SET MYADJPARAEST(KEEP = PDAT2 VARIABLE CLASSVAL0 TVALUE PROBT);
      WHERE PDAT2 = 1;

      IF VARIABLE IN ("Intercept") THEN DELETE;

      EFFECT = INPUT(CLASSVAL0, 8.);

      IF VARIABLE IN ("AGE_CATEGORY") THEN DO;
            VARIABLE_LABEL = PUT(EFFECT, AGE_FORMAT.);
            VARIABLE_VALUE = 1;
      END;
      ELSE IF VARIABLE IN ("SEX") THEN DO;
            VARIABLE_LABEL = PUT(EFFECT, SEX_FORMAT.);
            VARIABLE_VALUE = 2;
      END;
      ELSE IF VARIABLE IN ("RACE_ETH") THEN DO;
            VARIABLE_LABEL = PUT(EFFECT, RACE_FORMAT.);
            VARIABLE_VALUE = 3;
      END;
      ELSE IF VARIABLE IN ("EDUC1") THEN DO;
            VARIABLE_LABEL = PUT(EFFECT, EDUCATION_FORMAT.);
            VARIABLE_VALUE = 4;
      END;
      ELSE IF VARIABLE IN ("MARITAL2") THEN DO;
            VARIABLE_LABEL = PUT(EFFECT, MARTIAL_FORMAT.);
```

```
            VARIABLE_VALUE = 5;
      END;
      ELSE IF VARIABLE IN ("AGEGRP_M_I") THEN DO;
            VARIABLE_LABEL = PUT(EFFECT, MOAGE_FORMAT.);
            VARIABLE_VALUE = 6;
      END;
      ELSE IF VARIABLE IN ("INCOME_POV") THEN DO;
            VARIABLE_LABEL = PUT(EFFECT, INCPR_FORMAT.);
            VARIABLE_VALUE = 7;
      END;
      ELSE IF VARIABLE IN ("INS_STAT2_I") THEN DO;
            VARIABLE_LABEL = PUT(EFFECT, INSUR_FORMAT.);
            VARIABLE_VALUE = 8;
      END;
      ELSE IF VARIABLE IN ("CHECKUP") THEN DO;
            VARIABLE_LABEL = PUT(EFFECT, CHECKUP_FORMAT.);
            VARIABLE_VALUE = 9;
      END;
      ELSE IF VARIABLE IN ("CEN_REG") THEN DO;
            VARIABLE_LABEL = PUT(EFFECT, CENREG_FORMAT.);
            VARIABLE_VALUE = 10;
      END;
      ELSE IF VARIABLE IN ("MISSING_FACILITY") THEN DO;
            VARIABLE_LABEL = PUT(EFFECT, FACILITY_FORMAT.);
            VARIABLE_VALUE = 11;
      END;

      MYTVALUE = PUT(ROUND(TVALUE, 0.001), 8.3);
      MYPROBT = PUT(ROUND(PROBT, 0.01), 8.2);

      KEEP VARIABLE_VALUE VARIABLE EFFECT VARIABLE_LABEL MYTVALUE MYPROBT;
RUN;

PROC EXPORT DATA = MYADJPARAESTV1 OUTFILE
="&MYPATH.\TABLE3\MULTILOGTTESTTABLE3.xlsx" DBMS=XLSX REPLACE;
RUN;


DATA MYADJTYPE3TESTV1;
      RETAIN NEWEFFECT MYWALDCHISQ MYPROBCHISQ;
      LENGTH NEWEFFECT $20.;
      SET MYADJTYPE3TEST;
      WHERE PDAT2 = 1;

      NEWEFFECT = EFFECT;

      MYWALDCHISQ = PUT(ROUND(WALDCHISQ, 0.001), 8.3);
      MYPROBCHISQ = PUT(ROUND(PROBCHISQ, 0.01), 8.2);

      KEEP NEWEFFECT MYWALDCHISQ MYPROBCHISQ;
RUN;

PROC EXPORT DATA = MYADJTYPE3TESTV1 OUTFILE
="&MYPATH.\TABLE3\MULTILOGTYPE3TESTTABLE3.xlsx" DBMS=XLSX REPLACE;
RUN;
```

```
/****                  ADJUSTED MODEL 4  ODDS RATIOS                  ****/

TITLE1 "FITTING A LOGISTIC REGRESSION MODEL ACCOUNTING FOR COMPLEX SURVEY
DESIGN FEATURES";
TITLE2 'USING NIS-TEEN PUBLIC USER FILES 2021 AND UNGROUPED AGES (13 TO 17
YEARS) AT INTERVIEW';

PROC SURVEYLOGISTIC DATA = NEW_PROJECT;
    STRATA  STRATUM;
    CLUSTER SEQNUMT;
    WEIGHT PROVWT_C;
      DOMAIN PDAT2;

      CLASS SEX(PARAM=REF REF="2") RACE_ETH(PARAM=REF REF="1")
EDUC1(PARAM=REF REF="1") INCOME_POV(PARAM=REF REF="1") CHECKUP(PARAM=REF
REF="1") CEN_REG(PARAM=REF REF="1") MISSING_FACILITY(PARAM=REF REF="1");

    MODEL  P_UTDHPV(EVENT = "1") = SEX RACE_ETH EDUC1 INCOME_POV CHECKUP
CEN_REG MISSING_FACILITY;

      ODS OUTPUT PARAMETERESTIMATES=MYPARAESTML4;
      ODS OUTPUT ODDSRATIOS=MYORESTML4;
      ODS OUTPUT MODELANOVA=MYTYPE3TESTML4;
RUN;


DATA MYORESTML4V1;
      RETAIN NEWEFFECT MYRESULTS MYESTMATE CONINTELFL;
      LENGTH MYRESULTS NEWEFFECT $20.;
      SET MYORESTML4;
      WHERE PDAT2 = 1;

      NEWEFFECT = EFFECT;

      MYESTMATE = PUT(ROUND(ODDSRATIOEST,0.01), 5.2);
      CONINTEL = '('||PUT(ROUND(LOWERCL,0.01), 5.2)||' -
'||PUT(ROUND(UPPERCL,0.01), 5.2)||')';
      CONINTELFL = COMPRESS(CONINTEL);
      MYRESULTS = CATX(" ",MYESTMATE," ",CONINTELFL);

RUN;

DATA MYORESTML4V2;
      RETAIN NEWEFFECT MYRESULTS MYESTMATE CONINTELFL;
      SET MYORESTML4V1;

      KEEP NEWEFFECT MYRESULTS MYESTMATE CONINTELFL;
RUN;

PROC EXPORT DATA = MYORESTML4V2 OUTFILE
="&MYPATH.\TABLE2\MULTILOGODDSRATIOTABLE3ML4.xlsx" DBMS=XLSX REPLACE;
RUN;



PROC CONTENTS DATA = MYADJPARAEST SHORT;
RUN;
```

```
DATA MYADJPARAESTML4V1;
      RETAIN VARIABLE_VALUE VARIABLE EFFECT VARIABLE_LABEL MYTVALUE MYPROBT;
      LENGTH VARIABLE_LABEL $40.;
      SET MYADJPARAESTML4(KEEP = PDAT2 VARIABLE CLASSVAL0 TVALUE PROBT);
      WHERE PDAT2 = 1;

      IF VARIABLE IN ("Intercept") THEN DELETE;

      EFFECT = INPUT(CLASSVAL0, 8.);

      IF VARIABLE IN ("SEX") THEN DO;
            VARIABLE_LABEL = PUT(EFFECT, SEX_FORMAT.);
            VARIABLE_VALUE = 1;
      END;
      ELSE IF VARIABLE IN ("RACE_ETH") THEN DO;
            VARIABLE_LABEL = PUT(EFFECT, RACE_FORMAT.);
            VARIABLE_VALUE = 2;
      END;
      ELSE IF VARIABLE IN ("EDUC1") THEN DO;
            VARIABLE_LABEL = PUT(EFFECT, EDUCATION_FORMAT.);
            VARIABLE_VALUE = 3;
      END;
      ELSE IF VARIABLE IN ("INCOME_POV") THEN DO;
            VARIABLE_LABEL = PUT(EFFECT, INCPR_FORMAT.);
            VARIABLE_VALUE = 4;
      END;
      ELSE IF VARIABLE IN ("CHECKUP") THEN DO;
            VARIABLE_LABEL = PUT(EFFECT, CHECKUP_FORMAT.);
            VARIABLE_VALUE = 5;
      END;
      ELSE IF VARIABLE IN ("CEN_REG") THEN DO;
            VARIABLE_LABEL = PUT(EFFECT, CENREG_FORMAT.);
            VARIABLE_VALUE = 6;
      END;
      ELSE IF VARIABLE IN ("MISSING_FACILITY") THEN DO;
            VARIABLE_LABEL = PUT(EFFECT, FACILITY_FORMAT.);
            VARIABLE_VALUE = 7;
      END;

      MYTVALUE = PUT(ROUND(TVALUE, 0.001), 8.3);
      MYPROBT = PUT(ROUND(PROBT, 0.01), 8.2);

      KEEP VARIABLE_VALUE VARIABLE EFFECT VARIABLE_LABEL MYTVALUE MYPROBT;
RUN;

PROC EXPORT DATA = MYADJPARAESTML4V1 OUTFILE
="&MYPATH.\TABLE3\MULTILOGTTESTTABLE3ML4.xlsx" DBMS=XLSX REPLACE;
RUN;


DATA MYTYPE3TESTML4V1;
      RETAIN NEWEFFECT MYWALDCHISQ MYPROBCHISQ;
      LENGTH NEWEFFECT $20.;
      SET MYTYPE3TESTML4;
      WHERE PDAT2 = 1;
```

```
      NEWEFFECT = EFFECT;

      MYWALDCHISQ = PUT(ROUND(WALDCHISQ, 0.001), 8.3);
      MYPROBCHISQ = PUT(ROUND(PROBCHISQ, 0.01), 8.2);

      KEEP NEWEFFECT MYWALDCHISQ MYPROBCHISQ;
RUN;

PROC EXPORT DATA = MYTYPE3TESTML4V1 OUTFILE
="&MYPATH.\TABLE3\MULTILOGTYPE3TESTTABLE3ML4.xlsx" DBMS=XLSX REPLACE;
RUN;
```