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), 2020 Public User Files (PUF).

Name: Xuan Gao

ID: 002666237

I. Introduction.

National Vaccination Coverage Estimates of Adolescents Aged 13-17 years by Selected Demographic and Access to Healthcare Characteristics Using National Immunization Survey is conducted by National Center for Immunization and Respiratory Diseases (NCIRD) and the National Center for Health Statistics (NCHS) of CDC.

The target population for the NIS-Teen is non-institutionalized adolescents aged 13–17 years living in United States households at the time of the interview. For the 2020 NIS-Teen, household interviews began on January 9, 2020 and ended on January 15, 2021. Provider data collection extended from February 2020 through April 2021.

The official coverage estimates reported from the NIS-Teen are proportions of adolescents up-to-date with respect to the recommended numbers of doses of all routinely recommended vaccines for adolescents and selected catch-up vaccines (Robinson et al. 2020).

The data I would use to estimate coverage is coded **P_UTDHPV_15INT** which indicates teens that either have received 3 or more HPV doses or have received 2 or more HPV doses with the 1st dose before age 15 years and at least 5 months minus 4 days between the 1st and 2nd doses.

Methods.

Study Cohort:

- Inclusion criteria:
  All adolescents aged 13-17 years with adequate provider data (ADP) in the NIS-Teen 2020 PUF.
- Exclusion criteria:
  Adolescents in the U.S. Territories (i.e., Guam, Puerto Rico, and U.S. Virgin Islands.)
- The provider-phase sampling weight variable for producing estimates for teens with adequate provider data in the United States excluding territories is coded PROVWT_C.
- Total sample size should be equal to ***20,163***.

II. Results: Part I

In this survey, total 20,163 samples collected.

13-15 years old group were weighted 60.5% (N=12,447) and 16-17 years old group accounts for weighted 39.5% (N= 7716). Male group were weighted 51%(N=12,447) and female accounts for weighted 49%(N=9576). The census region which includes northeast, Midwest, south and west ’s proportion is 15.8%, 21.1%, 39%, 24.2% respectively. For the, mother's Educational Level, about half of them are college graduated. Non-Hispanic White accounts for the biggest part among all races. About half of the candidates’ mother education level is above college graduate.

The sample sizes and weighted% for each variable is presented in the below table.

TABLE 1. Sample Characteristics of Adolescents Aged 13-17 Years in the United States, by Selected Demographic and Access-To-Care Variables--NIS-Teen 2020

Characteristic		Overall	
		Sample Size	Weighted %
Total		**20163**	**100.0**
Age (years)			
	13	4276	20.2
	14	4173	20.1
	15	3998	20.3
	16	4028	20.6
	17*	3688	18.9
Age Group (in years)			
	13-15*	12447	60.5
	16-17	7716	39.5
Sex of Adolescent			
	Male	10587	51.0
	Female*	9576	49.0
Race/Ethnicity			
	Non-Hispanic White*	12585	50.0
	Non-Hispanic Black	1667	13.1
	Hispanic	3410	25.0
	Non-Hispanic Other	2501	11.8
Mother's Educational Level			
	<High School*	1689	12.4
	High School	3058	21.3
	Some college or college graduate	5187	24.1
	>College graduate	10229	42.3
Mother's Marital Status			
	Married*	13992	62.4

TABLE 1. Sample Characteristics of Adolescents Aged 13-17 Years in the United States, by Selected Demographic and Access-To-Care Variables--NIS-Teen 2020

Characteristic		Overall	
		Sample Size	Weighted %
	Never married/Widowed/divorced/separated	6171	37.6
Mother's Age			
	≤34 years*	1338	7.3
	35-44 years	8592	43.7
	≥45 years	10233	49.0
Income to Poverty Ratio			
	<133%*	4151	26.9
	133% - <322%	16012	73.1
Medical Insurance§			
	Private only*	12004	53.0
	Any Medicaid	5937	36.1
	Other‖	1539	6.7
	Uninsured	683	4.2
Well Child Visit at Age 11-12 Years**			
	Yes*	16525	80.6
	No	492	2.7
	Don't know/Refused/ Missing	3146	16.7
Census Region			
	Northeast*	4020	15.8
	Midwest	4508	21.1
	South	7189	39.0
	West	4446	24.2
Vaccination Facility Type			
	All private facilities*	9027	47.4
	All public facilities	2460	11.9
	All hospital facilities	2756	10.6
	All STD/school/teen clinics or other facilities	505	2.3
	Mixed††	3356	14.3
	Unknown/Don't Know‡‡	2059	13.5

* 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.

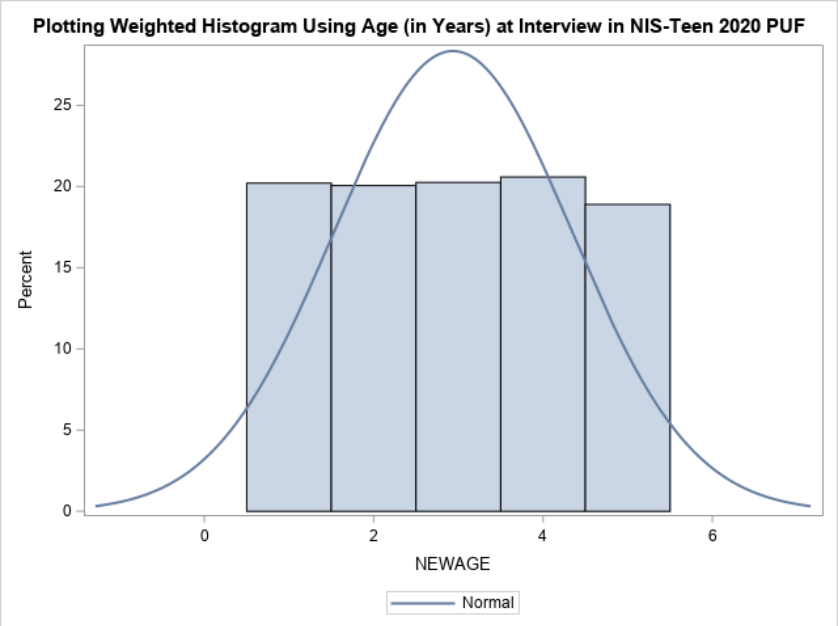
‡‡ Includes military, WIC clinics, pharmacies, unknown, and missing.

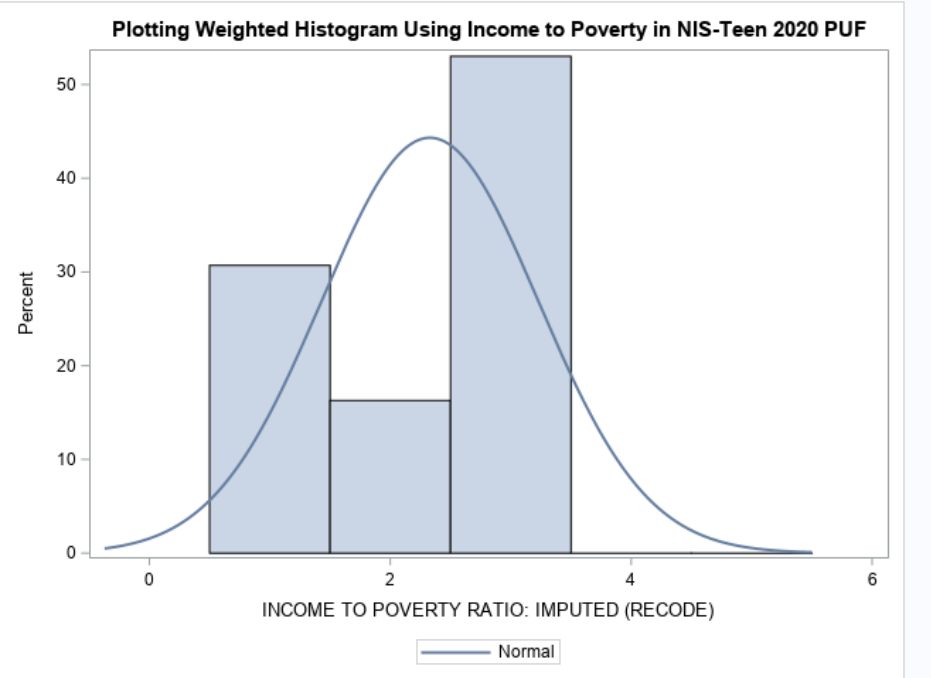
Plot, graph and charts for the variables

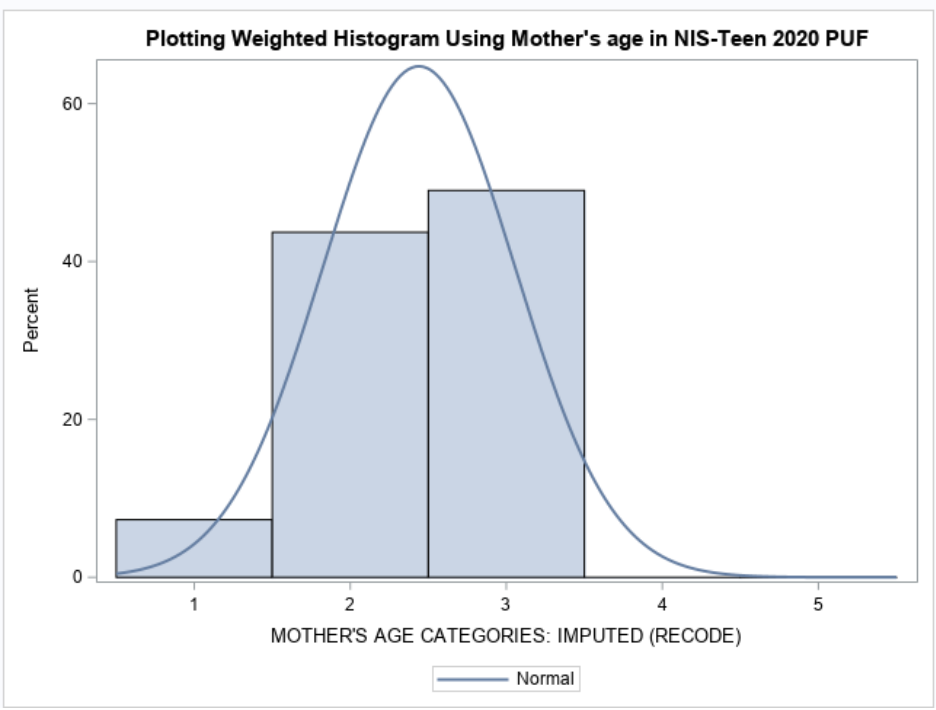
Charts, plots and graphs with respect of weights for the **P_UTDHPV_15INT** vaccines as given below.
First histogram is the histogram using Ages at interview in PUF, it is most likely to be evenly distributed across the ages, while the mother's age is clearly left skewed. The income to poverty ratio concaves downwards and then upwards and is also left skewed. About half of the candidates' mother's age is over 45b years old.

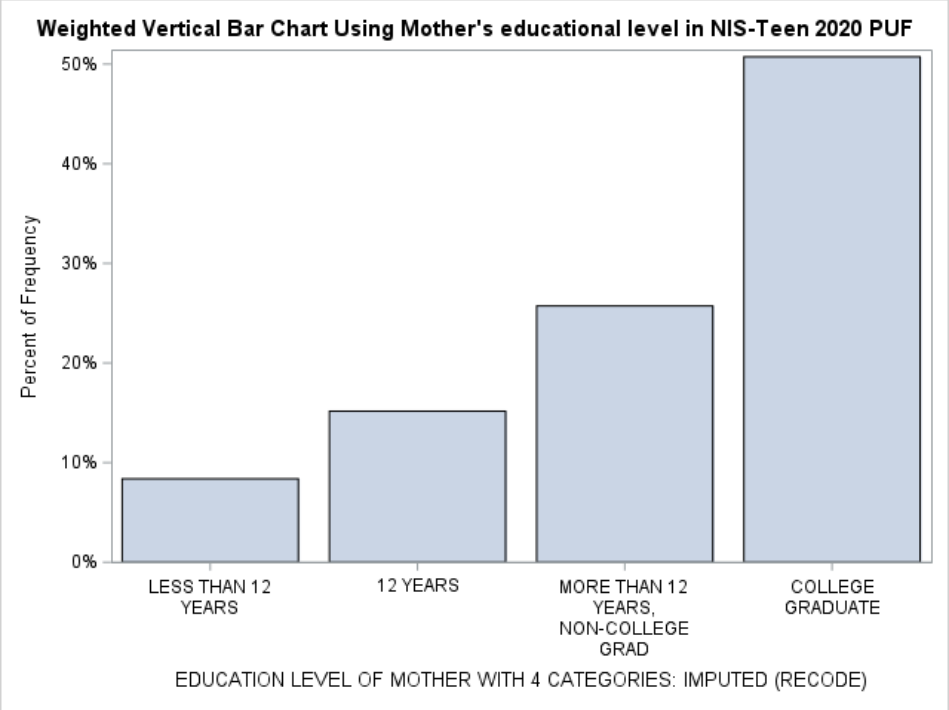
First vertical bar-graph is respect to the mother's educational level, 2020 NIS-Teen still over-represented adolescents whose mothers are college graduates (42.3% in survey, 35.2% in population) and under-represented adolescents whose mothers have some college but not a four- year degree (24.1% in survey, 31.2% in population).
With respect to the sex of adolescents, the male was 3%-4% more than the female.
For the Race/Ethnicity, the non-Hispanic white has the highest weighted percentage, followed by the Hispanic, non-Hispanic other+multiple races, the non-Hispanic black has the lowest weighted percentage.
For the mother's marital status, married mother is about twice more than unmarried.

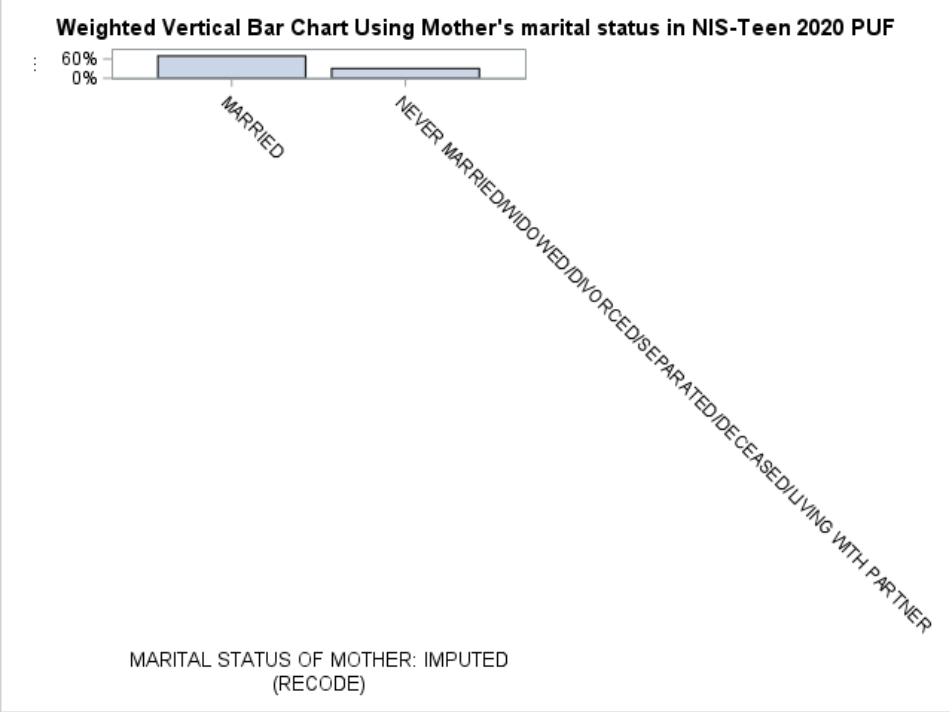
First pie-chart is for the medical insurance, from the chart we can see most of them have private insurance, followed by any Medicaid, other insurance and very few are uninsured.
The well child visit at age 11-12years, almost all the children had checkups, few had no checkup, and the rest are missing or choose others.
For the vaccine facility type, most of them go to private facility, followed by mixed which means facility is identified to be in more than one of the facility categories such as private, public, hospital, STD/school/teen clinics. Some people go to hospital or public facility. Few choose All STD/school/teen clinics or other facilities. With respect to the census region of adolescent, south group accounts for 38.95%, followed by west 24.15%, the lease is northeast group.

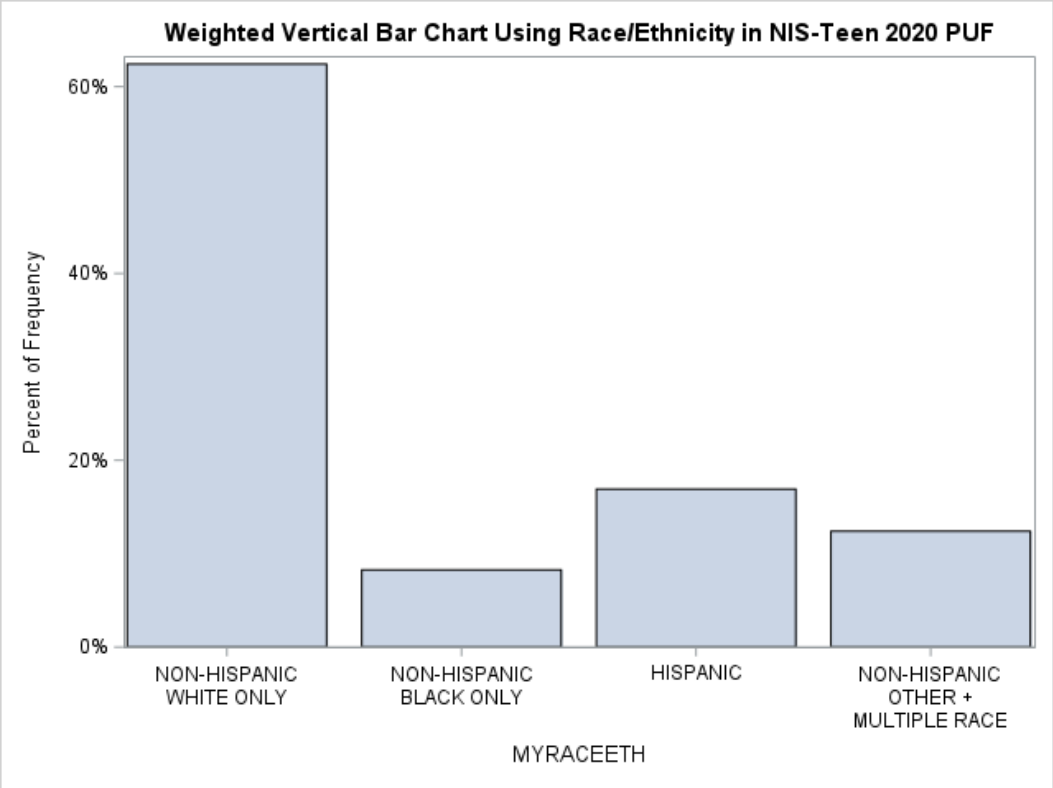


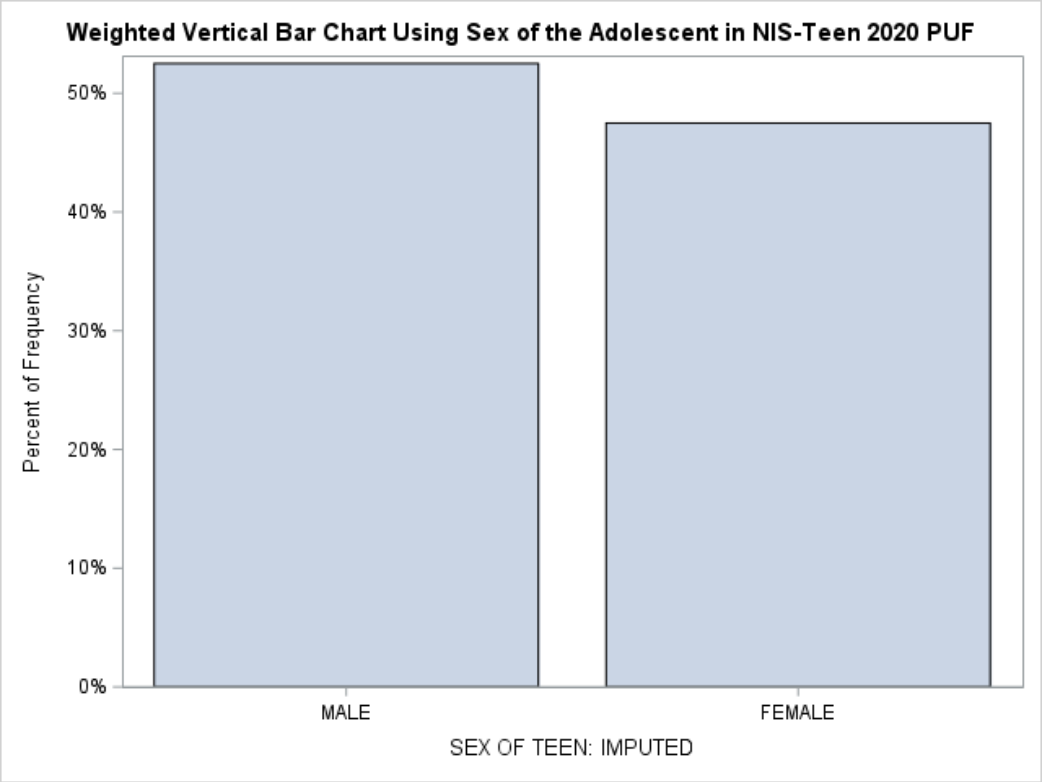

Plotting Weighted Histogram Using Income to Poverty in NIS-Teen 2020 PUF
Percent
50
40
30
20
10
0
0
2
4
6
INCOME TO POVERTY RATIO: IMPUTED (RECODE)
Normal


Plotting Weighted Histogram Using Mother's age in NIS-Teen 2020 PUF
Percent
60
40
20
0
1
2
3
4
5
MOTHER'S AGE CATEGORIES: IMPUTED (RECODE)
Normal

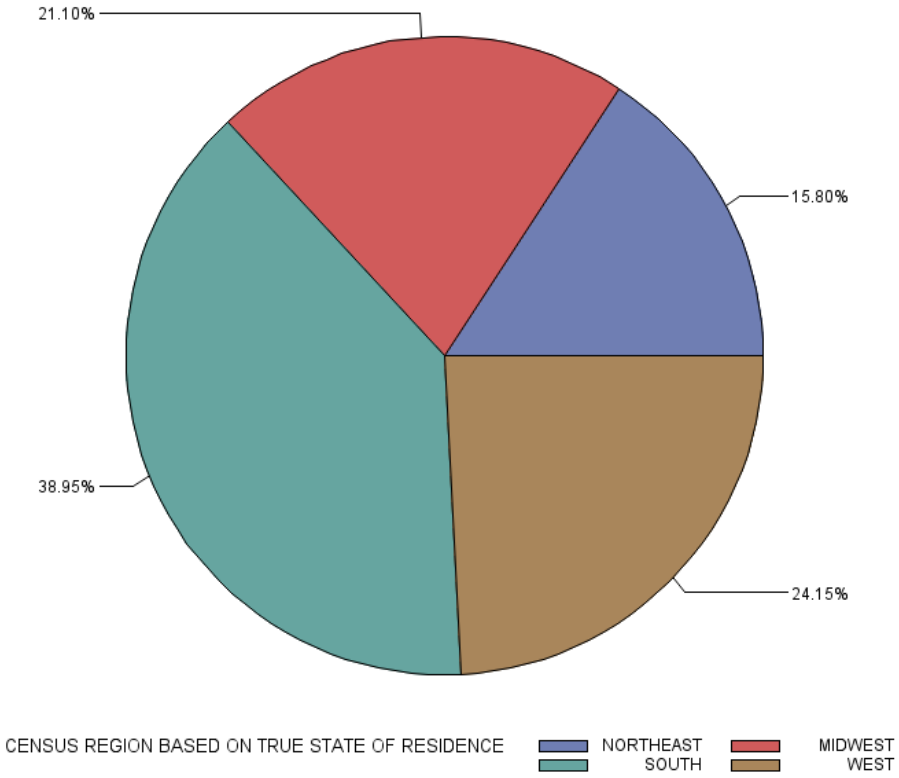

Weighted Vertical Bar Chart Using Mother's educational level in NIS-Teen 2020 PUF
Percent of Frequency
50%
40%
30%
20%
10%
0%
LESS THAN 12 YEARS
12 YEARS
MORE THAN 12 YEARS, NON-COLLEGE GRAD
COLLEGE GRADUATE
EDUCATION LEVEL OF MOTHER WITH 4 CATEGORIES: IMPUTED (RECODE)


Weighted Vertical Bar Chart Using Mother's marital status in NIS-Teen 2020 PUF
60%
0%
MARRIED
NEVER MARRIED/WIDOWED/DIVORCED/SEPARATED/DECEASED/LIVING WITH PARTNER
MARITAL STATUS OF MOTHER: IMPUTED (RECODE)

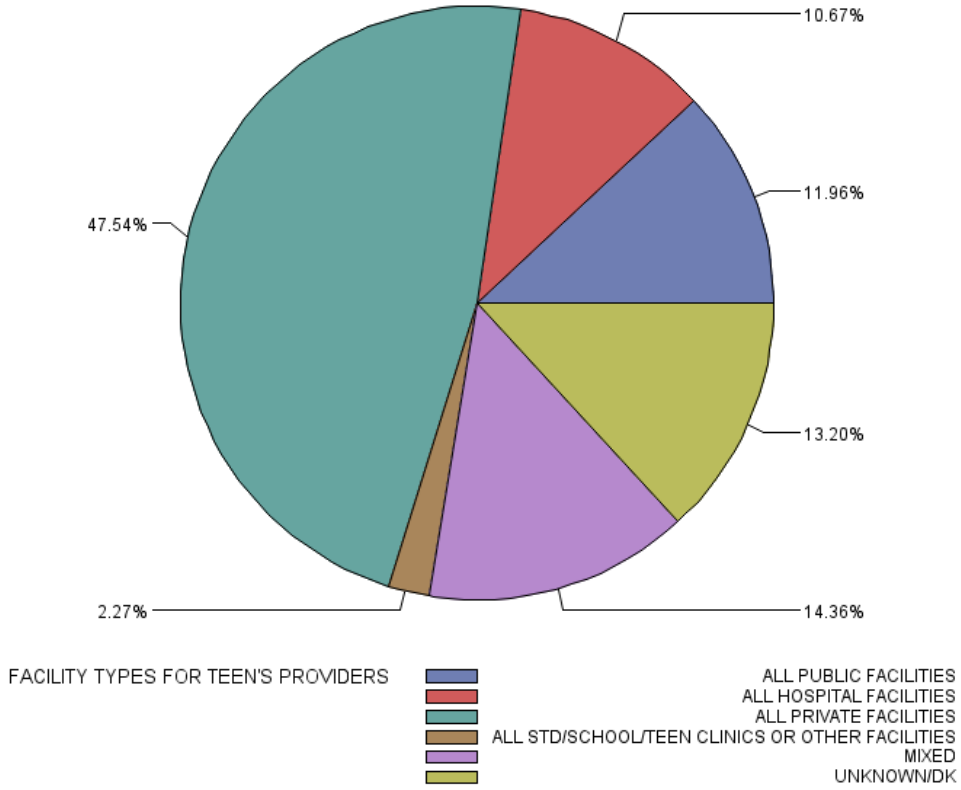

Weighted Vertical Bar Chart Using Race/Ethnicity in NIS-Teen 2020 PUF
Percent of Frequency
60%
40%
20%
0%
NON-HISPANIC WHITE ONLY
NON-HISPANIC BLACK ONLY
HISPANIC
NON-HISPANIC OTHER + MULTIPLE RACE
MYRACEETH


Weighted Vertical Bar Chart Using Sex of the Adolescent in NIS-Teen 2020 PUF
Percent of Frequency
50%
40%
30%
20%
10%
0%
MALE
FEMALE
SEX OF TEEN: IMPUTED

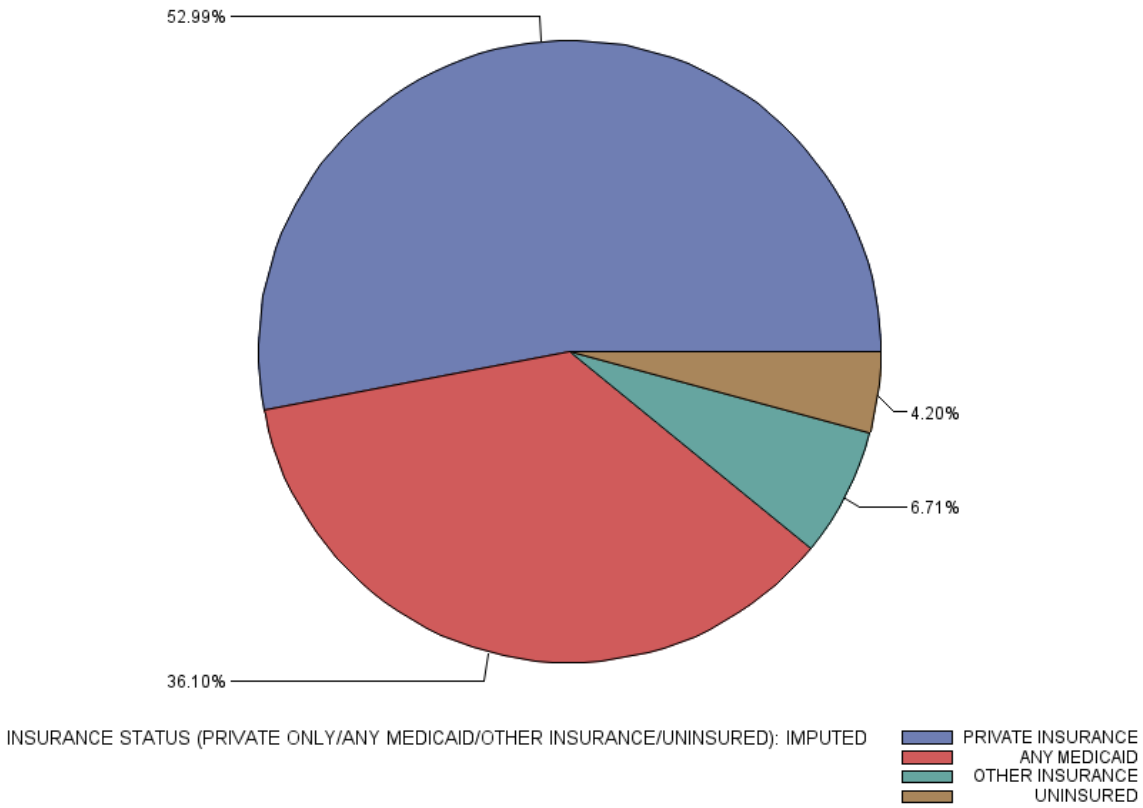
Using the Census Region of the Adolescent in NIS-Teen 2020 PUF



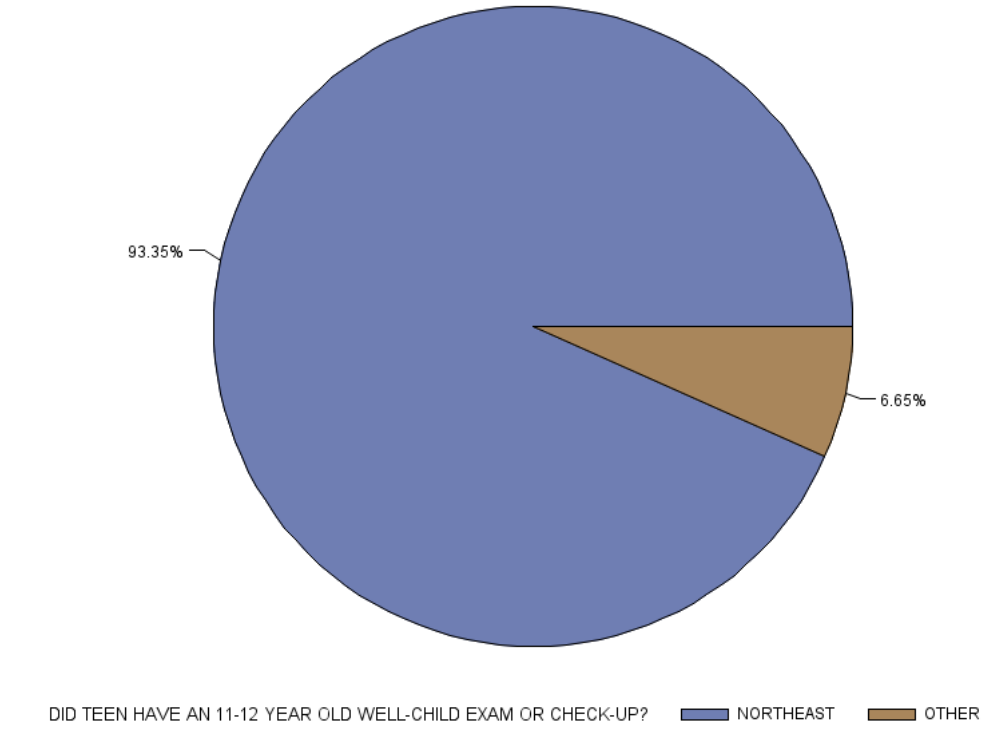
Using the Vaccination Facility Type in NIS-Teen 2020 PUF



Using the Medical insurance in NIS-Teen 2020 PUF



Using the Well Child visit at age 11-12 years in NIS-Teen 2020 PUF



III. Result: Part 2 Chi-Square Test

Null hypothesis: The demographic variables are not significantly associated with the P_UTDHPV_15INT vaccine.

Alternative hypothesis: The demographic variables are significantly associated with the P_UTDHPV_15INT vaccine.

Table 2 shows the sample size of the variables, weighted% 95% confidence interval, the chi-square and p-value.

It can be seen that Ages: chi-square =465887.00 PVALUE<0.001, the age groups chi-square =228552.00 PVALUE<0.001, the sex of Adolescent chi-square =62349.07 PVALUE<0.001, Race/Ethnicity chi-square =93321.30 PVALUE<0.001, mother's educational chi-square =126092.00 PVALUE<0.001, mother's marital status chi-square =1396.87 PVALUE<0.001, mother's age chi-square =46847.26 PVALUE<0.001, Income to poverty ratio chi-square =22150.33 PVALUE<0.001, medical chi-square =121735.00 PVALUE<0.001, well child visit at age 11-12years chi-square =777661.00 PVALUE<0.001, census chi-square =167002.00 PVALUE<0.001, and vaccination facility type chi-square =150358.00 PVALUE<0.001.

From the chi-square statistics and p-value, we can see that the demographic variables are significantly associated with the P_UTDHPV_15INT vaccine.

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 2020

Characteristic		P_UTDHPV_15INT			
		Sample size	Weighted % (95% C.I.)	Chi-Square Statistic	P-value
Total		**20163**	58.6(57.3,60.0)		
Age (years)				465887.09	**0**
	13	4276	45.6(44.1.47.1)		
	14	4173	56.0(54.9,57.0)		
	15	3998	61.9(61.0,62.7)		
	16	4028	65.5(64.7,66.2)		
	17*	3688	64.5(63.8,65.2)		
Age Group (in years)				228552.84	**0**
	13-15*	12447	54.5(53.6,55.3)		
	16-17	7716	65.0(64.3,65.8)		
Sex of Adolescent				62349.07	**0**
	Male	10587	56.0(55.1,56.9)		
	Female*	9576	61.4(60.7,0.62.1)		
Race/Ethnicity				93321.30	**0**
	Non-Hispanic White*	12585	55.4(54.5,56.3)		
	Non-Hispanic Black	1667	60.7(59.0,62.4)		
	Hispanic	3410	62.7(61.8,63.7)		
	Non-Hispanic Other	2501	61.3(60.3,62.2)		
Mother's Educational Level				126092.75	**0**
	<High School*	1689	64.1(61.8,66.4)		
	High School	3058	55.0(53.8,56.3)		
	Some college or college graduate	5187	54.1(53.3,54.9)		

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 2020

Characteristic		P_UTDHPV_15INT			
		Sample size	Weighted % (95% C.I.)	Chi-Square Statistic	P-value
	>College graduate	10229	61.4(60.9,61.9)		
Mother's Marital Status				1396.87	**0**
	Married*	13992	58.3(57.5,59.1)		
	Never married/Widowed/divorced/separated	6171	59.1(58.3,60.0)		
Mother's Age				46847.26	**0**
	≤34 years*	1338	54.3(51.6,56.9)		
	35-44 years	8592	56.8(56.1,57.5)		
	≥45 years	10233	60.9(60.4,61.5)		
Income to Poverty Ratio				22150.33	**0**
	<133%*	4151	61.3(59.8,62.8)		
	133% - <322%	16012	57.7(57.1,58.2)		
Medical Insurance[§]				121735.98	**0**
	Private only*	12004	58.7(57.8,59.6)		
	Any Medicaid	5937	61.1(60.2,62.0)		
	Other[‖]	1539	55.1(53.6,56.5)		
	Uninsured	683	42.4(40.5,44.3)		
Well Child Visit at Age 11-12 Years**				777661.11	**0**
	Yes*	16525	63.3(62.5,64.0)		
	No	492	42.2(39.1,45.3)		
	Don't know/Refused/ Missing	3146	38.8(37.8,39.8)		
Census Region				167002.21	**0**
	Northeast*	4020	67.2(65.7,68.6)		
	Midwest	4508	59.4(58.4,60.4)		

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 2020

Characteristic		P_UTDHPV_15INT			
		Sample size	Weighted % (95% C.I.)	Chi-Square Statistic	P-value
	South	7189	54.2(53.6,54.9)		
	West	4446	59.4(58.7,60.2)		
Vaccination Facility Type				150358.89	**0**
	All private facilities*	9027	61.4(60.8,62.0)		
	All public facilities	2460	51.7(49.7,53.6)		
	All hospital facilities	2756	61.2(59.9,62.5)		
	All STD/school/teen clinics or other facilities	505	42.6(40.4,44.7)		
	Mixed††	3356	59.1(58.3,59.8)		
	Unknown/Don't Know‡‡	2059	55.3(54.4,56.2)		

* 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.

IV. Result: Part 3

Table 3 shows the unweighted sample sizes and weighted% 95% confidence interval for each state in the United States for the P_UTDHPV_15INT vaccine. Among all the states, Texas accounts for most proportion.
The table lists 51 estimation areas for the survey.

TABLE 3. Vaccination Coverage Estimates Amongst Adolescents Aged 13-17 Years in the United States and by States --NIS-Teen 2020

U.S. National and States	P_UTDHPV_15INT	
	Sample Size	Weighted % (95% C.I.)
National	20163	58.6(57.3,60.0)
Alabama	298	52.9(47.2,58.6)
Alaska	302	54.9(50.9,58.9)
Arizona	340	51.4(48.7,54.0)
Arkansas	322	49.6 (47.1,52.0)
California	403	62.3 (60.4,64.3)
Colorado	354	66.4 (64.7,68.2)
Connecticut	331	66.9(65.2,68.6)
Delaware	360	63.2 (61.6,64.7)
District of Columbia	404	72.3 (71.0,73.6)
Florida	355	51.6 (50.1,53.1)
Georgia	300	54.9 (53.4,56.5)
Hawaii	290	73.9 (72.6,75.2)
Idaho	376	54.5 (53.3,55.8)
Illinois	699	63.1 (62.3,64.0)
Indiana	302	53.4 (52.1,54.7)
Iowa	280	60.3 (59.0,61.6)
Kansas	364	53.3 (52.1,54.4)
Kentucky	255	55.7 (54.4,57.1)
Louisiana	356	60.4 (59.3,61.5)
Maine	372	63.5 (62.5,64.5)
Maryland	815	66.8 (66.1,67.4)
Massachusetts	394	73.4 (72.5,74.3)
Michigan	398	61.3 (60.4,62.3)
Minnesota	330	69.2 (68.2,70.1)
Mississippi	282	31.9 (30.9,32.9)
Missouri	397	53.6 (52.7,54.5)
Montana	307	54.4 (53.4,55.4)
Nebraska	405	64.8 (64.0,65.6)
Nevada	369	50.1 (49.2,51.0)
New Hampshire	381	68.8 (68.0,69.6)
New Jersey	379	59.7 (58.9,60.6)
New Mexico	352	59.2 (58.3,60.0)
New York	729	68.1 (67.5,68.7)

North Carolina	327	60.7 (59.8,61.5)
North Dakota	401	70.3 (69.6,71.0)
Ohio	338	53.2 (52.3,54.0)
Oklahoma	338	45.8 (45.0,46.6)
Oregon	308	61.6 (60.8,62.5)
Pennsylvania	765	67.1 (66.5,67.6)
Rhode Island	271	83.0 (82.3,83.7)
South Carolina	311	47.0 (46.1,47.8)
South Dakota	317	71.5 (70.8,72.3)
Tennessee	338	52.9 (52.1,53.7)
Texas	1141	54.9 (54.5,55.3)
Utah	304	45.0 (44.2,45.8)
Vermont	398	70.5 (69.8,71.1)
Virginia	677	56.4 (55.8,56.9)
Washington	417	59.0 (58.4,59.7)
West Virginia	310	43.4 (42.6,44.1)
Wisconsin	277	61.5 (60.7,62.2)
Wyoming	324	44.8 (44.0,45.5)

V. Result: Part 4

Table 4 shows the unweighted sample sizes, points estimated and weighted% 95% confidence interval for each variable.

TABLE 4. Sample Characteristics of Adolescents Aged 13-17 Years in the United States, by Selected Demographic and Access-To-Care Variables--NIS-Teen 2020

Characteristic		**Overall**	
		Sample Size (n)	**Weighted % (95% C.I.)**
Total		**20163**	**100**
Age (years)			
	13	4276	20.2(19.1,21.3)
	14	4173	20.0(19.0,21.2)
	15	3998	20.3(19.2,21.4)
	16	4028	20.6(19.5, 21.7)
	17*	3688	18.9(17.8, 20.0)
Sex of Adolescent			
	Male	10587	51.0(49.7, 52.4)
	Female*	9576	49.0(47.6, 50.3)
Race/Ethnicity			

Characteristic		Overall	
		Sample Size (n)	**Weighted % (95% C.I.)**
	Non-Hispanic White*	12585	50.0(48.7, 51.4)
	Non-Hispanic Black	1667	13.1(12.2,14.1)
	Hispanic	3410	25.0(23.7,26.4)
	Non-Hispanic Other	2501	11.8(10.9,12.7)
Mother's Educational Level			
	<High School*	1689	12.4(11.3,13.6)
	High School	3058	21.3(20.1,22.5)
	Some college or college graduate	5187	24.1(22.9,25.2)
	>College graduate	10229	42.3(41.0,43.6)
Mother's Marital Status			
	Married*	13992	62.4(61.0,63.8)
	Never married/Widowed/divorced/separated	6171	37.6(36.2,39.0)
Mother's Age			
	≤34 years*	1338	7.3(6.6,8.1)
	35-44 years	8592	43.7(42.3,45.1)
	≥45 years	10233	49.0(47.6,50.4)
Income to Poverty Ratio			
	<133%*	4151	26.9(25.6,28.2)
	133% - <322%	16012	73.1(71.8,74.4)
Medical Insurance[§]			
	Private only*	12004	53.0(51.6,54.4)
	Any Medicaid	5937	36.1(34.7,37.5)
	Other[‖]	1539	6.7(6.1,7.4)
	Uninsured	683	4.2(3.6,4.8)
Well Child Visit at Age 11-12 Years**			
	Yes*	16525	80.6(79.5,81.8)
	No	492	2.7(2.2,3.2)
	Don't know/Refused/ Missing	3146	16.7(15.6,17.8)
Census Region			
	Northeast*	4020	15.8(15.3,16.3)
	Midwest	4508	21.1(20.5,21.7)
	South	7189	39.0(38.0,39.9)
	West	4446	24.2(23.1,25.2)
Vaccination Facility Type			
	All private facilities*	9027	47.4(46.0,48.7)
	All public facilities	2460	11.9(11.0,12.9)
	All hospital facilities	2756	10.6(9.9,11.4)
	All STD/school/teen clinics or other facilities	505	2.3(1.9,2.7)
	Mixed[††]	3356	14.3(13.5,15.2)
	Unknown/Don't Know[‡‡]	2059	13.5(12.4,14.6)

* 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.

VI. Result: Part 5

Table 5 shows the points estimates and corresponding confidence intervals for weighted estimates-Model 1, the unadjusted odds ratio-Model 2, the adjusted odds ratio-Model 3, and the Adjusted odds ratio for the variable that were significant in model 3-Model 4 for the P_UTDHPV_15INT vaccine.

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 2020

Characteristic		Overall Vaccinated Against "P_UTDHPV_15INT "			
		Weighted Estimates % (95% C.I.) MODEL 1	Unadjusted Odds Ratio Estimate (95% C.I.) MODEL 2	Adjusted Odds Ratio Estimate (95% C.I.) MODEL 3	Significant Variables Adjusted Odds Ratio Estimate (95% C.I.) MODEL 4
Total					
Age (years)					
	13	45.6(44.1.47.1)	0.46(0.39,0.55)	0.63(0.52,0.77)	0.62 (0.51-0.75)
	14	56.0(54.9,57.0)	0.70(0.59,0.84)	0.71(0.59,0.86)	0.71 (0.59-0.85)
	15	61.9(61.0,62.7)	0.89(0.75,1.07)	0.91(0.76,1.09)	0.91 (0.77-1.09)
	16	65.5(64.7,66.2)	1.04(0.87,1.25)	1.05(0.88,1.25)	1.05 (0.87-1.25)
	17*	64.5(63.8,65.2)	Ref	Ref	Ref
Sex of Adolescent					

	Male	56.0(55.1,56.9)	0.80(0.72,0.89)	0.78(0.69,0.87)	0.78 (0.69-0.87)
	Female*	61.4(60.7,62.1)	Ref	Ref	Ref
Race/Ethnicity					
	Non-Hispanic White*	55.4(54.5,56.3)	Ref	Ref	Ref
	Non-Hispanic Black	60.7(59.0,62.4)	1.24(1.05,1.47)	1.38(1.15,1.66)	1.40 (1.17-1.67)
	Hispanic	62.7(61.8,63.7)	1.36(1.16,1.59)	1.50(1.28,1.77)	1.52 (1.29-1.79)
	Non-Hispanic Other	61.3(60.3,62.2)	1.27(1.07,1.51)	1.29(1.08,1.53)	1.30 (1.09-1.55)
Mother's Educational Level					
	<High School*	64.1(61.8,66.4)	Ref	Ref	Ref
	High School	55.0(53.8,56.3)	0.69(0.54,0.87)	0.69(0.54,0.90)	0.67 (0.52-0.87)
	Some college or college graduate	54.1(53.3,54.9)	0.66(0.53,0.83)	0.69(0.53,0.89)	0.66 (0.51-0.84)
	>College graduate	61.4(60.9,61.9)	0.89(0.72,1.11)	0.94(0.73,1.22)	0.91 (0.71-1.16)
Mother's Marital Status					
	Married*	58.3(57.5,59.1)	Ref	Ref	Ref
	Never married/Widowed/divorced/separated	59.1(58.3,60.0)	1.04(0.92,1.16)	1.01(0.88,1.15)	
Mother's Age					
	≤34 years*	54.3(51.6,56.9)	Ref	Ref	Ref
	35-44 years	56.8(56.1,57.5)	1.11(0.89,1.39)	0.98(0.78,1.23)	
	≥45 years	60.9(60.4,61.5)	1.31(1.05,1.64)	1.07(0.84,1.36)	
Income to Poverty Ratio					
	<133%*	61.3(59.8,62.8)	Ref	Ref	Ref
	133% - <322%	57.7(57.1,58.2)	0.86(0.75,0.98)	0.85(0.71,1.02)	
Medical Insurance[§]					
	Private only*	58.7(57.8,59.6)	Ref	Ref	Ref
	Any Medicaid	61.1(60.2,62.0)	1.11(0.98,1.25)	1.15(0.97,1.36)	1.21 (1.05-1.41)
	Other[‖]	55.1(53.6,56.5)	0.86(0.70,1.51)	1.00(0.80,1.25)	1.01 (0.81-1.26)
	Uninsured	42.4(40.5,44.3)	0.52(0.38,0.71)	0.59(0.42,0.83)	0.60 (0.43-0.84)
Well Child Visit at Age 11-12 Years**					
	Yes*	63.3(62.5,64.0)	Ref	Ref	Ref
	No	42.2(39.1,45.3)	0.42(0.29,0.62)	0.45(0.31,0.66)	0.45 (0.31-0.66)
	Don't know/Refused/ Missing	38.8(37.8,39.8)	0.37(0.32,0.43)	0.45(0.38,0.54)	0.46 (0.38-0.54)
Census Region					
	Northeast*	67.2(65.7,68.6)	Ref	Ref	Ref
	Midwest	59.4(58.4,60.4)	0.71(0.62,0.82)	0.79(0.68,0.92)	0.79 (0.68-0.91)
	South	54.2(53.6,54.9)	0.58(0.50,0.66)	0.58(0.51,0.67)	0.58 (0.51-0.67)
	West	59.4(58.7,60.2)	0.72(0.60,0.86)	0.74(0.62,0.89)	0.73 (0.61-0.88)
Vaccination Facility Type					

	All public facilities	51.7(49.7,53.6)	Ref	Ref	Ref
	All hospital facilities	61.2(59.9,62.5)	1.48(1.19,1.83)	1.41(1.12,1.76)	1.39 (1.11-1.74)
	All private facilities*	61.4(60.8,62.0)	1.49(1.24,1.78)	1.43(1.18,1.74)	1.42 (1.17-1.73)
	All STD/school/teen clinics or other facilities	42.6(40.4,44.7)	0.69(0.48,0.99)	0.71(0.48,1.06)	0.70 (0.47-1.04)
	Mixed††	59.1(58.3,59.8)	1.35(1.10,1.67)	1.33(1.07,1.66)	1.32 (1.07-1.65)
	Unknown/Don't Know‡‡	55.3(54.4,56.2)	1.16(0.90,1.48)	1.12(0.86,1.44)	1.10 (0.85-1.42)

* 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.

VII. Result: Model Regression Results

Table 6 shows 3 models' test of effect models.

In model 2, it is shown that the unadjusted odds ratio for the age of the adolescent in years is significant (Chi-Square = 29.55, P-value < 0.001), the sex of the adolescent is significant (Chi-Square = 15.56, P-value < 0.001), the race/ethnicity is significant (Chi-Square = 7.56, P-value < 0.001), the mother's educational level is significant (Chi-Square = 10.34, P-value < 0.001), the mother's marital status is not significant (Chi-Square = 10.34, P-value= 0.56), the mother's age is not significant (Chi-Square = 5.76, P-value =0.003), the income to poverty ratio is not significant (Chi-Square = 4.9, P-value =0.03), the medical insurance is relatively not significant (Chi-Square = 8.05, P-value = 0.001), the well child visit at age 11-12 years is significant (Chi-Square = 84.35, P-value < 0.001), the census region is significant (Chi-Square = 20.24, P-value < 0.001), and the vaccination facility type is significant (Chi-Square = 7.90, P-value < 0.001).

In model 3, it is shown that the adjusted odds ratio for the age of the adolescent in years is significant (Chi-Square = 10.26, P-value < 0.001), the sex of the adolescent is significant (Chi-Square = 19.66, P-value < 0.001), the race/ethnicity is significant (Chi-Square = 11.34, P-value < 0.001) ,the mother's educational level is significant (Chi-Square = 9.68, P-value < 0.001) , the mother's marital status is not significant (Chi-Square = 0.00, P-value =0.95), the mother's age is not significant (Chi-Square = 0.82, P-value =0.44), the income to poverty ratio is not significant (Chi-Square = 3.11, P-value 0.08) ,the medical insurance is relatively not significant (Chi-Square = 5.11, P-value = 0.001) the well child visit at age 11-12years is significant (Chi-Square = 44.48, P-value < 0.001), the census region is significant (Chi-Square = 19.43, P-value < 0.001), and the vaccination facility type is significant(Chi-Square = 5.76, P-value < 0.001).

In model 4, the adjusted odds ratio for the variables that were significant in model 3 which was Age, Sex, Race/Ethnicity, Mother's Educational Level, well child visit at age 11-12years, census region, vaccination facility.

The adjusted odds ratio for the race/ethnicity is significant (Chi-Square = 14.14, P-value = 0.001), the sex of the adolescent is significant (Chi-Square = 20.03, P-value < 0.001), the mother's educational level is significant (Chi-Square = 8.46, P-value < 0.001) , the age of the adolescent in years is significant (Chi-Square = 10.48, P-value < 0.001), the well child visit at age 11-12years is (Chi-Square = 47.12P-value = 0.001), the census region is significant (Chi-Square = 20.92, P-value = 0.001), the vaccination facility type is significant (Chi-Square = 5.98, P-value = 0.001).

TABLE 6. Type III Test of Effect for Models Using NIS-Teen 2020.						
Characteristic	Wald Chi-Squares					
	Model 2		Model 3		Model 4	
	Statistic	P-Value	Statistic	P-Value	Statistic	P-Value
Age (years)	118.202	0.00	41.040	0.00	44.929	0.00
Sex of Adolescent	15.649	0.00	19.660	0.00	19.729	0.00
Race/Ethnicity	22.555	0.00	34.025	0.00	37.001	0.00
Mother's Educational Level	31.012	0.00	29.020	0.00	31.913	0.00
Mother's Marital Status	0.334	0.56	0.005	0.95		
Mother's Age	11.517	0.00	1.644	0.44		
Income to Poverty Ratio	4.903	0.03	33.113	0.08		
Medical Insurance	24.144	0.00	15.342	0.00	20.668	0.00
Well Child Visit at Age 11-12 Years	168.710	0.00	88.959	0.00	87.563	0.00
Census Region	60,727	0.00	58.308	0.00	59.337	0.00
Vaccination Facility Type	39.496	0.00	28.814	0.00	28.807	0.00

VIII. Conclusion

This project was designed to do the analysis of (NIS-Teen) 2020 data. Among all the vaccines types, my project is solely P_UTDHPV_15INT. 20163 people participated the survey. In my analysis, I conducted descriptive statistics analysis were for all the variables in order to give you a brief idea about how the data set constructed. Then the analysis gives you weighted and unweighted estimates, point estimates and corresponding 95% confidence intervals. What's more, four models were fitted for the data which included weighted estimates, adjusted and unadjusted odds ratios.

For the regression model, the wald chi-square was used to determine if the variables were significant. In model 2 which is an unadjusted odds ratio, Age, Sex, Race/Ethnicity, mother's educational level, Well Child Visit at Age 11-12 Years, Census Region, Vaccination Facility Type were all significant. Meanwhile, mother's marital status, Mother's Age, Medical Insurance and income to poverty ratio were not significant.

With respect to model 3 which is an adjusted odds ratio, the result is same as model 2. Among all the variables, Age, Sex, Race/Ethnicity, mother's educational level, Well Child Visit at Age 11-

12 Years, Census Region, Vaccination Facility Type were all significant. Meanwhile, mother's marital status, Mother's Age, Medical Insurance and income to poverty ratio were not significant.

Model 4 is also an adjusted odds ratio using only the variables significant in model 3, it was confirmed that all the variables that were significant in model 3 were also significant in model 4.

IX. Reference

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

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

Appendix:

```
LIBNAME PUF "D:\XuanSAS\Final project";
OPTIONS FMTSEARCH = (PUF WORK LIBRARY);

*%LET MYPATH = C:\Users\Papa Kojo Ntamah\Documents\SPRING
2022\GSU\NISTEEN2020\RESULTS;
%LET MYPATH.= D:\XuanSAS\Final project\Results;

/*************************************************************************/
/* Step 2:   CREATE THE DATA SET FOR YOUR PROJECT                        */
/*           USING THE VARIABLE LIST GIVING FROM THE MAIN DATA SET       */
/*************************************************************************/

DATA MYPROJECT;
      SET PUF.NISTEENPUF20(KEEP = SEQNUMT PDAT2 PROVWT_C STRATUM YEAR AGE SEX
RACEETHK EDUC1 AGEGRP_M_I
                                    STATE MARITAL2 INCPORAR_I INS_STAT2_I
CKUP_11_12 CEN_REG FACILITY P_UTDHPV_15INT);


      /*** ASSIGNING NEW AGE OF TEEN VARIABLE:  1 = 13 YEARS, 2 = 14 YEARS, 3
= 15 YEARS,
           4 = 16 YEARS, AND 5 = 17 YEARS ***/
      NEWAGE = .;
      IF AGE IN (13) THEN NEWAGE = 1;
      ELSE IF AGE IN (14) THEN NEWAGE = 2;
      ELSE IF AGE IN (15) THEN NEWAGE = 3;
      ELSE IF AGE IN (16) THEN NEWAGE = 4;
      ELSE IF AGE IN (17) THEN NEWAGE = 5;

/*    NEWAGE2 = AGE - 12;*/

      /*** ASSIGNING AGE GROUP OF TEEN VARIABLE:  1 = (13 - 15)YEARS; 2 =
(16-17) YEARS. ***/
      TEENAGEGP = .;
      IF AGE IN (13, 14, 15) THEN TEENAGEGP = 1;
      ELSE IF AGE IN (16, 17) THEN TEENAGEGP = 2;

      /*** REGROUPING 11-12 YEAR OLD WELL-CHILD EXAM OR CHECK-UP OF TEEN: BY
COMBINING DON'T KNOW /REFUSED
      / MISSING AS 3 ***/
      MYCKUP1112 = CKUP_11_12;
      IF  CKUP_11_12 IN (., 77, 99) THEN MYCKUP1112 = 3;

      /*** ASSIGNING MISSING FACILITY AS UNKNOW = 6 ***/
      MYFACILITY = FACILITY;
      IF  FACILITY IN (.) THEN MYFACILITY = 6;

      /*** INCOME TO POVERTY RATIO VARIABLE 1= <133%; 2=133% TO 322% ***/
      IF 0 <= INCPORAR_I < 1.33162 THEN MYINCTOPOV = 1;
      ELSE IF 1.33162 <= INCPORAR_I < 3.22046 THEN MYINCTOPOV = 2;

      /*** REASSIGNING RACE/ETHNICITY VARIABLES: 1 = NH-WHITES; 2 = NH-
BLACKS; 3 = HISPANICS;
      4 = NH-OTHERS ***/
```

```
      MYRACEETH = .;
      IF RACEETHK = 1 THEN MYRACEETH = 3;
      ELSE IF RACEETHK = 2 THEN MYRACEETH = 1;
      ELSE IF RACEETHK = 3 THEN MYRACEETH = 2;
      ELSE IF RACEETHK = 4 THEN MYRACEETH = 4;

      /*** REASSIGNING P_UTDHPV_15INT = 2 TO 1 ***/
      IF P_UTDHPV_15INT = 2 THEN P_UTDHPV_15INT = 1;
RUN;

/*************************************************************************/
/*** THIS PROGRAM PRODUCES ALL YOUR VARIABLE CREATED IN THE SUBSET DATA  ***/
/*************************************************************************/

PROC CONTENTS DATA = MYPROJECT VARNUM;
RUN;

/*************************************************************************
***************/
/*** THIS PROGRAM REMOVES ALL THE FORMATS FROM THE VARIABLES CREATED IN THE
SUBSET DATA  ***/
/*************************************************************************
***************/
DATA PROJECT;
      SET MYPROJECT;
      FORMAT _ALL_; /*** DELETE ALL THE FORMATS FROM THE ORIGINAL DATA SET
***/
RUN;

/*************************************************************************
********************/
/*** THIS PROGRAM PRODUCES NEW FORMATS TO BE USED FOR MY VARIABLES CREATED IN
THE SUBSET DATA  ***/
/*************************************************************************
********************/

PROC FORMAT;
      VALUE MYAGE 1 = "13"
                  2 = "14"
                  3 = "15"
                  4 = "16"
                  5 = "17"
                  ;
      VALUE FMTAGRP 1 = "13 - 15"
                    2   = "16 - 17"
                    ;
      VALUE FMTSEX  1 = "MALE  "
                    2 = "FEMALE"
                    ;
      VALUE FMTRACE   1 = "NON-HISPANIC WHITE ONLY           "
                        2 = "NON-HISPANIC BLACK ONLY          "
                        3 = "HISPANIC                         "
                        4 = "NON-HISPANIC OTHER + MULTIPLE RACE"
                        ;
      VALUE FMTCKUP 1 = "YES CHECK UP"
                    2 = "NO CHECK UP "
                    3 = "DK OR REF   "
```

```
                          ;
      VALUE FMTINS    1 = "PRIVATE INSURANCE"
                          2 = "ANY MEDICAID     "
                          3 = "OTHER INSURANCE  "
                          4 = "UNINSURED        "
                          ;
      VALUE FMTMAGRP  1 = "<= 34 YEARS    "
                          2 = "35 TO 44 YEARS"
                          3 = ">= 45 YEARS    "
                          ;
      VALUE FMTMARRY  1 = "MARRIED
"
                          2 = "NEVER
MARRIED/WIDOWED/DIVORCED/SEPARATED/DECEASED/LIVING WITH PARTNER"
                          ;
      VALUE FMTMEDU   1 = "LESS THAN 12 YEARS                  "
                          2 = "12 YEARS                                "
                          3 = "MORE THAN 12 YEARS, NON-COLLEGE GRAD"
                          4 = "COLLEGE GRADUATE                        "
                          ;
      VALUE FMTINCPR  1 = " 0% TO <133% "
                          2 = " 133% TO 322%"
                    ;

      VALUE FMTFACTY  1 = "ALL PUBLIC FACILITIES                           "
                          2 = "ALL HOSPITAL FACILITIES
"
                          3 = "ALL PRIVATE FACILITIES
"
                          4 = "ALL STD/SCHOOL/TEEN CLINICS OR OTHER
FACILITIES"
                          5 = "MIXED
"
                          6 = "UNKNOWN/DK
"
                          ;
      VALUE FMTCENREG 1 = "NORTHEAST"
                          2 = "MIDWEST  "
                          3 = "SOUTH    "
                          4 = "WEST     "
                          ;
      VALUE FMTUTD    0 = "NOT UTD"
                          1 = "UTD    "
                          ;

      VALUE FMSTATE     . = "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            "
                                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;

/*************************************************************************
***************/
/*** THIS PROGRAM PRODUCES THE DISTRIBUTION OF SAMPLE SIZES FOR EACH VARIABLE
OF INTEREST ***/
/*************************************************************************
***************/

ODS OUTPUT ONEWAYFREQS = RESPONSETABLE; /*** THIS CREATES YOUR SAS DATA SET
RESULTS FROM THE PROC FREQ RESULTS ***/
```

```
PROC FREQ DATA = PROJECT;
      WHERE PDAT2 = 1  AND PROVWT_C NE .; /*** USING ONLY ADEQUATE PROVIDER
DATA ***/
      TABLES NEWAGE TEENAGEGP SEX MYRACEETH EDUC1 MARITAL2 AGEGRP_M_I
MYINCTOPOV INS_STAT2_I
               MYCKUP1112 CEN_REG MYFACILITY STATE/ NOCUM NOPERCENT;
      TITLE1 '2020 NIS-TEEN PUBLIC-USE FILE';
      TITLE2 'UNWEIGHTED FREQUENCIES OF SELECTED CHARACTERISTICS OF
ADOLESCENTS AGED 13-17 YEARS';

      FORMAT NEWAGE MYAGE.;
      FORMAT TEENAGEGP FMTAGRP.;
      FORMAT SEX FMTSEX.;
      FORMAT MYRACEETH FMTRACE.;
      FORMAT EDUC1 FMTMEDU.;
      FORMAT MARITAL2 FMTMARRY.;
      FORMAT AGEGRP_M_I FMTMAGRP.;
      FORMAT MYINCTOPOV FMTINCPR.;
      FORMAT INS_STAT2_I FMTINS.;
      FORMAT MYCKUP1112 FMTCKUP.;
      FORMAT CEN_REG FMTCENREG.;
      FORMAT MYFACILITY FMTFACTY.;
      FORMAT STATE FMSTATE.;
RUN;

/*** THIS PROCEDURE DISPLAYS ALL THE VARIABLE NAMES IN THE DATA SET IN
ALPHABETICAL ORDER ***/
PROC CONTENTS DATA = RESPONSETABLE SHORT;
RUN;

/*** THIS CREATES YOUR SAS DATA SET RESULTS FOR YOUR SAMPLE SIZES ***/
DATA RESPONSETABLEV1;
      RETAIN TABLE MYVARIABLE MYVARCOUNT MYVARNUM FREQUENCY;
      LENGTH MYVARIABLE $40.; /*** CREATING THE LENGTH FOR THE CHARACTER
VALUES TO BE PLACED IN
                                                  THE VARIABLE MYVARIABLE ***/

      SET RESPONSETABLE(KEEP = AGEGRP_M_I CEN_REG EDUC1 FREQUENCY INS_STAT2_I
MARITAL2 MYCKUP1112
                              MYFACILITY MYINCTOPOV MYRACEETH NEWAGE SEX
STATE TEENAGEGP TABLE);

      /*** MYVARIABLE = THE LABEL FOR EACH VALUE OF VARIABLE; MYVARCOUNT =
THE VARIABLE NUMBER IN
                              THE TABLE; MYVARNUM = THE VALUE OF EACH
VARIABLE ***/
      IF NEWAGE NE . THEN DO;
            MYVARIABLE = PUT(NEWAGE, MYAGE.);
            MYVARCOUNT = 1;
            MYVARNUM = NEWAGE;
      END;
      ELSE IF TEENAGEGP NE . THEN DO;
            MYVARIABLE = PUT(TEENAGEGP, FMTAGRP.);
            MYVARCOUNT = 2;
            MYVARNUM = TEENAGEGP;
      END;
```

```
ELSE IF SEX NE . THEN DO;
      MYVARIABLE = PUT(SEX, FMTSEX.);
      MYVARCOUNT = 3;
      MYVARNUM = SEX;
END;
ELSE IF MYRACEETH NE . THEN DO;
      MYVARIABLE = PUT(MYRACEETH, FMTRACE.);
      MYVARCOUNT = 4;
      MYVARNUM = MYRACEETH;
END;
ELSE IF EDUC1 NE . THEN DO;
      MYVARIABLE = PUT(EDUC1, FMTMEDU.);
      MYVARCOUNT = 5;
      MYVARNUM = EDUC1;
END;
ELSE IF MARITAL2 NE . THEN DO;
      MYVARIABLE = PUT(MARITAL2, FMTMARRY.);
      MYVARCOUNT = 6;
      MYVARNUM = MARITAL2;
END;
ELSE IF AGEGRP_M_I NE . THEN DO;
      MYVARIABLE = PUT(AGEGRP_M_I, FMTMAGRP.);
      MYVARCOUNT = 7;
      MYVARNUM = AGEGRP_M_I;
END;
ELSE IF MYINCTOPOV NE . THEN DO;
      MYVARIABLE = PUT(MYINCTOPOV, FMTINCPR.);
      MYVARCOUNT = 8;
      MYVARNUM = MYINCTOPOV;
END;
ELSE IF INS_STAT2_I NE . THEN DO;
      MYVARIABLE = PUT(INS_STAT2_I, FMTINS.);
      MYVARCOUNT = 9;
      MYVARNUM = INS_STAT2_I;
END;
ELSE IF MYCKUP1112 NE . THEN DO;
      MYVARIABLE = PUT(MYCKUP1112, FMTCKUP.);
      MYVARCOUNT = 10;
      MYVARNUM = MYCKUP1112;
END;
ELSE IF CEN_REG NE . THEN DO;
      MYVARIABLE = PUT(CEN_REG, FMTCENREG.);
      MYVARCOUNT = 11;
      MYVARNUM = CEN_REG;
END;
ELSE IF MYFACILITY NE . THEN DO;
      MYVARIABLE = PUT(MYFACILITY, FMTFACTY.);
      MYVARCOUNT = 12;
      MYVARNUM = MYFACILITY;
END;
ELSE IF STATE NE . THEN DO;
      MYVARIABLE = PUT(STATE, FMSTATE.);
      MYVARCOUNT = 13;
      MYVARNUM = STATE;
END;

KEEP TABLE MYVARIABLE MYVARCOUNT MYVARNUM FREQUENCY;
```

```
RUN;

/*** THIS PROCEDURE EXPORTS YOUR SAMPLE SIZES IN A MS EXCEL FILE ***/
PROC EXPORT DATA = RESPONSETABLEV1 OUTFILE
="&MYPATH.\TABLE1\TABLE1SAMPLESIZESNEW.xlsx" DBMS=XLSX REPLACE;
RUN;


/*************************************************************************
******************/
/*** THIS PROGRAM PRODUCES THE DISTRIBUTION OF WEIGHTED FREQUENCIES AND
PERCENTAGES FOR EACH ***/
/*** VARIABLE OF INTEREST
***/
/*************************************************************************
******************/

ODS OUTPUT ONEWAYFREQS = WTRESPONSETABLE;
PROC FREQ DATA = PROJECT;
      WHERE PDAT2 = 1; /*** USING ONLY ADEQUATE PROVIDER DATA ***/
      WEIGHT PROVWT_C; /*** TO INCLUDE WEIGHTS FOR WEIGHTED RESULTS ***/
      TABLES NEWAGE TEENAGEGP SEX MYRACEETH EDUC1 MARITAL2 AGEGRP_M_I
MYINCTOPOV INS_STAT2_I
               MYCKUP1112 CEN_REG MYFACILITY STATE/ NOCUM;
      TITLE1 '2020 NIS-TEEN PUBLIC-USE FILE';
      TITLE2 'CHI-SQUARE TEST RESULTS FOR WEIGHTED VACCINATION COVERAGES BY
SELECTED VARIABLES';

      FORMAT NEWAGE MYAGE.;
      FORMAT TEENAGEGP FMTAGRP.;
      FORMAT SEX FMTSEX.;
      FORMAT MYRACEETH FMTRACE.;
      FORMAT EDUC1 FMTMEDU.;
      FORMAT MARITAL2 FMTMARRY.;
      FORMAT AGEGRP_M_I FMTMAGRP.;
      FORMAT MYINCTOPOV FMTINCPR.;
      FORMAT INS_STAT2_I FMTINS.;
      FORMAT MYCKUP1112 FMTCKUP.;
      FORMAT CEN_REG FMTCENREG.;
      FORMAT MYFACILITY FMTFACTY.;
      FORMAT STATE FMSTATE.;
RUN;

/*** THIS PROCEDURE DISPLAYS ALL THE VARIABLE NAMES IN THE DATA SET IN
ALPHABETICAL ORDER ***/
PROC CONTENTS DATA = WTRESPONSETABLE SHORT;
RUN;

/*** THIS CREATES YOUR SAS DATA SET RESULTS FOR YOUR SAMPLE SIZES ***/
DATA WTRESPONSETABLEV1;
      RETAIN TABLE MYVARIABLE MYVARCOUNT MYVARNUM PERCENT MYPERCENT;
      LENGTH MYVARIABLE $40.; /*** CREATING THE LENGTH FOR THE CHARACTER
VALUES TO BE PLACED IN
                                    THE VARIABLE MYVARIABLE ***/

      SET WTRESPONSETABLE(KEEP =  TABLE PERCENT NEWAGE TEENAGEGP SEX
MYRACEETH EDUC1 MARITAL2
```

```
                                    AGEGRP_M_I MYINCTOPOV INS_STAT2_I MYCKUP1112
CEN_REG MYFACILITY STATE);

      MYPERCENT = PUT(PERCENT, 8.1); /*** FORMATING PERCENTAGES TO 1 DECIMAL
PLACE ***/

      /*** MYVARIABLE = THE LABEL FOR EACH VALUE OF VARIABLE;***/
      /*** MYVARCOUNT = THE VARIABLE NUMBER IN THE TABLE;     ***/
      /*** MYVARNUM = THE VALUE OF EACH VARIABLE              ***/
      IF NEWAGE NE . THEN DO;
            MYVARIABLE = PUT(NEWAGE, MYAGE.);
            MYVARCOUNT = 1;
            MYVARNUM = NEWAGE;
      END;
      ELSE IF TEENAGEGP NE . THEN DO;
            MYVARIABLE = PUT(TEENAGEGP, FMTAGRP.);
            MYVARCOUNT = 2;
            MYVARNUM = TEENAGEGP;
      END;
      ELSE IF SEX NE . THEN DO;
            MYVARIABLE = PUT(SEX, FMTSEX.);
            MYVARCOUNT = 3;
            MYVARNUM = SEX;
      END;
      ELSE IF MYRACEETH NE . THEN DO;
            MYVARIABLE = PUT(MYRACEETH, FMTRACE.);
            MYVARCOUNT = 4;
            MYVARNUM = MYRACEETH;
      END;
      ELSE IF EDUC1 NE . THEN DO;
            MYVARIABLE = PUT(EDUC1, FMTMEDU.);
            MYVARCOUNT = 5;
            MYVARNUM = EDUC1;
      END;
      ELSE IF MARITAL2 NE . THEN DO;
            MYVARIABLE = PUT(MARITAL2, FMTMARRY.);
            MYVARCOUNT = 6;
            MYVARNUM = MARITAL2;
      END;
      ELSE IF AGEGRP_M_I NE . THEN DO;
            MYVARIABLE = PUT(AGEGRP_M_I, FMTMAGRP.);
            MYVARCOUNT = 7;
            MYVARNUM = AGEGRP_M_I;
      END;
      ELSE IF MYINCTOPOV NE . THEN DO;
            MYVARIABLE = PUT(MYINCTOPOV, FMTINCPR.);
            MYVARCOUNT = 8;
            MYVARNUM = MYINCTOPOV;
      END;
      ELSE IF INS_STAT2_I NE . THEN DO;
            MYVARIABLE = PUT(INS_STAT2_I, FMTINS.);
            MYVARCOUNT = 9;
            MYVARNUM = INS_STAT2_I;
      END;
      ELSE IF MYCKUP1112 NE . THEN DO;
            MYVARIABLE = PUT(MYCKUP1112, FMTCKUP.);
            MYVARCOUNT = 10;
```

```
            MYVARNUM = MYCKUP1112;
      END;
      ELSE IF CEN_REG NE . THEN DO;
            MYVARIABLE = PUT(CEN_REG, FMTCENREG.);
            MYVARCOUNT = 11;
            MYVARNUM = CEN_REG;
      END;
      ELSE IF MYFACILITY NE . THEN DO;
            MYVARIABLE = PUT(MYFACILITY, FMTFACTY.);
            MYVARCOUNT = 12;
            MYVARNUM = MYFACILITY;
      END;
      ELSE IF STATE NE . THEN DO;
            MYVARIABLE = PUT(STATE, FMSTATE.);
            MYVARCOUNT = 13;
            MYVARNUM = STATE;
      END;

      KEEP TABLE MYVARIABLE MYVARCOUNT MYVARNUM PERCENT MYPERCENT;
RUN;

/*** THIS PROCEDURE EXPORTS YOUR SAMPLE SIZES IN A MS EXCEL FILE ***/
PROC EXPORT DATA = WTRESPONSETABLEV1 OUTFILE
="&MYPATH.\TABLE1\TABLE1WEIGHTEDPERCENT.xlsx"
                  DBMS=XLSX REPLACE;
RUN;

/*************************************************************************
************************/
/*** THIS PROGRAM PRODUCES THE DISTRIBUTION OF WEIGHTED FREQUENCIES FOR EACH
VARIABLE OF INTEREST ***/
/***      AND THE CHI-SQUARE STATISTICS AND P-VALUE FOR EACH VARIABLE OF
INTEREST.                  ***/
/*************************************************************************
************************/

ODS OUTPUT CHISQ = MYCHISQTEST;
PROC FREQ DATA = PROJECT;
      WHERE PDAT2 = 1; /*** USING ONLY ADEQUATE PROVIDER DATA ***/
      WEIGHT PROVWT_C; /*** TO INCLUDE WEIGHTS FOR WEIGHTED RESULTS ***/
      TABLES (NEWAGE TEENAGEGP SEX MYRACEETH EDUC1 MARITAL2 AGEGRP_M_I
MYINCTOPOV INS_STAT2_I MYCKUP1112
                  CEN_REG MYFACILITY)*P_UTDHPV_15INT / CHISQ;
      TITLE1 '2020 NIS-TEEN PUBLIC-USE FILE';
      TITLE2 'CHI-SQUARE TEST RESULTS FOR WEIGHTED VACCINATION COVERAGES BY
SELECTED VARIABLES';

      FORMAT NEWAGE MYAGE.;
      FORMAT TEENAGEGP FMTAGRP.;
      FORMAT SEX FMTSEX.;
      FORMAT MYRACEETH FMTRACE.;
      FORMAT EDUC1 FMTMEDU.;
      FORMAT MARITAL2 FMTMARRY.;
      FORMAT AGEGRP_M_I FMTMAGRP.;
      FORMAT MYINCTOPOV FMTINCPR.;
      FORMAT INS_STAT2_I FMTINS.;
      FORMAT MYCKUP1112 FMTCKUP.;
```

```
      FORMAT CEN_REG FMTCENREG.;
      FORMAT MYFACILITY FMTFACTY.;
      FORMAT P_UTDHPV_15INT FMTUTD.;
RUN;

/*** THIS PROCEDURE DISPLAYS ALL THE VARIABLE NAMES IN THE DATA SET IN
ALPHABETICAL ORDER ***/
PROC CONTENTS DATA = MYCHISQTEST SHORT;
RUN;

DATA MYCHISQTESTV1;
      RETAIN TABLE STATISTIC MYVALUE MYPROB DF VALUE PROB;
      LENGTH MYVALUE MYPROB $15.;
      SET MYCHISQTEST;

      WHERE STATISTIC IN ("Chi-Square"); /*** SELECTING ONLY CHI-SQUARE
RESULTS ***/

      MYVALUE = PUT(VALUE, 10.3); /*** FORMATTING THE CHI-SQUARE STATISTIC TO
3 DECIMAL PLACES. ***/
      MYPROB = PUT(PROB, 8.2); /*** FORMATTING THE CHI-SQUARE P-VALUES TO 2
DECIMAL PLACES. ***/
RUN;

/*** THIS PROCEDURE EXPORTS YOUR VACCINATION COVERAGE ESTIMATES RESULTS IN A
MS EXCEL FILE ***/
PROC EXPORT DATA = MYCHISQTESTV1 OUTFILE
="&MYPATH.\TABLE2\TABLE2CHISQUARE.xlsx" DBMS=XLSX REPLACE;
RUN;


/*************************************************************************
*************/
/*** THIS PROGRAM PRODUCES A HISTOGRAM FOR AGE IN YEARS AT INTERVIEW OF THE
ADOLESCENT ***/
/*************************************************************************
*************/

/*** NOTE: YOUR CREATE HTML SHOULD BE CHECKED IN THE RESULTS WINDOW BEFORE
YOU CAN SEE YOUR PLOTS ***/

PROC SGPLOT DATA=PROJECT;
      WHERE PDAT2 = 1; /*** USING ONLY ADEQUATE PROVIDER DATA ***/
    TITLE "Plotting Weighted Histogram Using Age (in Years) at Interview in
NIS-Teen 2020 PUF";
    HISTOGRAM NEWAGE / BINSTART = 1 BINWIDTH = 1 NBINS = 5 WEIGHT = PROVWT_C;
    DENSITY NEWAGE;
RUN;

PROC SGPLOT DATA=PROJECT;
      WHERE PDAT2 = 1; /*** USING ONLY ADEQUATE PROVIDER DATA ***/
    TITLE "Plotting Weighted Histogram Using Mother's age in NIS-Teen 2020
PUF";
    HISTOGRAM AGEGRP_M_I / BINSTART = 1 BINWIDTH = 1 NBINS = 5 WEIGHT =
PROVWT_C;
    DENSITY AGEGRP_M_I;
RUN;
```

```
PROC SGPLOT DATA=PROJECT;
      WHERE PDAT2 = 1; /*** USING ONLY ADEQUATE PROVIDER DATA ***/
    TITLE "Plotting Weighted Histogram Using Income to Poverty in NIS-Teen
2020 PUF";
    HISTOGRAM INCPORAR_I / BINSTART = 1 BINWIDTH = 1 NBINS = 5 WEIGHT =
PROVWT_C;
    DENSITY INCPORAR_I;
RUN;

/*************************************************************************
***/
/*** THIS PROGRAM PRODUCES A VERTICAL BAR GRAPH FOR THE SEX OF THE ADOLECENT
***/
/*************************************************************************
***/

PROC SGPLOT DATA=PROJECT;
      WHERE PDAT2 = 1; /*** USING ONLY ADEQUATE PROVIDER DATA ***/
    TITLE "Weighted Vertical Bar Chart Using Sex of the Adolescent in NIS-
Teen 2020 PUF";
    VBAR SEX / WEIGHT = PROVWT_C STAT = PERCENT;
    FORMAT SEX FMTSEX.;
RUN;

PROC SGPLOT DATA=PROJECT;
      WHERE PDAT2 = 1; /*** USING ONLY ADEQUATE PROVIDER DATA ***/
    TITLE "Weighted Vertical Bar Chart Using Race/Ethnicity in NIS-Teen 2020
PUF";
    VBAR MYRACEETH / WEIGHT = PROVWT_C STAT = PERCENT;
    FORMAT MYRACEETH FMTRACE.;
RUN;

PROC SGPLOT DATA=PROJECT;
      WHERE PDAT2 = 1; /*** USING ONLY ADEQUATE PROVIDER DATA ***/
    TITLE "Weighted Vertical Bar Chart Using Mother's educational level in
NIS-Teen 2020 PUF";
    VBAR EDUC1 / WEIGHT = PROVWT_C STAT = PERCENT;
    FORMAT EDUC1 FMTMEDU.;
RUN;

PROC SGPLOT DATA=PROJECT;
      WHERE PDAT2 = 1; /*** USING ONLY ADEQUATE PROVIDER DATA ***/
    TITLE "Weighted Vertical Bar Chart Using Mother's marital status in NIS-
Teen 2020 PUF";
    VBAR MARITAL2 / WEIGHT = PROVWT_C STAT = PERCENT;
    FORMAT MARITAL2 FMTMARRY.;
RUN;


/*************************************************************************
****/
/*** THIS PROGRAM PRODUCES A PIE CHART OF THE CENSUS REGION OF THE ADOLESCENT
***/
/*************************************************************************
****/
```

```
PROC GCHART DATA=PROJECT;
   TITLE "Unweighted Pie-Chart";
   TITLE "Using the Census Region of the Adolescent in NIS-Teen 2020 PUF";
   WHERE PDAT2 = 1  AND PROVWT_C NE .; /*** USING ONLY ADEQUATE PROVIDER DATA
***/
   PIE CEN_REG / SUMVAR = PROVWT_C TYPE=SUM PERCENT = ARROW NOHEADING LEGEND
DISCRETE;
   FORMAT CEN_REG FMTCENREG.;
RUN;
QUIT;

PROC GCHART DATA=PROJECT;
   TITLE "Unweighted Pie-Chart";
   TITLE "Using the Medical insurance in NIS-Teen 2020 PUF";
   WHERE PDAT2 = 1  AND PROVWT_C NE .; /*** USING ONLY ADEQUATE PROVIDER DATA
***/
   PIE INS_STAT2_I / SUMVAR = PROVWT_C TYPE=SUM PERCENT = ARROW NOHEADING
LEGEND DISCRETE;
   FORMAT INS_STAT2_I FMTINS.;
RUN;
QUIT;

PROC GCHART DATA=PROJECT;
   TITLE "Unweighted Pie-Chart";
   TITLE "Using the Well Child visit at age 11-12 years in NIS-Teen 2020
PUF";
   WHERE PDAT2 = 1  AND PROVWT_C NE .; /*** USING ONLY ADEQUATE PROVIDER DATA
***/
   PIE CKUP_11_12  / SUMVAR = PROVWT_C TYPE=SUM PERCENT = ARROW NOHEADING
LEGEND DISCRETE;
   FORMAT CKUP_11_12  FMTCENREG.;
RUN;
QUIT;

PROC GCHART DATA=PROJECT;
   TITLE "Unweighted Pie-Chart";
   TITLE "Using the Vaccination Facility Type in NIS-Teen 2020 PUF";
   WHERE PDAT2 = 1  AND PROVWT_C NE .; /*** USING ONLY ADEQUATE PROVIDER DATA
***/
   PIE FACILITY  / SUMVAR = PROVWT_C TYPE=SUM PERCENT = ARROW NOHEADING
LEGEND DISCRETE;
   FORMAT FACILITY FMTFACTY.;
RUN;
QUIT;
/*************************************************************************
*******************/
/*****    THIS PROGRAM PRODUCES THE DISTRIBUTION OF SAMPLE SIZES AND
VACCINATION COVERAGE    *****/
/***** ESTIMATES WITH THEIR CORRESPONDING CONFIDENCE INTERVALS FOR EACH
VARIABLE OF INTEREST *****/
/*************************************************************************
*******************/


/************* REPEAT THE PROGRAMS BELOW FOR ALL THE REMAINING
CHARACTERISTICS REQUIRED ***************/
```

```
/************************************      BEFORE YOU RUN THIS
************************************/

/*************************************************************************
*************************/
/* BELOW IS A SAMPLE CODE TO USED
*/
/* ODS OUTPUT SUMMARY = ;
*/
/* PROC MEANS DATA=PROJECT MEAN CLM MAXDEC = 3;
*/
/*      WHERE PDAT2 = 1  AND PROVWT_C NE .;
*/
/*    TITLE "  ";
*/
/*    CLASS ;
*/
/*    WEIGHT PROVWT_C;
*/
/*    FREQ ;
*/
/*    VAR ;
*/
/*    FORMAT ;
*/
/*    FORMAT ;
*/
/* RUN;
*/
/*************************************************************************
*************************/

%MACRO MYESTIMATE(VAR1, VAR2, VAR3, VAR4, DESCRIPTION);
/*** &VAR1. VARIABLE ***/
ODS OUTPUT SUMMARY = MYMEANS&VAR1.; /*** GIVE A NAME TO THE SAS DATA SET TO
BE CREATED ***/
PROC MEANS DATA=PROJECT MEAN CLM MAXDEC = 3;
      TITLE "2020 NIS-TEEN PUBLIC-USE FILE VACCINATION COVERAGE ESTIMATES BY
DESCRIPTION";
      WHERE PDAT2 = 1  AND PROVWT_C NE .;
      CLASS &VAR1.; /*** INSERT YOUR SELECTED CHARACTERISTICS VARIABLE ***/
      WEIGHT PROVWT_C; /*** INSERT YOUR WEIGHT VARIABLE ***/
      FREQ &VAR1.; /*** INSERT YOUR SELECTED CHARACTERISTICS VARIABLE ***/
      VAR &VAR2.; /*** INSERT YOUR VACCINE VARIABLE ***/
      FORMAT &VAR1. &VAR3.;
      FORMAT &VAR2. FMTUTD.;
RUN;

/*** THIS PROCEDURE DISPLAYS ALL THE VARIABLE NAMES IN THE DATA SET IN
ALPHABETICAL ORDER ***/
PROC CONTENTS DATA = MYMEANS&VAR1. SHORT;
RUN;

DATA MYMEANS&VAR1.V1;
      RETAIN MYCHARACT MYVARIABLE MYVARNUM MYRESULTS FINALESTIMATE
&VAR2._MEAN &VAR2._LCLM &VAR2._UCLM;
      LENGTH MYRESULTS FINALESTIMATE $20. MYVARIABLE $40.;
```

```
      SET MYMEANS&VAR1.;

      MYESTMATE = PUT(ROUND(&VAR2._MEAN*100,0.1), 4.1); /*** ROUNDING THE
POINT ESTIMATE AS A PERCENTAGE
                                                          TO 1 DECIMAL
PLACE ***/
      CONINTEL = '('||PUT(ROUND(&VAR2._LCLM*100,0.1), 4.1)||' -
'||PUT(ROUND(&VAR2._UCLM*100,0.1), 4.1)||')'; /*** COMBINING THE LOWER AND
UPPER CONFIDENCE LIMITS ***/
      FINALESTIMATE = CATX(" ",MYESTMATE," ",CONINTEL); /*** COMBINING THE
POINT ESTIMATE AND CONFIDENCE
                                                          LIMITS TO SHOW
ONE RESULT ***/
      MYCIDIFF = (&VAR2._UCLM*100) - (&VAR2._LCLM*100); /*** FINDING THE
DIFFERENCE IN CONFIDENCE WIDTH ***/
      IF (MYCIDIFF > 20) THEN MYRESULTS = FINALESTIMATE||"**"; /*** TESTING
TO SEE IF THE DIFFERENCE IN
                                                    CONFIDENCE WIDTH IS GREATER
THAN 20 PERCENTAGE POINTS ***/
      ELSE MYRESULTS = FINALESTIMATE;

      /*** ASSIGNING MYVARIABLE = THE LABEL FOR EACH VALUE OF VARIABLE AND
MYVARNUM = THE VALUE
           OF EACH VARIABLE ***/
      MYVARIABLE = PUT(&VAR1.,&VAR3.);
      MYVARNUM = &VAR1.;
      MYCHARACT = &VAR4.;

      KEEP MYCHARACT MYVARIABLE MYVARNUM MYRESULTS FINALESTIMATE &VAR2._MEAN
&VAR2._LCLM &VAR2._UCLM;
RUN;

/*** THIS PROCEDURE EXPORTS YOUR VACCINATION COVERAGE ESTIMATES RESULTS IN A
MS EXCEL FILE ***/
/*** MAKE SURE YOU CHANGE FILE NAMES FOR EACH DIFFERENT VARIABLE
(CHARACTERISTICS) ***/
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(NEWAGE, P_UTDHPV_15INT, MYAGE., 1, "Age (years) at Interview");
%MYESTIMATE(TEENAGEGP, P_UTDHPV_15INT, FMTAGRP., 2, "Age Group (in years) at
Interview");
%MYESTIMATE(SEX, P_UTDHPV_15INT, FMTSEX., 3, "Sex of Adolescent at
Interview");
%MYESTIMATE(MYRACEETH, P_UTDHPV_15INT, FMTRACE., 4, "Sex of Adolescent at
Interview");
%MYESTIMATE(EDUC1, P_UTDHPV_15INT, FMTMEDU., 5, "Sex of Adolescent at
Interview");
%MYESTIMATE(MARITAL2, P_UTDHPV_15INT, FMTMARRY., 6, "Sex of Adolescent at
Interview");
```

```
%MYESTIMATE(AGEGRP_M_I, P_UTDHPV_15INT, FMTMAGRP., 7, "Sex of Adolescent at
Interview");
%MYESTIMATE(MYINCTOPOV, P_UTDHPV_15INT, FMTINCPR., 8, "Sex of Adolescent at
Interview");
%MYESTIMATE(INS_STAT2_I, P_UTDHPV_15INT, FMTINS., 9, "Sex of Adolescent at
Interview");
%MYESTIMATE(MYCKUP1112, P_UTDHPV_15INT, FMTCKUP., 10, "Sex of Adolescent at
Interview");
%MYESTIMATE(CEN_REG, P_UTDHPV_15INT, FMTCENREG., 11, "Sex of Adolescent at
Interview");
%MYESTIMATE(MYFACILITY, P_UTDHPV_15INT, FMTFACTY., 12, "Sex of Adolescent at
Interview");
%MYESTIMATE(STATE, P_UTDHPV_15INT, FMSTATE., 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;



/*************************************************************************
***************/
/*** THIS PROGRAM PRODUCES THE DISTRIBUTION OF SAMPLE SIZES FOR EACH VARIABLE
OF INTEREST ***/
/***                            USING SAS SURVEY PROCEDURES
***/
/*************************************************************************
***************/

/* DEMONSTRATE THE SURVEYFREQ PROCEDURE */
TITLE1 "FREQUENCY ANALYSIS - PUF FOR NIS-TEEN 2020";
TITLE2 'UNIVARIATE FREQUENCIES ON VARIOUS VARIABLES';

ODS OUTPUT CROSSTABS = FINALSTABLE1; /*** THIS CREATES YOUR SAS DATA SET
RESULTS FROM THE PROC SURVEYFREQ
                                          RESULTS ***/
PROC SURVEYFREQ DATA = PROJECT;
    STRATA  STRATUM;  /*** STRATUM VARIABLE FOR VARIANCE ESTIMATION ***/
    CLUSTER SEQNUMT;  /*** UNIQUE TEEN IDENTIFIER ***/
    WEIGHT  PROVWT_C; /*** FINAL DUAL-FRAME PROVIDER-PHASE WEIGHT (EXCLUDES
TERRITORIES) ***/

    TABLES  PDAT2*(P_UTDHPV_15INT NEWAGE SEX MYRACEETH EDUC1 MARITAL2
AGEGRP_M_I MYINCTOPOV INS_STAT2_I
                  MYCKUP1112 CEN_REG MYFACILITY)/ CL (TYPE=CP) NOWT NOSTD;
RUN;

/*** THIS PROCEDURE DISPLAYS ALL THE VARIABLE NAMES IN THE DATA SET IN
ALPHABETICAL ORDER ***/
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 MYCKUP1112
                           MYFACILITY MYINCTOPOV MYRACEETH NEWAGE PDAT2
P_UTDHPV_15INT 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;

/*** THIS CREATES YOUR SAS DATA SET RESULTS YOU WILL NEED ***/
DATA FINALSTABLE1V2;
      RETAIN TABLE MYVARIABLE MYVARCOUNT MYVARNUM FREQUENCY FNLESTIMATE
MYRESULTS;
      SET FINALSTABLE1V1;

      /*** MYVARIABLE = THE LABEL FOR EACH VALUE OF VARIABLE; MYVARCOUNT =
THE VARIABLE NUMBER IN
           THE TABLE; MYVARNUM = THE VALUE OF EACH VARIABLE ***/
      IF P_UTDHPV_15INT NE . THEN DO;
            MYVARIABLE = PUT(P_UTDHPV_15INT, FMTUTD.);
            MYVARCOUNT = 0;
            MYVARNUM = P_UTDHPV_15INT;
      END;
    IF NEWAGE NE . THEN DO;
            MYVARIABLE = PUT(NEWAGE, MYAGE.);
            MYVARCOUNT = 1;
            MYVARNUM = NEWAGE;
      END;
      ELSE IF TEENAGEGP NE . THEN DO;
            MYVARIABLE = PUT(TEENAGEGP, FMTAGRP.);
            MYVARCOUNT = 2;
            MYVARNUM = TEENAGEGP;
      END;
      ELSE IF SEX NE . THEN DO;
            MYVARIABLE = PUT(SEX, FMTSEX.);
            MYVARCOUNT = 3;
            MYVARNUM = SEX;
      END;
      ELSE IF MYRACEETH NE . THEN DO;
            MYVARIABLE = PUT(MYRACEETH, FMTRACE.);
            MYVARCOUNT = 4;
            MYVARNUM = MYRACEETH;
      END;
      ELSE IF EDUC1 NE . THEN DO;
            MYVARIABLE = PUT(EDUC1, FMTMEDU.);
            MYVARCOUNT = 5;
```

```
            MYVARNUM = EDUC1;
      END;
      ELSE IF MARITAL2 NE . THEN DO;
            MYVARIABLE = PUT(MARITAL2, FMTMARRY.);
            MYVARCOUNT = 6;
            MYVARNUM = MARITAL2;
      END;
      ELSE IF AGEGRP_M_I NE . THEN DO;
            MYVARIABLE = PUT(AGEGRP_M_I, FMTMAGRP.);
            MYVARCOUNT = 7;
            MYVARNUM = AGEGRP_M_I;
      END;
      ELSE IF MYINCTOPOV NE . THEN DO;
            MYVARIABLE = PUT(MYINCTOPOV, FMTINCPR.);
            MYVARCOUNT = 8;
            MYVARNUM = MYINCTOPOV;
      END;
      ELSE IF INS_STAT2_I NE . THEN DO;
            MYVARIABLE = PUT(INS_STAT2_I, FMTINS.);
            MYVARCOUNT = 9;
            MYVARNUM = INS_STAT2_I;
      END;
      ELSE IF MYCKUP1112 NE . THEN DO;
            MYVARIABLE = PUT(MYCKUP1112, FMTCKUP.);
            MYVARCOUNT = 10;
            MYVARNUM = MYCKUP1112;
      END;
      ELSE IF CEN_REG NE . THEN DO;
            MYVARIABLE = PUT(CEN_REG, FMTCENREG.);
            MYVARCOUNT = 11;
            MYVARNUM = CEN_REG;
      END;
      ELSE IF MYFACILITY NE . THEN DO;
            MYVARIABLE = PUT(MYFACILITY, FMTFACTY.);
            MYVARCOUNT = 12;
            MYVARNUM = MYFACILITY;
      END;

      KEEP TABLE MYVARIABLE MYVARCOUNT MYVARNUM FREQUENCY FNLESTIMATE
MYRESULTS;
RUN;

PROC EXPORT DATA = FINALSTABLE1V2 OUTFILE ="&MYPATH.\TABLE1\SURVEYTABLE1.xls"
            DBMS=EXCEL REPLACE;
RUN;

/*************************************************************************
************/
/*** UP-TO-DATE FLAG (PROV INFO): 2+ VARICELLA-CONTAINING SHOTS AT 12+ MONTHS
OF AGE, ***/
/*** EXCLUDING ANY VACCINATIONS AFTER THE RDD INTERVIEW DATE.
***/
/*************************************************************************
************/

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

```
/*************************************************************************/

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

/*** CREATE A DATA SET FOR VARIABLE YOU WANT TO ESTIMATE VACCINATION COVERAGE
***/
DATA FLPRJTDATA&VAR2.;
      SET PROJECT(KEEP = SEQNUMT STRATUM PROVWT_C &VAR1. &VAR2.);
RUN;

/*** SORT DATA BY VARIABLES IN THE BY STATEMENT YOU INTEND TO ESTIMATE ***/
PROC SORT DATA = FLPRJTDATA&VAR2.;
      BY &VAR2.;
RUN;

/*** ODS OUTPUT TO CREATE A SAS DATA SET FOR ESTIMATES NEEDED ***/
ODS OUTPUT STATISTICS=SAS_EST&VAR2.;

/*** USING SAS SURVEYMEANS TO ESTIMATE VACCINATION COVERAGE ***/
PROC SURVEYMEANS DATA = FLPRJTDATA&VAR2. NOBS SUM MEAN STDERR CLM;
      STRATUM STRATUM; /*** STRATUM VARIABLE FOR VARIANCE ESTIMATION ***/
      CLUSTER SEQNUMT; /*** UNIQUE TEEN IDENTIFIER ***/
      WEIGHT PROVWT_C; /*** FINAL DUAL-FRAME PROVIDER-PHASE WEIGHT (EXCLUDES
TERRITORIES) ***/
      CLASS &VAR1.;
      VAR &VAR1.;
      BY &VAR2.;
RUN;

/*** THIS PROCEDURE DISPLAYS ALL THE VARIABLE NAMES IN THE DATA SET IN
ALPHABETICAL ORDER ***/
PROC CONTENTS DATA = SAS_EST&VAR2. SHORT;
RUN;

DATA SAS_ESTV1&VAR2.;
      SET SAS_EST&VAR2.;
      MEAN = MEAN*100; *CONVERT TO PERCENT ESTIMATES;
      STDERR = STDERR*100; *CONVERT TO PERCENT ESTIMATES;
      LOWERCLMEAN = LOWERCLMEAN*100;*CONVERT TO PERCENT ESTIMATES;
      UPPERCLMEAN = UPPERCLMEAN*100;*CONVERT TO PERCENT ESTIMATES;

      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 MYVARCOUNT MYVARNUM MYVARIABLE MEAN STDERR
LOWERCLMEAN UPPERCLMEAN MYRESULTS;
      LENGTH MYVARIABLE $30.0 ;
      SET SAS_ESTV1&VAR2.;
      WHERE VARLEVEL IN ("1");
```

```
      MYVARCOUNT = &VAR4.;
      MYVARNUM = &VAR2.;
      MYVARIABLE = PUT(&VAR2.,&VAR3.);



      KEEP VARNAME VARLEVEL MYVARCOUNT MYVARNUM MYVARIABLE MEAN STDERR
LOWERCLMEAN UPPERCLMEAN MYRESULTS;
RUN;

PROC PRINT DATA=SAS_ESTV2&VAR2. NOOBS LABEL;
      FORMAT MYVARNUM &VAR3.;
      FORMAT MEAN STDERR 5.2;
      VAR MYVARNUM MEAN STDERR MYRESULTS;
      LABEL
      MEAN='PERCENT UP-TO-DATE'
      STDERR='STANDARD ERROR'
      MYRESULTS = "WEIGHTED PERCENT AND 95% C.L.";
      TITLE "&VAR1. ESTIMATES BY ESTIMATION DEMOGRAPHIC VARIABLE";
RUN;

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

%MEND MYESTIMATES;

%MYESTIMATES(P_UTDHPV_15INT, NEWAGE, MYAGE., 1, "AGE IN YEARS OF SELECTED
TEEN");
%MYESTIMATES(P_UTDHPV_15INT, SEX, FMTSEX., 2, "SEX OF TEEN");
%MYESTIMATES(P_UTDHPV_15INT, MYRACEETH, FMTRACE., 3, "RACE/ETHNICITY OF TEEN
WITH MULTIRACE CATEGORY (RECODE)");
%MYESTIMATES(P_UTDHPV_15INT, EDUC1, FMTMEDU., 4, "EDUCATION LEVEL OF MOTHER
WITH 4 CATEGORIES (RECODE)");
%MYESTIMATES(P_UTDHPV_15INT, MARITAL2, FMTMARRY., 5, "MARITAL STATUS OF
MOTHER (RECODE)");
%MYESTIMATES(P_UTDHPV_15INT, AGEGRP_M_I, FMTMAGRP., 6, "MOTHER'S AGE
CATEGORIES (RECODE)");
%MYESTIMATES(P_UTDHPV_15INT, MYINCTOPOV, FMTINCPR., 7, "(INCOME TO POVERTY
RATIO: IMPUTED (RECODE)");
%MYESTIMATES(P_UTDHPV_15INT, INS_STAT2_I, FMTINS., 8, "INSURANCE STATUS
(PRIVATE ONLY/ANY MEDICAID/
                                                    OTHER INSURANCE/UNINSURED):
IMPUTED");
%MYESTIMATES(P_UTDHPV_15INT, MYCKUP1112, FMTCKUP., 9, "DID TEEN HAVE AN 11-12
YEAR OLD WELL-CHILD EXAM OR
                                                    CHECK-UP?");
%MYESTIMATES(P_UTDHPV_15INT, CEN_REG, FMTCENREG., 10, "CENSUS REGION BASED ON
TRUE STATE OF RESIDENCE");
%MYESTIMATES(P_UTDHPV_15INT, MYFACILITY, FMTFACTY., 11, "FACILITY TYPES FOR
TEEN'S PROVIDERS");


DATA PUF.FINALTABLE2;
      SET FINALTABLE2;
RUN;
PROC EXPORT DATA = FINALTABLE2 OUTFILE= "&MYPATH.\TABLE2\FINALTABLE2.xls"
```

```
      DBMS=EXCEL REPLACE;
RUN;


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

/****** MODEL 2 ODDS RATIO PROGRAM *********/
%MACRO MYODDSRATIO(VAR1, VAR2, VAR3, VAR4, DESCRIPTION);
PROC SURVEYLOGISTIC DATA = PROJECT;
    STRATA  STRATUM; /*** STRATUM VARIABLE FOR VARIANCE ESTIMATION ***/
    CLUSTER SEQNUMT; /*** UNIQUE TEEN IDENTIFIER ***/
    WEIGHT PROVWT_C; /*** FINAL DUAL-FRAME PROVIDER-PHASE WEIGHT (EXCLUDES
TERRITORIES) ***/
      DOMAIN PDAT2;    /*** ADEQUATE PROVIDER DATA FLAG ***/

      CLASS &VAR3.;

    MODEL  P_UTDHPV_15INT(EVENT = "1") = &VAR1.;

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

/*** CREATING RESULTS FOR ODDS RATIOS ***/

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 MYVARCOUNT NEWEFFECT MYRESULTS MYESTMATE CONINTELFL;
      LENGTH MYVARIABLE NEWEFFECT $20.;
      SET MYORESTV1&VAR1.;

      MYVARCOUNT = &VAR4.;

      KEEP MYVARCOUNT NEWEFFECT MYRESULTS MYESTMATE CONINTELFL;
RUN;

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

```
/*** CREATING RESULTS FOR SIGNIFICANCE T-TESTS AND P-VALUES WITHIN MODEL
VARIABLES  ***/

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

DATA MYUNADJPARAESTV1&VAR1.;
      RETAIN MYVARNUM VARIABLE EFFECT MYVARIABLE MYTVALUE MYPROBT;
      LENGTH MYVARIABLE $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;
            MYVARIABLE = PUT(EFFECT, &VAR2.);
            MYVARNUM = &VAR4.;
      END;

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

      KEEP MYVARNUM VARIABLE EFFECT MYVARIABLE MYTVALUE MYPROBT;
RUN;

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


/*** CREATING RESULTS FOR TYPE III TEST OF EFFECT FOR MODELS  ***/

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

      MYVARCOUNT = &VAR4.;

      NEWEFFECT = EFFECT;

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

      KEEP MYVARCOUNT NEWEFFECT MYWALDCHISQ MYPROBCHISQ;
RUN;

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

%MEND MYODDSRATIO;

%MYODDSRATIO(NEWAGE, MYAGE., NEWAGE(PARAM=REF REF="5"), 1, "AGE IN YEARS OF
SELECTED TEEN");
%MYODDSRATIO(SEX, FMTSEX., SEX(PARAM=REF REF="2"), 2, "SEX OF TEEN");
```

```
%MYODDSRATIO(MYRACEETH, FMTRACE., MYRACEETH(PARAM=REF REF="1"), 3,
"RACE/ETHNICITY OF TEEN WITH
                                                                    MULTIRACE
CATEGORY (RECODE)");
%MYODDSRATIO(EDUC1, FMTMEDU., EDUC1(PARAM=REF REF="1"), 4, "EDUCATION LEVEL
OF MOTHER WITH 4 CATEGORIES
                                                              (RECODE)");
%MYODDSRATIO(MARITAL2, FMTMARRY., MARITAL2(PARAM=REF REF="1"), 5, "MARITAL
STATUS OF MOTHER (RECODE)");
%MYODDSRATIO(AGEGRP_M_I, FMTMAGRP., AGEGRP_M_I(PARAM=REF REF="1"), 6,
"MOTHER'S AGE CATEGORIES (RECODE)");
%MYODDSRATIO(MYINCTOPOV, FMTINCPR., MYINCTOPOV(PARAM=REF REF="1"), 7,
"(INCOME TO POVERTY RATIO: IMPUTED

                           (RECODE)");
%MYODDSRATIO(INS_STAT2_I, FMTINS., INS_STAT2_I(PARAM=REF REF="1"), 8,
"INSURANCE STATUS (PRIVATE ONLY/ANY

      MEDICAID/OTHER INSURANCE/UNINSURED): IMPUTED");
%MYODDSRATIO(MYCKUP1112, FMTCKUP., MYCKUP1112(PARAM=REF REF="1"), 9, "DID
TEEN HAVE AN 11-12 YEAR OLD

                          WELL-CHILD EXAM OR CHECK-UP?");
%MYODDSRATIO(CEN_REG, FMTCENREG., CEN_REG(PARAM=REF REF="1"), 10, "CENSUS
REGION BASED ON TRUE STATE OF

                     RESIDENCE");
%MYODDSRATIO(MYFACILITY, FMTFACTY., MYFACILITY(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.xls"
                  DBMS=EXCEL REPLACE;
RUN;

DATA PUF.MYUNADJPARATTEST;
      SET MYUNADJPARATTEST;
RUN;

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

DATA PUF.MYTYPE3TEST;
      SET MYTYPE3TEST;
RUN;

PROC EXPORT DATA = MYTYPE3TEST OUTFILE
="&MYPATH.\TABLE3\MYTYPE3TESTTABLE3.xls"
                  DBMS=EXCEL REPLACE;
```

```
RUN;



/*************************************************************************
**********************/
/*** THIS PROGRAM PRODUCES THE DISTRIBUTION OF WEIGHTED FREQUENCIES FOR EACH
VARIABLE OF INTEREST ***/
/***      AND THE CHI-SQUARE STATISTICS AND P-VALUE FOR EACH VARIABLE OF
INTEREST.                  ***/
/*************************************************************************
**********************/

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

TITLE1 "FITTING A LOGISTIC REGRESSION MODEL ACCOUNTING FOR COMPLEX SURVEY
DESIGN FEATURES";
TITLE2 'USING NIS-TEEN PUBLIC USER FILES 2020 AND UNGROUPED AGES (13 TO 17
YEARS) AT INTERVIEW';

PROC SURVEYLOGISTIC DATA = PROJECT;
    STRATA  STRATUM; /*** STRATUM VARIABLE FOR VARIANCE ESTIMATION ***/
    CLUSTER SEQNUMT; /*** UNIQUE TEEN IDENTIFIER ***/
    WEIGHT PROVWT_C; /*** FINAL DUAL-FRAME PROVIDER-PHASE WEIGHT (EXCLUDES
TERRITORIES) ***/
      DOMAIN PDAT2;     /*** ADEQUATE PROVIDER DATA FLAG ***/

      CLASS NEWAGE(PARAM=REF REF="5") SEX(PARAM=REF REF="2")
MYRACEETH(PARAM=REF REF="1")
              EDUC1(PARAM=REF REF="1") MARITAL2(PARAM=REF REF="1")
AGEGRP_M_I(PARAM=REF REF="1")
          MYINCTOPOV(PARAM=REF REF="1") INS_STAT2_I(PARAM=REF REF="1")
MYCKUP1112(PARAM=REF REF="1")
              CEN_REG(PARAM=REF REF="1") MYFACILITY(PARAM=REF REF="1");

    MODEL  P_UTDHPV_15INT(EVENT = "1") = NEWAGE SEX MYRACEETH EDUC1 MARITAL2
AGEGRP_M_I MYINCTOPOV
                                                    INS_STAT2_I MYCKUP1112
CEN_REG MYFACILITY;

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

/*** CREATING RESULTS FOR ODDS RATIOS ***/

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.xls"
                  DBMS=EXCEL REPLACE;
RUN;

/*** CREATING RESULTS FOR SIGNIFICANCE T-TESTS AND P-VALUES WITHIN MODEL
VARIABLES  ***/

PROC CONTENTS DATA = MYADJPARAEST SHORT;
RUN;

DATA MYADJPARAESTV1;
      RETAIN MYVARNUM VARIABLE EFFECT MYVARIABLE MYTVALUE MYPROBT;
      LENGTH MYVARIABLE $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 ("NEWAGE") THEN DO;
            MYVARIABLE = PUT(EFFECT, MYAGE.);
            MYVARNUM = 1;
      END;
      ELSE IF VARIABLE IN ("SEX") THEN DO;
            MYVARIABLE = PUT(EFFECT, FMTSEX.);
            MYVARNUM = 2;
      END;
      ELSE IF VARIABLE IN ("MYRACEETH") THEN DO;
            MYVARIABLE = PUT(EFFECT, FMTRACE.);
            MYVARNUM = 3;
      END;
      ELSE IF VARIABLE IN ("EDUC1") THEN DO;
            MYVARIABLE = PUT(EFFECT, FMTMEDU.);
            MYVARNUM = 4;
      END;
      ELSE IF VARIABLE IN ("MARITAL2") THEN DO;
            MYVARIABLE = PUT(EFFECT, FMTMARRY.);
            MYVARNUM = 5;
      END;
      ELSE IF VARIABLE IN ("AGEGRP_M_I") THEN DO;
```

```
            MYVARIABLE = PUT(EFFECT, FMTMAGRP.);
            MYVARNUM = 6;
      END;
      ELSE IF VARIABLE IN ("MYINCTOPOV") THEN DO;
            MYVARIABLE = PUT(EFFECT, FMTINCPR.);
            MYVARNUM = 7;
      END;
      ELSE IF VARIABLE IN ("INS_STAT2_I") THEN DO;
            MYVARIABLE = PUT(EFFECT, FMTINS.);
            MYVARNUM = 8;
      END;
      ELSE IF VARIABLE IN ("MYCKUP1112") THEN DO;
            MYVARIABLE = PUT(EFFECT, FMTCKUP.);
            MYVARNUM = 9;
      END;
      ELSE IF VARIABLE IN ("CEN_REG") THEN DO;
            MYVARIABLE = PUT(EFFECT, FMTCENREG.);
            MYVARNUM = 10;
      END;
      ELSE IF VARIABLE IN ("MYFACILITY") THEN DO;
            MYVARIABLE = PUT(EFFECT, FMTFACTY.);
            MYVARNUM = 11;
      END;

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

      KEEP MYVARNUM VARIABLE EFFECT MYVARIABLE MYTVALUE MYPROBT;
RUN;

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

/*** CREATING RESULTS FOR TYPE III TEST OF EFFECT FOR MODELS  ***/

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.xls"
                  DBMS=EXCEL 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 2020 AND UNGROUPED AGES (13 TO 17
YEARS) AT INTERVIEW';

PROC SURVEYLOGISTIC DATA = PROJECT;
    STRATA  STRATUM; /*** STRATUM VARIABLE FOR VARIANCE ESTIMATION ***/
    CLUSTER SEQNUMT; /*** UNIQUE TEEN IDENTIFIER ***/
    WEIGHT PROVWT_C; /*** FINAL DUAL-FRAME PROVIDER-PHASE WEIGHT (EXCLUDES
TERRITORIES) ***/
      DOMAIN PDAT2;    /*** ADEQUATE PROVIDER DATA FLAG ***/

      CLASS NEWAGE(PARAM=REF REF="5") EDUC1(PARAM=REF REF="1")
MYCKUP1112(PARAM=REF REF="1") SEX(PARAM=REF REF="2")
             CEN_REG(PARAM=REF REF="1") MYRACEETH(PARAM=REF REF="1")
MYFACILITY(PARAM=REF REF="1") INS_STAT2_I(PARAM=REF REF="1");

    MODEL  P_UTDHPV_15INT(EVENT = "1") = NEWAGE EDUC1 MYCKUP1112 CEN_REG
MYFACILITY SEX MYRACEETH INS_STAT2_I;

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

/*** CREATING RESULTS FOR ODDS RATIOS ***/

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.xls"
                  DBMS=EXCEL REPLACE;
```

```
RUN;

/*** CREATING RESULTS FOR SIGNIFICANCE T-TESTS AND P-VALUES WITHIN MODEL
VARIABLES  ***/

PROC CONTENTS DATA = MYADJPARAEST SHORT;
RUN;

DATA MYADJPARAESTML4V1;
      RETAIN MYVARNUM VARIABLE EFFECT MYVARIABLE MYTVALUE MYPROBT;
      LENGTH MYVARIABLE $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 ("NEWAGE") THEN DO;
            MYVARIABLE = PUT(EFFECT, MYAGE.);
            MYVARNUM = 1;
      END;
      ELSE IF VARIABLE IN ("EDUC1") THEN DO;
            MYVARIABLE = PUT(EFFECT, FMTMEDU.);
            MYVARNUM = 2;
      END;
      ELSE IF VARIABLE IN ("MYCKUP1112") THEN DO;
            MYVARIABLE = PUT(EFFECT, FMTCKUP.);
            MYVARNUM = 3;
      END;
      ELSE IF VARIABLE IN ("CEN_REG") THEN DO;
            MYVARIABLE = PUT(EFFECT, FMTCENREG.);
            MYVARNUM = 4;
      END;
      ELSE IF VARIABLE IN ("INS_STAT2_I") THEN DO;
            MYVARIABLE = PUT(EFFECT, FMTINS.);
            MYVARNUM = 8;
      END;
      ELSE IF VARIABLE IN ("MYFACILITY") THEN DO;
            MYVARIABLE = PUT(EFFECT, FMTFACTY.);
            MYVARNUM = 5;
      END;
      ELSE IF VARIABLE IN ("SEX") THEN DO;
            MYVARIABLE = PUT(EFFECT, FMTSEX.);
            MYVARNUM = 2;
      END;
      ELSE IF VARIABLE IN ("MYRACEETH") THEN DO;
            MYVARIABLE = PUT(EFFECT, FMTRACE.);
            MYVARNUM = 3;
      END;

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

      KEEP MYVARNUM VARIABLE EFFECT MYVARIABLE MYTVALUE MYPROBT;
RUN;
```

```
PROC EXPORT DATA = MYADJPARAESTML4V1 OUTFILE
="&MYPATH.\TABLE3\MULTILOGTTESTTABLE3ML4.xls"
                  DBMS=EXCEL REPLACE;
RUN;

/*** CREATING RESULTS FOR TYPE III TEST OF EFFECT FOR MODELS  ***/

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.xls"
                  DBMS=EXCEL REPLACE;
RUN;
```