National Immunization Survey-Child

A User's Guide for the 2018 Public-Use Data File

Centers for Disease Control and Prevention

National Center for Immunization and Respiratory Diseases

Presented by:

NORC at the University of Chicago

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Convention for Bolding Text

The Data User's Guide uses **bold** font to highlight substantive changes in the methodology or study design from the previous year's Guide.

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1. Introduction

In 1992, the Childhood Immunization Initiative (CII) (CDC 1994) was established to 1) improve the delivery of vaccines to children; 2) reduce the cost of childhood vaccines; 3) enhance awareness, partnerships, and community participation; 4) improve vaccinations and their use; and 5) monitor vaccination coverage and occurrences of disease. Subsequently, the Healthy People 2020 objectives established a target of having at least 90% of 2-year-old children fully vaccinated with most recommended vaccines (targets are 85% for HepA and the birth dose of HepB, and 80% for rotavirus) and 80% of 2-year-old children vaccinated with the basic immunization series. To fulfill the CII mandate of monitoring vaccination coverage and marking progress toward achieving those objectives, the National Immunization Survey - Child (NIS-Child) was implemented by the National Center for Immunization and Respiratory Diseases (NCIRD) and the National Center for Health Statistics (NCHS) of the Centers for Disease Control and Prevention (CDC) in 1994. From 1994 to 2014, the NIS-Child was conducted jointly by NCIRD and NCHS; since 2015, the NIS-Child has been conducted by NCIRD.

The target population for the NIS-Child is non-institutionalized children aged 19 through 35 months living in United States households at the time of the interview. The official coverage estimates reported from the NIS-Child are proportions of children up-to-date with respect to the requisite numbers of doses of all routinely recommended vaccines for this age group (Robinson et al. 2018). These vaccines and their recommended numbers of doses are:

- diphtheria and tetanus toxoids and acellular pertussis vaccine adsorbed, diphtheria and tetanus toxoids and pertussis vaccine, or diphtheria and tetanus toxoids adsorbed (DTaP/DTP/DT) – 4 doses;
- poliovirus vaccine (polio) – 3 doses;
- measles, mumps, and rubella vaccine (MMR) – 1 dose;

- *Haemophilus influenzae* type b conjugate vaccine (Hib) – 3 or 4 doses depending on product type;
- hepatitis B vaccine (Hep B) – 3 doses;
- varicella (chicken pox) vaccine (varicella) – 1 dose;
- pneumococcal conjugate vaccine (PCV) – 4 doses;
- hepatitis A vaccine (Hep A) – 2 doses;
- influenza vaccine; (For the recommended number of doses of influenza vaccine and other vaccines, see http://www.cdc.gov/vaccines/hcp/acip-recs/vacc-specific/index.html.)
- rotavirus vaccine (RV) – 2 or 3 doses depending on product type.

In addition to these vaccines, interest focuses on the combined vaccine series 4:3:1:3*:3:1:4 (4+ DTaP/DTP/DT; 3+ polio; 1+ measles-containing vaccine (MCV); full series Hib, i.e., 3 or 4 doses depending on type of vaccine received; 3+ Hep B; 1+ varicella at or after 12 months of age; and 4+ PCV).

The NIS-Child collects data on each of these vaccines. Varicella vaccine was added in Quarter 3, 1996, pneumococcal conjugate vaccine in Quarter 4, 2000, influenza vaccine and hepatitis A vaccine in Quarter 1, 2003, and rotavirus vaccine in Quarter 3, 2007. The remainder of the vaccines have been included in the NIS-Child from its start in 1994. Information about current and past recommendations for each vaccine can be found at https://www.cdc.gov/vaccines/hcp/acip-recs/index.html.

The NIS-Child uses random digit dialing (RDD) telephone survey methodology to identify households containing children in the target age range, and interviews are conducted with the adult who is most knowledgeable about the child's vaccinations. With consent of the child's parent or guardian, the NIS-Child also contacts (by mail) the child's health care provider(s) to request information on vaccinations from the child's medical records. Since 2005, NIS-Child sampling, data collection, and weighting operations have been conducted by NORC at the University of Chicago.

Samples of telephone numbers are drawn independently, for each calendar quarter, within selected geographical areas, or strata. In 2018, there are 59 geographic strata for which vaccination coverage levels can be estimated (see Table F.1), including 7 local areas; the remaining 52 estimation areas are either an entire state, the District of Columbia, a territory (Guam), or a "rest of state" area. For states with "rest of state" or local estimation areas, estimates for the whole-state area can be produced as well. This design makes it possible to produce annual estimates of vaccination coverage levels for each state or territory, each "rest of state" area, the District of Columbia, and for each of the 7 local estimation areas with a specified degree of precision (a coefficient of variation of approximately 7.5%). Further, by using the same data collection methodology and survey instruments in all estimation areas, the NIS-Child produces comparable vaccination coverage levels among estimation areas and over time.

When the NIS-Child was established in 1994, 78 areas were chosen for sampling strata, including the 50 states, 6 urban areas that receive federal Section 317 immunization grants (Bexar County, TX; Chicago, IL; District of Columbia; Houston, TX; New York City, NY; Philadelphia County, PA), and 22 other urban areas. These areas were called "Immunization Action Plan" (IAP) areas in reference to plans developed to improve vaccination coverage following the resurgence of measles during 1989-1991. In 2005 and 2006, selected non-awardee IAP areas – areas that do not receive separate Section 317 funds – were "rotated off" (i.e., sample design no longer ensured adequate sample size to produce estimates for the area), and replaced by new areas "rotated on" (i.e., sample design ensured adequate sample size to produce estimates for the area). Starting in 2007, the base NIS-Child geographic strata included 56 areas (5 sub-state awardee urban areas, the District of Columbia, and 50 state or "rest of state" areas). In addition, starting in 2007, state immunization programs could choose additional city/county areas of interest to have adequate sample size to produce estimates for the area, using their Section 317 funds. **In 2018, three additional areas were chosen: Hidalgo County, TX; Tarrant County, TX; and Guam.** As noted throughout this report, several of the sampling, data collection, and estimation procedures differed for Guam when compared to the rest of the United States.

The 59 = 56 + 2 + 1 (territory) areas are called *estimation areas*. Table 10 in Section 8 shows a cross-walk of estimation areas between years.

Data for Guam are not included in the 2018 public-use data file to protect respondent confidentiality, as the sampling fraction was large in this small-population area. Interested researchers can access data for Guam by submitting a proposal and working through the NCHS Research Data Center. The link and guidelines for developing a proposal are located at the following URL: www.cdc.gov/rdc. **Data for the U.S. Virgin Islands and Puerto Rico are not available for 2018, as data collection did not occur in these areas due to hurricane damage sustained the previous year.**

To maintain consistency with past NIS-Child public-use data files, or PUFs, variable names and descriptions continue to use the term "IAP" to designate areas included as strata, which was the term used prior to 2008. The changing geographic strata over time will not cause a problem with bias in estimation of state and national coverage levels since the geographic strata are nested within state.

In 2018, the NIS-Child utilized a single-frame cell-phone sampling design, with telephone numbers sampled only from a sampling frame of cell-phone numbers. Prior to 2011, the NIS-Child was based on a landline telephone sample. A cell-phone sample was added to the survey in 2011 in order to address the rapid rise of cell-phone-only households. As cell-phone penetration has increased, fewer and fewer households, especially households with children, have relied only on a landline telephone. Because the proportion of households with children that are reachable only by landline telephone is now very small – only 2% in 2018 (Blumberg and Luke 2019) – the landline sample was dropped beginning in 2018, and the 2018 NIS-Child used only a cell-phone sample. Data from the 2016 and 2017 NIS-Child, which included both a landline and a cell-phone sample, were used to evaluate the impact of removing the landline sample on estimates of vaccination coverage (Hill et al., 2019a). Nationally, there were no significant differences in vaccination coverage among children 19-35 months old when comparing single-frame estimates with dual-frame estimates in survey year

2016 or 2017. At the state level, the median difference between dual-frame and single-frame design estimates of vaccination coverage was -0.2 percentage points in survey year 2016 and 0.0 percentage points in survey year 2017 for the combined 7-vaccine series. The majority of the differences in state-level estimates were between -2.0 and 2.0 percentage points for both years.

For the 2018 NIS-Child, telephone interviewing began on January 11, 2018 and ended on January 31, 2019. Provider data collection extended from February 2018 to April 2019. A total sample (including sample from Guam) of approximately 22.9 million telephone numbers yielded household interviews for 29,353 children, 15,883 of whom had adequate provider data (provider-reported vaccination data adequate to determine whether the child was up-to-date with respect to the recommended immunization schedule). The 2018 NIS-Child public-use data file (which does not include data for Guam) contains data for 28,971 children with completed household interviews, and more extensive data (e.g. provider-reported vaccinations and facility data) for 15,657 children with adequate provider data (including 302 unvaccinated children). Data were collected in Guam in 2018, although children in this area are not included on the public-use data file in order to protect confidentiality.

In 2012, to reduce the length of the household interview, decrease respondent burden, and potentially improve response rates, the NIS-Child household questionnaire was modified. Official NIS-Child vaccination coverage estimates are based on the provider-reported vaccination histories for each child. Among children with data received from vaccination providers identified in the household interview, it must be determined which children have "adequate provider data," that is, which children have provider data adequate to determine whether the child is up to date with respect to the recommended immunization schedule. Beginning in 2012, questions that were previously used to define adequate provider data were no longer available. With this questionnaire change, it was no longer possible to use the same definition of adequate provider data as was used prior to 2012, and so beginning in 2012 all children with any

provider-reported vaccination data are considered to have adequate provider data. See the user's guide for the 2014 NIS-Child public-use data file (NCHS 2015a) for more detail about this change and its impact.

The weights included in this public-use data file afford the data analyst the capability of conducting several different types of analyses, depending on interests and aims. One can choose to analyze all children with completed household interviews or only the subset of children for whom the provider-reported data are adequate. Previous NIS-Child public-use data files have also provided analysts with these capabilities. Section 6 of this user's guide provides information about the creation of the weight variables included in the 2018 NIS-Child public-use data file, and Section 8 provides guidance for their use.

Vaccination coverage estimates are available on the *ChildVaxView* website, https://www.cdc.gov/vaccines/imz-managers/coverage/childvaxview/index.html. An article summarizing key findings from the NIS-Child data, as published in the *Morbidity and Mortality Weekly Report (MMWR)*, will also be available on this website. **Historically, these estimates have been based on NIS-Child data collected in a single survey year (e.g., the 2018 NIS-Child) and applied to the population of children age 19-35 months; beginning in 2018, the estimates on *ChildVaxView* and in the MMWR are based on data pooled over 2-3 survey years (e.g., the 2016-2018 NIS-Child surveys) and apply to the population of children in particular annual birth cohorts (e.g., children born in 2015 or 2016). This cohort-based approach to estimating vaccination coverage has been described by Singleton et al., (2019) and Singleton (2019).**

The 2018 NIS-Child public-use file and this user's guide focus on a single survey year (2018) and producing vaccination coverage estimates for children age 19-35 months in 2018. Therefore, estimates produced from this public-use file will differ from cohort-based estimates on *ChildVaxView* and in the MMWR.

The accompanying codebook (NCIRD 2020) documents the contents of the 2018 NIS-Child public-use data file. For reference, Appendix E (Alphabetical Listing of Variables in the 2004-2018 Public-Use Data Files) provides a full list of variables in the 2018 and previous NIS-Child public-use data files.

Additional information on the NIS-Child is available at: http://www.cdc.gov/vaccines/imz-managers/nis/about.html.

For additional information on the NIS-Child public-use data file, please contact the NCIRD Information Dissemination Staff:

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Internet: http://www.cdc.gov/vaccines/imz-managers/nis/index.html

2. Sample Design

The NIS-Child uses two phases of data collection to obtain vaccination information for a large national probability sample of young children: an RDD telephone survey designed to identify households with children 19 through 35 months of age, followed by the Provider Record Check, a mailed survey to children's vaccination providers. This section summarizes these two phases of data collection. Other descriptions of the sample design are given by Ezzati-Rice et al. (1995), Zell et al. (2000), Smith et al. (2001a, 2005), and Wolter et al. (2017a).

2.1. The NIS-Child RDD Telephone Survey

The NIS-Child RDD telephone survey phase uses independent, quarterly samples of telephone numbers. Sampling frames were provided by Marketing Systems Group (MSG). Cell-phone numbers were sampled within estimation areas in each quarter of 2018. Table F.1 (in Appendix F) lists the estimation areas for the 2018 NIS-Child by state and shows the estimated number of children living in each state and estimation area in 2018.

Prior to 2011, the NIS-Child used a single-frame landline RDD sample design. In 2011, a cell-phone sample was added, and from 2011-2017, the NIS-Child used a dual-frame landline and cell-phone RDD sample design. In 2018, the landline sample was dropped, and the NIS-Child now uses a single-frame cell-phone RDD sample design.

The target sample size of completed telephone interviews in each estimation area is designed to achieve an approximately equal coefficient of variation of 7.5% for an estimator of vaccination coverage derived from provider-reported vaccination histories, given a true coverage parameter of 50%. Cell-phone sample sizes were chosen to meet the target coefficient of variation of 7.5%.

In 2018, including Guam sample, 54.1% of children with a completed household interview were determined to have adequate provider data. Excluding Guam, this proportion was 54.0%. The

percentage of children with adequate provider data varies among the non-territory estimation areas (from 45.2% in Mississippi to 61.1% in Utah). The phrase "adequate provider data" originally meant that sufficient vaccination history information was obtained from the provider(s) to determine whether the child is up-to-date with respect to the recommended vaccination schedule. Starting with the 2002 NIS-Child public-use data file, the definition of children with adequate provider data was expanded to include unvaccinated children. These are children for whom either (1) the respondent reported during the household interview that the child had received no vaccinations and has no providers, or (2) the respondent reported during the household interview that the child had received no vaccinations but has one or more providers, and those providers all reported administering no vaccinations. An NCHS Series 2 Report on the statistical methodology of the NIS-Child (Smith et al. 2005) includes details of how unvaccinated children are included in the estimates of vaccine coverage. This report can be viewed at http://www.cdc.gov/nchs/data/series/sr_02/sr02_138.pdf. This modification to the NIS-Child produces only small changes in vaccination coverage for estimation areas and states, because the number of unvaccinated children in the sample is very small (**only 304 in 2018**, including Guam). As described in the introduction, the definition of adequate provider data was modified in 2012 to include all children with provider-reported vaccination data, plus unvaccinated children.

The design and implementation of the NIS-Child cell-phone sample involves three procedures. First, statistical models predict the number of sample telephone numbers needed in each estimation area to meet the target precision requirements. Second, the sample for an estimation area is divided into random sub-samples called replicates. By releasing replicates as needed, it is possible to spread the interviews for each sampling area evenly across the entire calendar quarter. Third, an automated procedure eliminates numbers on the NIS do-not-call list from the sample before the interviewers dial them.

In 2014 and 2015, an automated process was implemented to remove cell-phone numbers flagged as having no recent activity and that were therefore very likely to be non-working cell phones. In 2016, a different automated process found to be more efficient in removing non-working cell-phone numbers was

used. Following a July 2016 Federal Communications Commission (FCC) declaratory ruling (FCC 16-72, CG Docket No. 02-278) stating that the federal government and contractors working on behalf of the federal government are not subject to the restrictions on cell-phone dialing in the Telephone Consumer Protection Act of 1991 (TCPA, 47 U.S.C. 227), the NIS transitioned from manual dialing of cell phones to auto-dialing cell phones in November 2016. After this transition, the automated process to remove non-working cell-phone numbers was no longer cost effective, and beginning in 2017 this process was no longer used in the cell-phone sample.

2.2. The NIS-Child Provider Record Check

At the end of the household interview, consent to contact the child's vaccination provider(s) is requested from the parent/guardian. When oral consent is obtained, each provider is mailed an immunization history questionnaire. This mail survey portion of the NIS-Child is the Provider Record Check (PRC).

The instructions ask vaccination providers to mail or fax the immunization history questionnaire back upon completion. Two weeks after the initial mailing, a telephone call is made to providers who have still not responded, to remind and encourage them to complete the form and either mail or fax the information back. In some instances, provider-reported vaccination histories are completed over the telephone. The data from the questionnaires are edited, entered, cleaned, and merged with the household information from the RDD survey to produce a child-level record.

2.3. Summary of Data Collection

Table 1 presents selected operational results of NIS-Child data collection for calendar year 2018. To facilitate comparisons with prior years, the numbers in Table 1 and discussed in this section exclude the U.S. territory samples. **Children aged 19 through 35 months during 2018 data collection were born between January 2015 and May 2017.**

The total cell-phone sample (in replicates that were released for use) consisted of 22,600,251 telephone numbers. Of those, 78,811 were eliminated before release to the telephone centers as numbers on the NIS do-not-call list. The remaining 22,521,440 numbers were sent to the telephone centers to be dialed, and 1,564,907 active personal cell-phone numbers (APCNs) were identified, as shown in Row F. Among the identified APCNs, 1,329,275 (84.9%) were successfully screened. Of these, 39,935 (3.0%) were deemed eligible for the NIS-Child interview. Among the identified eligible respondents, 28,066 (70.3%) completed the interview.

A standard approach for measuring response rates in telephone surveys has been defined by the Council of American Survey Research Organizations (CASRO 1982). The CASRO response rate is equivalent to "RR3" of AAPOR Standard Definitions (AAPOR 2016). **In 2018, the CASRO response rate (Table 1, Row J) was 24.6%. The CASRO response rate equals the product of the resolution rate (41.2%, Row E), the screening completion rate (84.9%, Row G), and the interview completion rate among eligible households (70.3%, Row I).** The resolution rate is the percentage of the total telephone numbers selected that are classifiable as non-working, non-residential, or residential. The screening completion rate is the percentage of known households that are successfully screened for the presence of age-eligible children. The interview completion rate is the percentage of households with one or more age-eligible children who complete the household interview.

Row K of Table 1 shows that household interviews were completed on behalf of 28,971 age-eligible children. Rows L through O give results for the Provider Record Check phase. Specifically, Row L gives the rate of obtaining oral consent from household respondents to contact their children's vaccination providers – 63.1% in 2018.

The number of immunization history questionnaires mailed to vaccination providers exceeds the number of completed interviews for children with consent because some children have more than one vaccination provider. **Of the questionnaires mailed to providers of children, 21,220 (94.3%, Row N) were**

returned. Among the children with completed household interviews, 15,657 (54.0%, Row O) had adequate vaccination histories based on provider reporting (15,355) or were determined to be unvaccinated (302). The other 46.0% of children lacked adequate provider data for a variety of reasons, such as the parent did not give consent to contact the child's provider(s), the provider(s) did not have records for the child, or the provider(s) did not report the vaccination history.

In 2018, data from the Health Insurance Module (HIM) were collected. Among the 28,971 children with completed household interviews, 18,929 (65.3%, Row P) completed the HIM.

For each estimation area and each state, Table F.1 (see Appendix F) shows the number of children with completed household interviews and the number of children with adequate provider data.

Table 1: Selected Operational Results of Q1/2018-Q4/2018 NIS-Child Data Collection (Excluding U.S. Territories)

Row	Key Indicator	Cell-Phone Sample		Formula
		Number	Percent	
	Household Phase			
A	Total Selected Telephone Numbers in Released Replicates	22,600,251	--	--
B	Phone Numbers Resolved before Computer-Assisted Telephone Interviewing	78,811	0.3%	B/A
C	Total Phone Numbers Released to Telephone Centers	22,521,440	--	A-B
D	Advance Letters Mailed	0	0.0%	D/C
E	Resolved Phone Numbers[1] – *Resolution Rate*	9,322,476	41.2%	E/A
F	Households Identified – *APCN Rate*[2]	1,564,907	16.8%	F/E
G	Households Successfully Screened[3] – *Screener Completion Rate*	1,329,275	84.9%	G/F
H	Eligible Households – *Eligibility Rate*[4]	39,935	3.0%	H/G
I	Households with Completed Household Interviews – *Interview Completion Rate*	28,066	70.3%	I/H
J	CASRO[5] Response Rate[6]	--	24.6%	--
K	Age-Eligible Children with Completed Household Interviews[7]	28,971	--	--
	Provider Phase			
L	Children with Consent to Contact Vaccination Providers	18,281	63.1%	L/K
M	Immunization History Questionnaires Mailed to Providers	22,511	--	--
N	Immunization History Questionnaires Returned from Providers	21,220	94.3%	N/M
O	Children with Adequate Provider Data	15,657 (includes 302 unvaccinated children)	54.0%	O/K
	Modules			
P	Age-Eligible Children with Completed Household Interview and Completed Health Insurance Module	18,929	65.3%	P/K

[1] Includes phone numbers resolved before CATI (Row B).

[2] Active personal cell-phone number (APCN) rate.

[3] The household screener screens for non-minor-only cell phone households with age-eligible children.

[4] Of the screened households, the proportion that were non-minor-only cell-phone households with age-eligible children.

[5] CASRO, Council of American Survey Research Organizations.

[6] The response rate is the number of households with a completed household interview divided by the estimated number of eligible households in the sample. The number of eligible households in the sample was estimated using the CASRO assumptions; these assumptions are that the rate of households among the unresolved telephone numbers is the same as the observed rate of households among the resolved telephone numbers, and the rate of eligible households among unscreened households is the same as the observed rate of eligible households among screened households. Under these assumptions, the CASRO response rate is equal to the product of the resolution rate, the screener completion rate, and the interview completion rate.

[7] Rows K-P reflect the removal of children with an ineligible best date of birth.

2.4. Informed Consent, Security, and Confidentiality of Information

The advance letter, introduction to the telephone survey, and oral consent assure the respondent of the confidentiality of his/her responses and the voluntary nature of the survey. Informed consent is obtained from the person in the household most knowledgeable about the eligible child's vaccination history (generally the parent or guardian of the child). Informed consent to contact the child's vaccination provider(s) is obtained at the end of the interview.

Information in the NIS-Child is collected and processed under high security. To ensure privacy of the respondents and confidentiality of sensitive information, standards have been established for release of data from this survey. All CDC staff and contractor staff involved with the NIS-Child sign confidentiality agreements and follow instructions to prevent disclosure.

All information in the NIS-Child is collected under strict confidentiality and can be used only for research [Section 308(d) of the Public Health Service Act, 42 U.S. Code 242m(d) and the Privacy Act of 1974 (5 U.S. Code 552a)]. Prior to public release, the contents of the public-use data file go through extensive review by the NCIRD Disclosure Review Board to protect participant privacy as well as data confidentiality.

3. Content of NIS-Child Questionnaires

This section describes the questionnaires used in the 2018 NIS-Child telephone interview of households and in the NIS-Child Provider Record Check.

3.1. Content of the Household Questionnaire

The computer-assisted telephone interview (CATI) questionnaire used in the RDD phase of NIS-Child data collection consists of two parts: a screener to identify households with children aged 19 through 35 months and an interview portion. The questionnaire is modeled on the Immunization Supplement to the National Health Interview Survey (NHIS) (NCHS 1999). The NIS-Child CATI questionnaire has been translated into Spanish, and LanguageLine Solutions® (formerly part of AT&T) is used for real-time translation into many other languages (Wall et al. 1995). Table 2 summarizes the content of each section of the NIS-Child household interview. The CATI questionnaire is available at http://www.cdc.gov/vaccines/imz-managers/nis/datasets.html.

In the screener, the purpose of the survey is explained to the respondent, and the household is screened to determine whether it contains any children aged 19 through 35 months (any child who was or would be aged 19 through 35 months during the calendar quarter is eligible). If the household has an eligible child, the respondent is asked whether he/she is the most knowledgeable person for the child's vaccination history. If the respondent indicates that another person in the household is more knowledgeable, the interviewer asks to speak to him/her at that time. If that person is unavailable to be interviewed, the interview proceeds to Section MR, the name of the most knowledgeable person is recorded, and a "callback" is scheduled for a later date. For the cell-phone sample, prior to screening for age-eligibility, the household is screened to ensure that the cell-phone is used by an adult (i.e., to ensure it is not a minor-only cell phone). If the household has more than one age-eligible child, data are collected for each eligible child.

Table 2: Content of the Household Interview, National Immunization Survey - Child, 2018

Questionnaire Section	Content of Section
Section S	Screening questions to determine NIS-Child eligibility
Section MR	Most-knowledgeable-respondent callback questions
Section B	Ever vaccinated and influenza vaccination questions
Section C	Demographic and socioeconomic questions
Section D	Provider information and request for consent to contact the eligible child's vaccination provider(s)
Section E	Health Insurance Module (HIM)

Prior to Q1/2012, the person being interviewed was asked during the screener section whether he/she had a written record (shot card) of the child's vaccination history and whether it was easily accessible. If a shot card was available, the respondent was asked to provide information directly from it in Section A (which asked respondents with shot cards about the shots on the card). However, beginning in Q1/2012, Section A and most of Section B were eliminated from the regular questionnaire, and therefore all interviews proceeded directly to a reduced form of Section B, which asks the respondent to recall information about the child's influenza vaccinations. In 2015 and 2016, Section A was reinstated for Guam respondents, but was discontinued for all respondents beginning in 2017.

Section C obtains information that includes relationship of respondent to the child, race and Hispanic origin of the child, household income, educational attainment of the mother, and other information on the socioeconomic characteristics of the household and its eligible children.

In Section D of the NIS-Child household interview, identifying information (such as name, address, and telephone number) for the child's vaccination provider(s) is requested, as well as the full names of the child(ren) and the respondent, so that NIS-Child personnel can contact the provider(s) and identify the child(ren) whose immunization information the NIS-Child is requesting. After this information is obtained, consent to contact the child's vaccination provider(s) is requested. When oral consent and

sufficient identifying information are obtained, the immunization history questionnaire is mailed to the child's vaccination provider(s).

Beginning in 2006, a Health Insurance Module (HIM) was administered upon completion of Section D to collect data regarding the types of medical insurance coverage the child has had since birth. If a respondent provided consent to contact medical providers and completed Section D, he/she flowed directly into the HIM. If, however, consent or any other critical provider question was refused, the call was terminated; only upon callback on which consent was granted or a second refusal given within Section D was the respondent asked the HIM.

Some changes were made to the NIS-Child questionnaire during 2018. These are listed below.

- **Year references for income questions were updated to refer to the previous year, 2017. That is, the question text at CFAMINC, C13_DON'T_KNOW, and C13_REFUSED was updated to ask about 2017 income rather than 2016 income.**

- **While one set of questions about influenza vaccinations are asked in Section B throughout the year, additional questions are asked only between April and June and often change year to year; the influenza question responses are not included on the PUF, so the PUF contents are not affected by these changes.**

3.2. Content of the Immunization History Questionnaire (IHQ)

The immunization history questionnaire mailed to the vaccination providers is designed to be simple and brief, to minimize provider burden and encourage survey participation. The structure and content of this form were initially derived from the National Immunization Provider Record Check Study (NHIS/NIPRCS), which collected and reconciled vaccination data from the providers of respondents to the Immunization Supplement to the National Health Interview Survey. The immunization history questionnaire consists of two double-sided pages. Page 1 includes space for a label that gives the child's

name, date of birth, and sex . The remainder of page 1 contains questions about the facility and vaccination provider. Page 2 gives instructions for filling out the shot grid, which appears on page 3. Page 4 thanks the vaccination provider for providing the information, and lists websites and telephone numbers that can be used to obtain more information about the NIS-Child and the NCIRD. The Immunization History Questionnaire is available at http://www.cdc.gov/vaccines/imz-managers/nis/datasets.html.

No changes were made to the NIS-Child IHQ during 2018.

4. Data Preparation and Processing Procedures

The household and provider data collection in the NIS-Child incorporate extensive data preparation and processing procedures. During the household interview, the CATI system supports reconciliation of critical errors as interviewers enter the data. After completion of interviewing for a quarter, post-CATI editing and data cleaning produce a final interview data file. The editing of the provider data begins with a manual review of returned immunization history questionnaires, data entry of the questionnaires, and cleaning of the provider data file. After the provider data are merged with the household interview data and responses from multiple providers for a child are consolidated into a child-level data record, the editing continues. A quality assurance check is performed based on the name, sex, and date-of-birth information from all sources to ensure that the provider completed the questionnaire for the correct child and to confirm age-eligibility. Editing of the provider-reported vaccination dates then attempts to resolve specific types of discrepancies in the provider data. The end product is an analytic file containing household and provider data for use in estimating vaccination coverage.

4.1. Data Preparation

The editing and cleaning of NIS-Child data involve several steps. First, the CATI system enables interviewers to reconcile potential errors while the respondent is on the telephone. Further cleaning and editing take place in a post-CATI clean-up stage, involving an extensive review of data values, cross tabulations, and the recoding of verbatim responses for race and ethnicity. The next step involves the creation of numerous composite variables. Provider data are cleaned in a separate step. After these steps have been completed, imputations are performed for item non-response on selected variables, and weights are calculated. The procedures and rules of the National Health Interview Survey serve as the standard in all stages of data editing and cleaning (http://www.cdc.gov/nchs/nhis.htm).

4.1.1. Editing in the CATI System

The CATI software checks consistency across data elements and does not allow interviewers to enter invalid values. Catching potential errors early increases the efficiency of post-survey data cleaning and processing.

To prevent an overly complicated CATI system, out-of-range and inconsistent responses produce a warning screen, allowing the interviewer to correct real time errors. This allows the interviewer to reconcile errors while respondent is on the telephone. CATI warning screens focus on items critical to the survey, such as those that determine a child's eligibility (e.g., date of birth).

A CATI system cannot simultaneously incorporate every possible type of error check and maximize system performance. To reconcile this trade-off, post-CATI edits are used to resolve problems that do not require access to the respondent, as well as unanticipated logic problems that appear in the data.

4.1.2. Post-CATI Edits

The post-CATI editing process produces final, cleaned data files for each quarter. The steps in this process, implemented after all data collection activities for a quarter are completed, are described below.

Initial Post-CATI Edits and File Creation

After completion of interviewing each quarter, the raw data are extracted from the CATI data system and used to create two files: the sample file and the interview data file. The sample file contains one record for each sample telephone number and summary information for telephone numbers and households. The interview data file contains one record for each eligible sampled child and all data reported for the child during the household survey.

Following creation of these two files, a preliminary analysis of each file identifies out-of-range values and extraneous codes. The first check verifies the eligibility status of children. Once the required corrections are verified, invalid values are replaced with either an appropriate data value or a missing value code.

Frequency Review

After the pre-programmed edits are run, frequency distributions of all variables in each file are produced and reviewed. Each variable's range of values is examined for any invalid values or unusual distributions. If blank values exist for a variable, they are checked to see whether they are allowable and whether they occur in excessive numbers. Any problems are investigated and corrected as appropriate.

File Crosschecks

Crosscheck programs ensure that cases exist across files in a consistent manner. Specifically, checks ensure that each case in the interview data file is also present in the sample file and that each case in the sample file was released to the telephone center. Checks also ensure that no duplicate households exist in the sample file and no duplicate children exist in the interview data file.

When all checks have been performed, the final quarterly interview data file is created. Programmers and statisticians then create composite variables constructed from basic variables for each child. Sampling weights (described in Section 6 of this Guide) are added to each record.

4.1.3. Editing of Provider Data

Six to eight weeks after the close of household data collection for a quarter, the majority of the immunization history questionnaires have been collected from providers. The data from the hard-copy questionnaires are entered and independently re-entered to provide 100% verification. The provider data file is cleaned, in a similar fashion to the household data file, for out-of-range values and consistency. A computer program back-codes "other shot" verbatim responses into the proper vaccine category (e.g., Engerix B counts as Hep B, and Tetramune counts as DTP and Hib). These translations come from a file that contains all such verbatim responses ever encountered in the NIS-Child. Also, the provider data file is checked for duplicate records, and exact duplicates are removed. If the provider data contain a date of birth, sex, or name for the child that differs from the household interview for that child, the questionnaire is re-examined to see whether it may have been filled out for the incorrect child. Provider data that appear to have been filled out for the wrong child are removed from the provider database. When a child has data

from multiple providers, decision rules are applied to produce the most complete picture of the child's vaccination history.

Once these data have been cleaned, they are combined with the household data file. Information from up to five providers can be added to a child's record. If more than one provider reported vaccination data for the child, the data from the multiple provider reports are combined into a single history for the child, called the "synthesized provider-reported vaccination history." The determination of whether the child is up-to-date for recommended vaccines and vaccine series is based on the child's synthesized provider-reported vaccination history.

Many variables in the household data file are checked against or verified with the provider data file. For example, a child's date of birth as recorded by the provider is checked against the date of birth as given by the household, to verify that the provider was reporting for that specific child and to form a "best" date of birth for the child. All children with at least one provider-reported vaccination are considered to have adequate provider data.

4.2. Limitations of Data Editing Procedures

Although data editing procedures were used for the NIS-Child, the data user should be aware that some inconsistent data might remain in the public-use data file. The variables that indicate whether a child is up-to-date on each vaccine or series (on which the estimates of vaccination coverage are based) are derived from provider-reported data, and the NIS-Child does not re-contact households or providers to attempt to reconcile potential discrepancies in provider-reported vaccination dates or to resolve date-of-birth reporting errors. However, beginning with the 1999 NIS-Child, the provider-reported data are manually reviewed and edited to correct specific reporting errors. The *National Immunization Survey: Guide to Quality Control Procedures* (CDC 2002) discusses the change in editing procedures in more detail. Some children with adequate provider data may have incomplete vaccination histories. These incomplete histories arise from three primary sources: 1) the household does not identify all vaccination

providers, 2) some but not all providers respond with vaccination data, and 3) all identified providers respond with vaccination data but fail to list all the vaccinations in the child's medical record. Even with these limitations, the NIS-Child overall is a rich source of data for assessment of up-to-date status and age-appropriate vaccination. Also, the NIS-Child is the only source to provide comparable provider-reported vaccination data across states and local areas in the United States.

4.3. Variable-Naming Conventions

The names of variables follow a systematic pattern as much as possible. The codebook for the public-use data file groups the variables into ten broad categories according to the source of the data (household or provider) and the content of the variable (NCIRD 2020). See Section 7 of this report for detailed information on the contents of the public-use data file.

4.4. Missing Value Codes

Missing value codes for each variable can be found in the codebook (NCIRD 2020). For household variables, the missing value codes usually are 77 for DON'T KNOW and 99 for REFUSED. Some household variables may also contain blanks, if the question was not asked. The variables developed from the immunization history questionnaire generally do not have specific missing value codes.

4.5. Imputation for Item Non-Response

The NIS-Child uses imputation primarily to replace missing values in the socioeconomic and demographic variables used in weighting. Missing values of these variables are imputed for all children with a completed household interview – i.e., all children appearing on the public-use data file. Missing values of health insurance variables are also imputed for children with adequate provider data. A sequential hot-deck method is used to assign imputed values (Ford 1983). Class variables are used to separate respondents into cells. Donors and recipients must agree on the categories of the class variables, which include the estimation area. Within the categories of the class variables, respondents are sorted by variables related to the variable to be imputed. The last case with an observed value is used as the donor

for up to four recipients. The "Notes" line for each variable in the codebook (NCIRD 2020) identifies variables that contain imputed values. These variables include the sex, Hispanic origin, race, health insurance status, and first-born status of the child; the education level, age group, marital status, and mobility status of the mother; and the income-to-poverty ratio of the household.

The count of vaccinations for a specific vaccine is based on the number of unique vaccination *dates* reported by the child's provider(s). In filling out the immunization history questionnaire a provider may not know the date of the first dose of hepatitis B, which is typically given at birth. The provider does, however, have the option of checking the "Given at Birth" box for the first dose of hepatitis B. If it was checked "yes" and the date of the birth dose of hepatitis B was not reported, a program assigns the date of the birth dose for this vaccine. A value is imputed from the distribution of provider-reported dates for the birth dose of hepatitis B. The birth dose for this imputation is defined as being given in the first 7 days of life--between the date of birth (i.e., 0 days) and the date of birth plus 6 days. This imputation procedure was first implemented for Quarter 1, 2000 – Quarter 4, 2000. **For 2018 (excluding territories), a total of 63 children had the date of the birth dose of hepatitis B assigned using the above procedure (see HEP_FLAG).**

Table 3 shows the distribution of age in days at the birth dose of hepatitis B for children in 2018 with a provider-reported birth dose. A similar table is included in the 2000-2017 data user's guides. For 1997, 1998, and 1999, Section 5 of the data user's guide provides information on the distribution of age in days for the birth dose of hepatitis B vaccine and gives guidance on imputing age in days at birth dose for children with a missing date, but for whom the provider checked the box indicating that a dose was administered at birth (see HEP_BRTH).

Table 3: Distribution of Age (in Days) at the Birth Dose of Hepatitis B Vaccine, National Immunization Survey - Child, 2018

Age in Days at Birth Dose	Unweighted Percentage Of Birth Doses*
0	60.0
1	26.7
2	8.2
3	2.2
4	1.2
5	0.9
6+	0.9

* Excludes U.S. territories.

4.6. Vaccine-Specific Recoding of Verbatim Responses

On the IHQ, providers can list vaccinations in the "other" section of the IHQ shot grid. After data collection, they are reclassified into the listed categories, if possible, using a vaccination recoding table. This table is reviewed by NCIRD personnel to ensure the shots are recoded into the appropriate category or categories (for combination shots).

4.7. Composite Variables

A number of composite variables (constructed from basic variables) are created and included in the NIS-Child public-use data file. Composite variables assist users and data analysts by eliminating duplication of effort and making NIS-Child data easier to use.

Since the initial years of NIS-Child data collection, the household composite variables have included up-to-date status on individual vaccinations, race of child, household income, and up-to-date status on several vaccination series. Many of these household composite variables are included in the NIS-Child public-use data file. See Section 7 of this report for information on the key variables.

In Quarter 3, 1999, the NIS-Child race questions (see questions C3, C9 and C10 in the household questionnaire) were expanded to include Alaska Native, Native Hawaiian, and Pacific Islander, implementing the revised Office of Management and Budget (OMB) standards for classification of race and ethnicity (https://www.whitehouse.gov/wp-content/uploads/2017/11/Revisions-to-the-Standards-for-the-Classification-of-Federal-Data-on-Race-and-Ethnicity-October30-1997.pdf). The composite race variables in the 2002 through present NIS-Child public-use data files, however, contain only three categories: white alone; black alone; and all other races alone/multiple races. (The variable RACE_K classifies each child into one of these three categories, while the variable RACEETHK includes a separate "Hispanic" category.) The "all other races alone" category includes Asian, American Indian or Alaska Native, Native Hawaiian or Pacific Islander, and other races. If more than one race was selected during administration of the child race questions, the child is classified as multiple races. Because of small sample sizes and risk of disclosure within estimation areas, the 2002 through present NIS-Child public-use data files do not contain any variables with separate multiple-race categories. Rather, the children with multiple races are included in the "all other races" category. Table 4 shows some characteristics of the current race/ethnicity categories.

Table 4: Weighted Distribution of Children by Race/Ethnicity and Corresponding Combined Vaccine Series* (4:3:1:3*:3:1:4), Pneumococcal, and Varicella Vaccination Coverage Estimates, National Immunization Survey - Child, 2018

Race/Ethnicity Classification	Weighted Distribution of Children aged 19-35 Months in U.S. Estimate (%)	Weighted Percentage 4:3:1:3*:3:1:4 UTD Estimate (%) (Standard Error (%))	Weighted Percentage 4+ Pneumococcal Estimate (%) (Standard Error (%))	Weighted Percentage 1+ Varicella at 12+ Months Estimate (%) (Standard Error (%))
Hispanic	27.3	70.4 (2.1)	81.9 (1.9)	93.3 (0.7)
Non-Hispanic white only	46.7	75.0 (1.0)	85.5 (0.8)	91.4 (0.6)
Non-Hispanic black only	12.3	67.9 (2.3)	79.0 (2.1)	91.0 (1.6)
Non-Hispanic American Indian or Alaska Native only	0.9	64.3 (6.1)	73.6 (5.7)	83.8 (5.5)
Non-Hispanic Asian only	5.2	72.5 (3.7)	80.1 (3.6)	94.5 (1.4)
Non-Hispanic Native Hawaiian or Pacific Islander only	0.2	80.0 (6.0)	83.6 (5.3)	89.3 (4.4)
Multiple races	7.3	76.5 (2.5)	84.9 (2.0)	91.6 (1.6)
Non-Hispanic white/black	2.9	69.7 (4.8)	78.1 (4.2)	87.0 (3.5)
Non-Hispanic white/ American Indian or Alaska Native	0.9	68.2 (5.5)	80.6 (4.3)	88.0 (3.4)
Non-Hispanic white/Asian	2.1	85.8 (3.2)	95.0 (1.6)	96.4 (1.2)
Non-Hispanic other combination	1.4	81.7 (4.2)	86.5 (3.4)	96.1 (1.4)

Note: UTD = up-to-date. Weighted by PROVWT_C. Children with an unknown Hispanic origin and/or race were imputed by a hot-deck method. This table excludes U.S. territories.

* 4+ diphtheria and tetanus toxoids and acellular pertussis vaccine adsorbed, diphtheria and tetanus toxoids and pertussis vaccine, or diphtheria and tetanus toxoids vaccine adsorbed (DTaP/DTP/DT); 3+ poliovirus vaccine; 1+ measles-containing vaccine (MCV); full series *Haemophilus influenzae* type b conjugate vaccine (Hib), i.e., 3 or 4 doses depending on type of vaccine received; 3+ hepatitis B vaccine (Hep B); 1+ varicella at or after 12 months of age; and 4+ pneumococcal conjugate vaccine (PCV).

4.8. Subsets of the NIS-Child Data

The NIS-Child public-use data file contains data for all eligible children who have a completed household interview. An interview is considered complete if the respondent completed Section C of the questionnaire. As explained in Section 6 of this guide, each child with a completed household interview is assigned a weight (**RDDWT_C**) for use in estimation.

The NIS-Child uses the synthesized provider-reported vaccination histories to form the estimates of vaccination coverage because the provider data are considered more accurate than household-reported data. Thus, the most important subset of the data consists of children with adequate provider data. For these children, one or more providers returned an immunization history questionnaire that included vaccination data. Unvaccinated children are also considered to have adequate provider data. As discussed in Section 7 below, the **PDAT** variable identifies the children with adequate provider data (**PDAT**=1). These children have a separate weight **(PROVWT_C**), which should be used to form estimates of vaccination coverage (see Section 6).

4.9. Confidentiality and Disclosure Avoidance

To prevent identification of participants in the NIS-Child and the resulting disclosure of information, certain items from the questionnaires are not included in the public-use data file. In addition, some of the released variables either are top- or bottom-coded, or have their categories collapsed. Variable labels indicate which variables have been re-coded in these ways.

5. Quality Control and Quality Assurance Procedures

A major contributor to NIS-Child data quality is its sample management system, which in 2018 managed over 230 estimation area by quarter samples and used a number of performance measures to track their progress toward completion. Important aspects of the quality assurance program for the RDD component of the NIS-Child included on-line interviewer monitoring; on-line provider look-ups in a database system

integrated with the CATI system, including names, addresses, and telephone numbers of vaccination providers; and automated range-edits and consistency checks. These and other quality assurance procedures contributed to a reduction in total data collection cost by minimizing interviewer labor and overall burden to respondents. Khare et al. (2000), Khare et al. (2001), and the *National Immunization Survey: Guide to Quality Control Procedures* (CDC 2002) describe quality assurance procedures.

The Provider Record Check component used quality control measures at four junctions: prior to mailing packets to providers; during the telephone prompting effort; during the editing of returned questionnaires; and during and after their data entry. The final quality assurance activities are implemented during post-processing of the returned questionnaires or vaccination records. All returned questionnaires were examined to identify and correct any obvious errors prior to data entry and then key-entered with 100% verification. The keying error rate is estimated, by way of a second verification process, to be less than 1%.

6. Sampling Weights

Each of the two phases of data collection results in a separate sampling weight for each child that has data at that phase. The RDD-phase sampling weights permit analyses of data for children with completed household interviews. Each child with adequate provider data (the subset on which official estimates of vaccination coverage are based) has a provider-phase sampling weight. The single-frame cell-phone RDD-phase sampling weight variable for producing estimates for children with completed household interviews is called **RDDWT_C**. The single-frame cell-phone provider-phase sampling weight variable for producing estimates for children with adequate provider data is called **PROVWT_C**. See Section 8 of this user's guide for more information about the weights included in the data file and the proper way to use them.

As discussed below, revisions in weighting methodology were made on various occasions and the names of the weight variables were also changed to keep track of the revisions. The RDD-phase sampling weights were called HY_WGT in 1995-2001, RDD_WT in 2002, WGT_RDD in 2003- 2004, RDDWT in 2005-2008, RDDWT/RDDWTVI in 2009-2010, RDDWT_LL/RDDWTVI_LL/RDDWT_D in 2011, RDDWT_D/RDDWTVI_D in 2012, RDDWT_D/RDDWTVIGU_D in 2013, RDDWT_D/RDDWT_D_TERR in 2014-2016, RDDWT_D in 2017, and RDDWT_C in 2018**.** The provider-phase sampling weights were called W0 in 1995-2001, WT in 2002, WGT in 2003- 2004, PROVWT in 2005-2008, PROVWT/PROVWTVI in 2009-2010, PROVWT_LL/PROVWTVI_LL/PROVWT_D in 2011, PROVWT_D/PROVWTVI_D in 2012, PROVWT_D/PROVWTVIGU_D in 2013, PROVWT_D/PROVWT_D_TERR in 2014-2016, PROVWT_D in 2017, and PROVWT_C in 2018**.**

A sampling weight may be interpreted as the approximate number of children in the target population that a child in the sample represents. Thus, for example, the sum of the sampling weights of children with adequate provider data who are up-to-date (on a particular vaccine or series of vaccines) yields an

estimate of the total number of children in the target population who are up-to-date. Dividing this sum by the total of the sampling weights for all children with adequate provider data gives an estimate of the corresponding vaccination coverage rate.

This section describes how these weights are developed and adjusted so as to achieve an accurate representation of the target population. The base weights reflect each telephone number's probability of being selected into the sample; the adjustments take into account non-resolution of residential/non-residential/non-working status of a telephone number, non-response to the screener and household interviews, number of cell phones used by parents in the household, raking for differential coverage rates and non-coverage of households that do not have cell phones, non-response by providers, and a final raking adjustment.

6.1. Base Sampling Weight

In each quarterly NIS-Child sample, each child with a completed household interview receives a base sampling weight. For all four quarters, the base sampling weight is equal to the total of telephone numbers in the sampling frame for the estimation area divided by the total of telephone numbers that were randomly sampled from that sampling frame and released for interview during that quarter.

6.2. Adjustments for Non-Resolution of Telephone Numbers, Screener Non-Response, and Interview Non-Response

Non-response occurs in population-based surveys when potential respondents refuse to participate, are not available at the time of the interview, or could not be reached during the survey period. Thus, the sum of the base sampling weights of children with completed household interviews will underestimate the size of the target population in the estimation area, because not all sampled households respond to all stages of data collection up to the household interview. As a result, the base sampling weights must be adjusted so they accurately reflect the number of children in the target population that each sampled child with a completed household interview represents.

Some sampled households with age-eligible children fail to complete the household interview because of unit non-response: for some telephone numbers, it is never determined whether or not the number is a working residential number despite multiple call attempts; for some households it is never determined whether or not the household contains age-eligible children; and some households with age-eligible children do not complete the household interview. To compensate for these three types of unit non-response, the sampling weights of children with a completed household interview are adjusted to account for the estimated number of age-eligible children in households whose telephone numbers are never resolved, the estimated number of age-eligible children in households that fail to complete the screening interview, and the number of identified age-eligible children for whom the household interview is not completed. Each of these adjustments is carried out within each estimation area by forming weighting cells based on the Metropolitan Statistical Area (MSA) status of the wire center associated with the cell-phone number (MSA/non-MSA). Each cell in each stage of adjustment must have sufficient resolved/responding cases (usually 20, but 15 for interview non-response) at that stage of adjustment. The cells with a deficient number of responding cases are collapsed into neighboring cells, i.e. both MSA categories are collapsed if either of the cells have a deficient number of responding cases. Once the adjustment cells are formed, the weights of the unresolved/non-responding records from the previous adjustment step are distributed to the weights of the resolved/responding records within each cell.

6.3. Adjustment for Multiple Cell Phones and Deriving Annual Weights

Once the non-response-adjusted interview weights for households are computed, these weights are adjusted for additional cell phones in the household. Because households with multiple cell phones have a greater chance of being sampled, each child's household interview weight is adjusted by dividing it by the total number of cell-phones used by parents or guardians (up to a maximum of 3).

Up to the previous step, the sampling weights are adjusted separately for each quarter, and the weights in each quarter pertain to the target population. However, annual vaccination coverage estimates are obtained from data for four consecutive quarters, so the weights in each quarterly file are adjusted when

the data from the four quarters are combined. The adjustment factor is proportional to the number of households with completed household interviews in each quarter and estimation area.

6.4. Calibration

Next, survey weights are calibrated to population control totals as described below. The control totals used for the NIS-Child are derived from current natality data from the National Center for Health Statistics (NCHS 2015b, 2016). Because the Vital Statistics data give the counts of all live births in the United States, regardless of whether the household has any cell phones, the control totals include all eligible children. **The control total for each raking dimension is derived from the NCHS natality files from 2015 and 2016 (children born between July 1, 2015 and November 30, 2016 would have been 19 through 35 months on June 30, 2018).** Use of the natality data to form the required population control totals for the NIS-Child has three limitations: 1) the natality file provides a universe of live births and therefore does not reflect infant mortality; 2) the natality file does not include children born outside the United States who immigrate to this country before reaching ages 19 through 35 months; and 3) the natality file records residence at time of birth, and some children may move from one estimation area to another by the time they reach 19 through 35 months of age. Adjustments are made to the natality data to account for these three factors. **For 2018, the combined 2015, 2016, and 2017 one-year American Community Survey Public Use Microdata Sample data files were used to make the immigration and migration adjustments (U.S. Census Bureau 2016, 2017, 2018).**

Survey weights are adjusted to agree with independent estimates of the population total by telephone status. The proportions of 19 through 35 month old children by detailed telephone status (cell-phone-only, landline and cell-phone dual user, landline-only, phoneless) within each estimation area were derived using a similar small area modeling approach as described in Blumberg et al. (2011). These modeled telephone status estimates are applied to the population control total for the estimation area to estimate the control totals by detailed telephone status within the estimation area. In each estimation area, children in dual landline and cell-phone households are weighted to represent children living in dual landline and

cell-phone households in the estimation area, and children in cell-phone-only households are weighted to represent children in cell-phone-only households in the estimation area. Children in landline-only and phoneless households, which are excluded from the cell phone sample, are accounted for in the raking step described below.

To reduce sampling variability and improve the precision of estimation, extreme weights are trimmed and then recalibrated to control totals. RDD sampling weight values exceeding the median weight plus three times the interquartile range of the weights within an estimation area are truncated and then recalibrated to control totals. This is done by up to five iterations. This weight trimming prevents children with unusually large weights from having an unusually large impact on immunization coverage estimates.

The final step in adjusting the RDD sampling weights is a raking adjustment (Deming 1943) of the trimmed, telephone status adjusted weights. The raking procedure uses estimation area-level control totals for maternal education categories, maternal race/ethnicity, age group of the child, sex of the child, and telephone status. Briefly, raking takes each variable in turn and applies a proportional adjustment to the current weights of the children who belong to the same category of the variable. After a number of iterations over all the variables, the raked weights have totals that match all the desired control totals. Raking makes it possible to incorporate additional variables into the weighting and to use more detailed categories for those variables. Wolter et al. (2017a) gives the details of various aspects of the NIS-Child estimation procedures.

The sampling weights after all the foregoing adjustments constitute the "RDD sampling weights" **(RDDWT_C**).

6.5. Adjustment for Provider Non-Response

Among the 28,971 children with a completed household interview (excluding Guam), 15,657 (54.0%) had adequate provider data. Starting with the 2002 NIS-Child public-use data file, the definition of children with adequate provider data includes unvaccinated children. These are children for

whom the respondent reported during the household interview that the child had received no vaccinations and has no providers, or for whom one or more providers were reported but those providers reported administering no vaccinations. Among the 15,657 children with adequate provider data, 302 were unvaccinated children. Failure to obtain adequate provider data for the remaining 46.0% was attributable to:

- parent or guardian not identifying any providers or not giving consent to contact the child's vaccination provider(s) (36.4%);
- consent to contact vaccination providers obtained but no providers returned the immunization history questionnaire (5.2%); and
- one or more providers returned the immunization history questionnaire, but no providers reported any vaccination data, despite the parent or guardian indicating that the child has received vaccinations (4.3%).

The 13,314 children for whom a household interview was completed but adequate provider data were not obtained are classified as "partial non-responders" because they have only a partial response to the NIS-Child as a whole.

Empirical results suggest that children with adequate provider data have characteristics believed to be associated with a greater likelihood of being up-to-date, compared with children who had missing provider data. Specifically, children with adequate provider data are more likely to live in households that have higher total family income, have a white mother, and live outside a principal city of a Metropolitan Statistical Area. Also, a child with missing provider data is less likely to live in the state where the mother lived when the child was born. These factors indicate a potential lack of continuity of health care, and are associated with lower vaccination coverage (Coronado et al. 2000). If no adjustment is made to the RDD sampling weights to account for these differences, estimated vaccination coverage rates may be biased.

To reduce potential bias in estimators of vaccination coverage attributable to partial non-response, a weighting-class adjustment is used in each estimation area (Brick and Kalton 1996). This adjustment involves three steps. In the first step, sampled children are classified according to the quintile of their estimated probabilities of having adequate provider data. In the statistical literature these probabilities are called response propensities (Rosenbaum and Rubin 1983, 1984; Rosenbaum 1987). Children who have similar response propensities will also be similar with respect to variables that are strongly associated with the probability of having adequate provider data. In this important respect, children in each class are comparable. Because of this comparability, any sub-sample of children in a class may represent all children in the class. Therefore, the weighting-class adjustment uses the children with adequate provider data to represent all children in the class. An NCHS Series 2 Report on the statistical methodology of the NIS-Child (Smith et al. 2005) includes details of the methodology for forming weighting classes based on propensity scores. This report can be viewed at http://www.cdc.gov/nchs/data/series/sr_02/sr02_138.pdf.

In the second step of this weighting-class adjustment, within each class an adjustment factor redistributes the RDD sample weights of the children with missing provider data to the weights of the children who have adequate provider data. These adjusted sampling weights of children with adequate provider data are initial non-response-adjusted provider-phase weights.

Within an estimation area, the sums of non-response adjusted weights of children with adequate provider data for the various levels of important socio-demographic variables (such as race/ethnicity) may not be equal to corresponding population totals. To reduce bias attributable to these differences, raking was used in the third step to adjust the non-response adjusted weights to match estimation area control totals. Control totals for these variables were estimated using the weighted totals from the sample of children with completed household interviews. Smith et al. (2001b, 2005) describe the development of this approach in more detail. Similar to the RDD weighting, the extreme weights exceeding the median weight plus three times the interquartile range of the weights within an estimation area are truncated and then recalibrated to control totals. These raked weights of children with adequate provider data are called

"final provider-phase weights" **(PROVWT_C**). Because of the comparability of children within each weighting class, any estimate that uses data only from the children with adequate provider data along with their provider-phase sampling weights will have less bias attributable to differences between children with adequate provider data and children with missing provider data.

Appendix B summarizes the distribution of the sampling weights **(RDDWT_C** and **PROVWT_C)** in each estimation area.

NIS-Child public-use data files for 1995 to 2001 do not include sampling weights that account for the effect of unvaccinated children. An assessment of the effect of accounting for unvaccinated children for the period 1995 to 2003 was made. Weights were calculated for each year with and without unvaccinated children and the vaccination coverage estimates compared. Details of this assessment and the results are available in the user's guide for the 2004 NIS-Child public-use data file. At the national level, accounting for unvaccinated children had very little effect on the estimates of 4:3:1:3 vaccination coverage. Within estimation areas also, the two coverage estimates differed little. The largest difference (in either direction) was most often around 2 percentage points. Differences of that magnitude are small relative to the standard errors of the estimates. Although accounting for unvaccinated children has a small effect on estimates of vaccination coverage, data users who use the pre-2002 public-use data files to examine estimation area-level trends over time are advised to interpret the results with appropriate caution.

7. Contents of the Public-Use Data File

The NIS-Child public-use data file contains a record for each eligible child for whom Section C of the household interview was completed, along with household-reported information about the child and the child's mother. For children with Immunization History Questionnaires (IHQs) returned by one or more providers, the file also contains provider characteristic variables, as well as variables based on the child's synthesized provider-reported vaccination history: the age of the child at each vaccination, the number of

each type of vaccination received, and indicators of whether the child is up-to-date with respect to various recommended vaccines and vaccine series.

The public-use data file consists of ten sections, the contents of which are described below in detail. For additional information, users are encouraged to consult the codebook (NCIRD 2020). The codebook is divided into the ten sections described below and contains variable names, labels, and response frequencies (for categorical variables). For select variables, the codebook also gives additional information about the variable in the "Notes" field.

Table 5 lists key NIS-Child variables commonly used in analyses. A full list of variables appearing on the 2004-2018 NIS-Child public-use data files appears in Appendix E, along with the reason for the addition, subtraction, or modification of the variables in 2005-2018. Information on changes made between 1995-2004 can be found in the *Alphabetical Listing of Variables that are Not Available in All Public-Use Data Files, National Immunization Survey, 1995-2004*.
http://www.cdc.gov/nchs/data/nis/pufvariables1995to2004.pdf

Table 5: NIS-Child Variables Commonly Used in Analyses or for Published Estimates

Variable	Categories
ID Variables	
SEQNUMC – unique child ID variable	
SEQNUMHH – unique household ID variable	
Geographic Variables	
ESTIAP18 – estimation area number (ITRUEIAP used through 2004; ESTIAP in 2005; ESTIAP06 in 2006; ESTIAP07 in 2007; ESTIAP08 in 2008; ESTIAP09 in 2009; ESTIAP10 in 2010; ESTIAP11 in 2011; ESTIAP12 in 2012; ESTIAP13 in 2013; ESTIAP14 in 2014; ESTIAP15 in 2015; ESTIAP16 in 2016; ESTIAP17 in 2017; ESTIAP18 in 2018)	
STATE – state FIPS code	
CEN_REG – census region	Northeast Midwest South West
Child Demographic Variables	
AGEGRP – age category of child	19-23 months 24-29 months 30-35 months
RACEETHK – race/ethnicity of child (introduced in 2002; RACEKIDR used in 1995-2001)	Hispanic White alone, non-Hispanic Black alone, non-Hispanic All other races alone and multiple races, non-Hispanic
SEX – sex of child	Male Female
FRSTBRN – firstborn status of the child	No Yes
Mother Demographic Variables	
EDUC1 – education of the mother	<12 years 12 years >12 years, not a college graduate College graduate
MARITAL2 – marital status of mother (Living with partner response option added to questionnaire in 2015)	Currently married Never married, widowed, divorced, separated, deceased, or living with partner
M_AGEGRP2 – age group of mother (introduced in 2016; M_AGEGRP used through 2015)	<=29 years 30 years or older
Poverty Variables	
INCPOV1 – poverty status (introduced in 2005; INCPOV1R used through 2004)	At or above poverty level, income > $75,000 At or above poverty level, income <= $75,000 Below poverty level Not determined
INCPORAR – income-to-poverty ratio (introduced in 2005; INCPORAT used through 2004)	
INCPORAR_I – imputed income-to-poverty ratio (introduced in 2016)	
WIC Variables	

Variable	Categories
CWIC_01 – child ever participated in WIC program	Yes No Never heard of WIC Don't know Refused Missing
CWIC_02 – child currently participating in WIC program	Yes No Don't know Refused Missing
Breastfeeding Variables	
CBF_01 – child ever fed breast milk	Yes No Don't know Missing
BF_ENDR06 – length of time in days child was fed breast milk	
BF_EXCLR06 – length of time in days child was exclusively fed breast milk or formula (introduced in 2006)	
BF_FORMR08 – age in days when child was first fed formula (introduced in 2008; BF_FORMR06 used in 2006 and 2007)	
Chicken Pox Variables	
HAD_CPOX – did child ever have chicken pox (introduced in 2005; I_HADCPX used through 2004)	Yes No Don't know Refused Missing
AGECPOXR – age in months when child had chicken pox (introduced in 2005; IAGECPXR used through 2004)	0-6 months 7-12 months 13-18 months 19-24 months 25-30 months 31 months or older Missing
Presence of Provider Data Variables	
PDAT – adequate provider data indicator	Yes No
Number of Provider-Reported Doses of Vaccine Variables	
P_NUMDTP – total number of DTaP/DTP/DT doses	
P_NUMPOL – total number of polio doses	
P_NUMMMR – total number of MCV doses	
P_NUMHIB – total number of Hib doses	
P_NUMHEP – total number of hepatitis B doses	
P_NUMVRC – total number of varicella doses	
P_NUMPCV – total number of pneumococcal doses	
P_NUMFLU – total number of seasonal influenza doses	
P_NUMHEA – total number of hepatitis A doses	
P_NUMROT – total number of rotavirus doses	
Provider Characteristic Variables	

Variable	Categories
PROV_FAC – provider facility type	All public facilities All hospital facilities All private facilities All military/other facilities Mixed types Unknown
VFC_ORDER – do child's providers order vaccines for children from state/local health department? (introduced in 2006)	All providers Some but not all providers No providers Unknown
REGISTRY – provider(s) reported child's vaccination(s) to state or community immunization registry	All providers Some but not all providers No providers Unknown
Insurance Status Variables	
INS_STAT2_I – child's current health insurance coverage status (introduced in 2017, INS_STAT_I used in 2016)	Private insurance only Any Medicaid Other insurance (CHIP, IHS, military, or some other form of insurance, alone or in combination with private insurance) Uninsured
INS_BREAK_I – child's insurance history since birth (introduced in 2016)	Currently insured but uninsured since birth Currently insured and never uninsured since birth Currently uninsured but insured since birth Currently uninsured and never insured since birth

Before describing the sections of the public-use data file below, we first summarize the differences between the 2017 and 2018 NIS-Child public-use data files:

- **Because the 2018 estimation areas differ from those used in prior years, a new 2018 estimation area variable has been added (ESTIAP18) and the 2017 estimation area variable (ESTIAP17) has been dropped. Note that two new estimation areas have been added for 2018: Hidalgo County, TX is identified by ESTIAP18=107, and Tarrant County, TX is identified by ESTIAP18=109. Although data were collected for Guam in 2018, children in this area are not included on the public-use data file in order to protect confidentiality. Data for the U.S. Virgin Islands and Puerto Rico are also not included on the 2018 public-use data file as data collection did not occur in these areas in 2018.**
- **In 2018, the NIS switched from a dual-frame landline and cell-phone RDD sample design to a single-frame cell-phone RDD sample design. With the removal of the landline sample,**

dual-frame landline and cell-phone combined weights are no longer produced, and instead only single-frame cell-phone sample weights are created. Consequently, the previous dual-frame weight variables RDDWT_D and PROVWT_D have been dropped, and replaced with single-frame cell-phone weight variables RDDWT_C and PROVWT_C.

- **A new up-to-date variable U24_FLU_24D has been added which indicates whether each child has received at least 2 doses of influenza vaccine at least 4 weeks minus 4 days apart by 24 months.**

7.1. Section 1: ID, Weight, and Flag Variables

SEQNUMHH and SEQNUMC are the unique household and child identifiers, respectively. **PDAT** indicates which children are considered to have adequate provider data. As described in Section 6 of this report, **RDDWT_C** and **PROVWT_C** are the final household- and provider-phase weights, respectively. **PROVWT_C** should be used when analyzing the provider-reported data, i.e., the variables in Sections 7, 8, and 9 of the NIS-Child public-use data file.

7.2. Section 2: Household-Reported Vaccination and Chickenpox Information

Section 2 of the public-use data file contains variables derived from the information collected in Section B of the household questionnaire. In particular, it contains variables indicating whether the respondent reported that the child has had chicken pox disease **(HAD_CPOX)** and the child's age in months at chicken pox disease **(AGECPOXR).**

7.3. Section 3: Demographic, Socio-Economic, and Other Household/Child Information

Section 3 of the NIS-Child public-use data file consists of information collected during the household screening interview and Section C of the household main interview. To protect confidentiality, many of these variables have been collapsed, top-coded, or bottom-coded from the original, fully-detailed

versions; the variable labels (see the public-use date file codebook) indicate which variables have been collapsed or recoded.

AGEGRP is the age of the child in months in three categories (19-23 months, 24-29 months, 30-35 months), based on the child's best date of birth and the eligibility date. **SEX** gives the sex of the child, and **FRSTBRN** indicates whether the child is the first born, with missing values of these variables imputed. The language in which the interview was conducted is stored in variable **LANGUAGE**, and **C5R** gives the relationship of the respondent to the child.

The breastfeeding variables include whether the child was ever fed breast milk **(CBF_01)**, length of time in days the child was fed breast milk **(BF_ENDR06)**, the age in days when the child was first fed formula **(BF_FORMR08)**, and the length of time in days the child was exclusively fed breast milk or formula **(BF_EXCLR06)**. Two types of inconsistencies arise in the breastfeeding data: 1) duration of any breastfeeding can exceed age of the child, and 2) age when the child was first fed formula can exceed the age of the child. **BFENDFL06** is set equal to 1 when BF_ENDR06 exceeds the age of the child (with a buffer), and **BFFORMFL06** is set equal to 1 when BF_FORMR08 exceeds the age of the child (with a buffer). Appendix C provides details on how the flags were created. Data users are cautioned to review Appendix C before analyzing any of the breastfeeding variables.

The WIC variables include whether the child ever participated in the WIC program **(CWIC_01)** and whether the child is currently participating **(CWIC_02)**.

C1R and **CHILDNM** give the number of people and children, respectively, in the household. The child's Hispanic origin indicator, race with three categories, and race/ethnicity with four categories are presented in variables **I_HISP_K**, **RACE_K**, **and RACEETHK**, respectively; for each of these variables, missing values have been imputed. The age, education level, and marital status of the mother of the child are stored in variables **M_AGEGRP2**, **EDUC1**, and **MARITAL2** (married vs. not married), with missing values imputed.

The categorized total combined income for the child's family is given by **INCQ298A. INCPOV1** gives the family's poverty status (at or above poverty, income > $75,000; at or above poverty, income <= $75,000; below poverty; unknown), and **INCPORAR** gives the ratio of the family's income to the poverty level. **INCPORAR_I** gives the same ratio after missing values of family income have been imputed. Household tenure is given by **RENT_OWN**.

The number of landline telephone numbers in the household, the number of working cell phones household members have available for personal use, and the number of these cell phones that are usually used by parents or guardians are given by **NUM_PHONE**, **NUM_CELLS_HH**, and **NUM_CELLS_PARENTS**, respectively.

Variable **CEN_REG** gives the census region of the respondent's current residence, and **MOBIL_I** indicates whether the mother's current state of residence is the same as her state of residence at the time of the child's birth.

7.4. Section 4: Geographic Variables

Variables **ESTIAP18** and **STATE** give the 2018 estimation area and state of residence, respectively, for each child. **EST_GRANT** indicates which of the 50 states, District of Columbia, and 5 local areas that receive federal Section 317 immunization awards (Bexar County, TX; City of Chicago, IL; City of Houston, TX; New York City, NY; Philadelphia County, PA) the child resides in.

7.5. Section 5: Number of Providers Identified and Consent Variables

Variable **D7** indicates whether the respondent gave consent to contact the child's providers. If D7=1, then consent was granted; if D7=2 then consent was explicitly denied; and if D7 is missing, consent was not granted because the respondent broke off the interview before being explicitly asked for consent.

Variable **D6R** gives the number of providers identified by the respondent. Note that sometimes respondents report erroneous provider counts and sometimes report the same provider more than one time, and D6R does not reflect cleaning or de-duplication of the initially-reported provider count.

7.6. Section 6: Number of Responding Providers Variables

Variable **N_PRVR** indicates the number of providers returning IHQs with vaccination information for the child. That is, N_PRVR is the number of IHQs that were returned for the child that contain information on the IHQ shot grid.

7.7. Section 7: Characteristics of Providers Variables

The variables in this section of the public-use data file summarize the information collected in IHQ questions 5b, 6, and 7 across the child's providers who returned IHQs containing vaccination (i.e., shot grid) data.

PROV_FAC indicates the facility type of the child's vaccination providers based on responses to IHQ question 5b. If all of the child's providers that returned IHQs containing shot grid data (see Section 6 variable N_PRVR) reported the facility type to be:

- a public health department-operated clinic, community health center, or rural health clinic, then PROV_FAC=1 (all public facilities);
- a hospital-based clinic, then PROV_FAC=2 (all hospital facilities);
- a private practice, then PROV_FAC=3 (all private facilities);
- a military health care facility, WIC clinic, school-based health center, pharmacy, or other type of facility, then PROV_FAC=4 (all military/WIC/school/pharmacy or other facilities).

If the responses of providers that returned IHQs containing shot grid data fell into more than one of the above bulleted categories, PROV_FAC=5 (mixed); otherwise, if at least one of the child's providers

returned an IHQ containing shot grid data, PROV_FAC=6 (unknown). If none of the child's providers returned an IHQ containing shot grid data, PROV_FAC is set to missing.

The Vaccines For Children (VFC) program is a federally-funded program that provides vaccines at no cost to children who might not otherwise be vaccinated because of inability to pay (http://www.cdc.gov/vaccines/programs/vfc/index.html). CDC buys vaccines at a discount and distributes them to awardees—i.e., state health departments and certain local and territorial public health agencies—which in turn distribute them at no charge to those private physicians' offices and public health clinics registered as VFC providers. **VFC_ORDER**, based on responses to IHQ question 6, indicates whether the child's vaccination providers order vaccines from a state or local health department to administer to children. If all of the child's providers that returned IHQs containing shot grid data (see Section 6 variable N_PRVR) reported that they order vaccines from a state or local health department to administer to children, then VFC_ORDER=1 (all providers); if at least one of the child's providers that returned an IHQ containing shot grid data reported that the practice orders vaccines from a state or local health department to administer to children and the child's other providers that returned IHQs containing shot grid data reported either that they did not order such vaccines or that they did not know whether or not they did, then VFC_ORDER=2 (some but possibly or definitely not all providers); if all of the child's providers that returned IHQs containing shot grid data reported that they do not order vaccines from a state or local health department to administer to children, then VFC_ORDER=3 (no providers); if none of the conditions for VFC_ORDER=1, 2, or 3 were met but at least one of the child's providers returned an IHQ containing shot grid data, VFC_ORDER=4 (unknown). If none of the child's providers returned an IHQ containing shot grid data, VFC_ORDER is set to missing. Note that having a provider that orders VFC vaccines does not imply that the child is VFC-entitled; providers enrolled in the VFC program could also vaccinate children who are not VFC-entitled.

REGISTRY is based on responses to IHQ question 7 and indicates whether the child's vaccination providers reported the child's vaccinations to a local or state immunization registry (also known as an

Immunization Information System, or IIS). If all of the child's providers that returned IHQs containing shot grid data (see Section 6 variable N_PRVR) indicated that they reported to a registry, then REGISTRY=1 (all providers); if at least one of the child's providers that returned an IHQ containing shot grid data indicated that the practice reported to a registry and the child's other providers that returned IHQs containing shot grid data indicated that they did not report to a registry, that they did not know whether or not they reported to a registry, or that the question is not applicable, then REGISTRY=2 (some but possibly or definitely not all providers); if all of the child's providers that returned IHQs containing shot grid data indicated that they did not report to a registry or that the question is not applicable, then REGISTRY=3 (no providers); if none of the conditions for REGISTRY=1, 2, or 3 were met but at least one of the child's providers returned an IHQ containing shot grid data, REGISTRY=4 (unknown). If none of the child's providers returned an IHQ containing shot grid data, REGISTRY is set to missing.

7.8. Section 8: Provider-Reported Up-To-Date Vaccination Variables

This section contains vaccination count and up-to-date variables based on the child's synthesized provider-reported vaccination history. To facilitate data processing and to accommodate the large and continually growing number of vaccination types covered by the NIS-Child, the provider-reported vaccination data are organized around the concept of vaccine categories and vaccine types within vaccine category. The vaccine categories correspond to the sections of the IHQ shot grid, and the vaccine types correspond to the type boxes on the IHQ shot grid. (For each vaccine category, an "unknown" vaccine type is created for vaccinations that are reported without a type box being checked. Also, a few vaccine types, such as Measles-Mumps, arise through the backcoding of shots initially reported in the "other" section of the IHQ shot grid.) Table 6 shows the vaccine categories and types for the 2018 NIS-Child. Note that a single vaccination can fall into more than one vaccine category; for example, an MMR-Varicella vaccination is part of both the Measles-containing and Varicella-containing vaccine categories. (The full list of vaccine type codes can also be found in Appendix H.)

For each vaccine category, Section 8 of the public-use data file contains a variable typically named **P_NUM*YYY*** – where "YYY" is the vaccine category abbreviation given in Table 6 – that stores the number of vaccinations in that vaccine category in the child's synthesized provider-reported vaccination history. For each vaccine type in Table 6, Section 8 also contains a variable that stores the number of vaccinations of that vaccine type in the child's synthesized provider-reported vaccination history. For example, **P_NUMDHI** is the number of DTaP/HepB/IPV shots in the child's history.

This section of the public-use data file also contains up-to-date indicators for a variety of recommended vaccines and vaccine series. These variables' names typically begin with "**P_UTD**". Additional variables indicate whether the child is up-to-date for various vaccine series. For example, **P_UTD431** indicates whether the child has received 4 or more DTaP/DTP/DT shots, 3 or more polio shots, and one or more measles-containing shots. The variable labels indicate what is needed to be considered up-to-date for each variable, and the "Notes" field in the codebook shows the vaccine type codes (see Table 6) being included when determining whether the child is up-to-date.

Note that it is possible that the administration of the NIS-Child interview itself prompts some respondents to vaccinate their children following the interview; to ensure that the vaccination coverage estimates are not artificially boosted because of this, the synthesized vaccination history count and up-to-date variables in this section of the public-use data file count only vaccinations received before the date the household interview was completed. Note also that because children are eligible for the NIS-Child if they are 19 to 35 months old on any day of the survey quarter, some children are less than 19 months old or greater than 35 months old on the date the household interview is completed. For children with interviews conducted before they became 19 months old, the Provider Record Check is not conducted until after the child has become 19 months old, and all vaccinations given up to age 19 months are counted, including those given after the household interview date. For children with interviews conducted after they became 36 months old, only vaccinations given through age 35 months are counted.

Table 6: Vaccine Categories and Vaccine Types, National Immunization Survey - Child, 2018

Vaccine Category Abbreviation	Vaccination Category Description	Vaccine Type Code	Vaccine Type Description
DTP	DTaP/DTP/DT-containing vaccine	03	DTaP/DTP/DT-containing, unknown type
		04	DTaP/DTP/DT
		07	DTaP-Hib
		08	DTaP-HepB-IPV
		D3	DTaP-IPV-Hib
POL or POLIO	Polio-containing vaccine	08	DTaP-HepB-IPV
		20	OPV
		21	IPV
		22	Polio-containing, unknown type
		D3	DTaP-IPV-Hib
MCV or MMR	Measles-containing vaccine	30	MMR
		31	Measles only
		32	Measles-mumps
		33	Measles-rubella
		MM	Measles-containing, unknown type
		VM	MMR-Varicella
HIB	Hib-containing vaccine	07	DTaP-Hib
		43	HepB-Hib
		44	Hib-only, unknown type
		D3	DTaP-IPV-Hib
		HG	Hib-only (GSK)
		HI	Hib-containing, unknown type
		HM	Hib-only (Merck)
		HS	Hib-only (Sanofi)
		HY	Hib-MenCY
HEPB or HEP	Hepatitis B-containing vaccine	08	DTaP-HepB-IPV
		43	HepB-Hib
		60	HepB-only
		HB	HepB-containing, unknown type
VRC	Varicella-containing vaccine	VA	Varicella-containing, unknown type
		VM	MMR-Varicella
		VO	Varicella-only
PCV	Pneumococcal-containing vaccine	70	Conjugate-unknown
		71	Polysaccharide
		72	Pneumococcal-containing, unknown type
		73	Conjugate-7
		74	Conjugate-13

Vaccine Category Abbreviation	Vaccination Category Description	Vaccine Type Code	Vaccine Type Description
HEPA or HEA	Hepatitis A-containing vaccine	HA	Hepatitis A
INFLUENZA	Seasonal influenza vaccine	FL	Seasonal influenza, unknown type
		FM	Seasonal influenza spray
		FN	Injected seasonal influenza
MP	Mumps-only vaccine	MP	Mumps-only
MPRB or MPR	Mumps-Rubella-only vaccine	MB	Mumps-Rubella-only
RB	Rubella-only vaccine	RB	Rubella-only
ROT	Rotavirus-containing vaccine	RG	Rotarix® (GSK)
		RM	RotaTeq® (Merck)
		RO	Rotavirus, unknown type

7.8.1. Hib Up-To-Date Variables

A Hib vaccine shortage and interim recommendation to suspend the booster dose for healthy children occurred December 2007 to September 2009 (CDC 2010). Furthermore, the NIS-Child has historically considered children to be up-to-date for Hib if the child had 3 or more doses of any Hib-containing vaccine, but for some Hib vaccine product types, 4 doses are required. Because the NIS-Child has historically not distinguished between product types for Hib vaccine, children who received 3 doses of a vaccine product that required 4 doses were misclassified as up-to-date for Hib (CDC 2010).

Because of the Hib vaccine shortage and because of the dependence of the Hib recommendation on product type, in 2009 the IHQ was modified to capture the manufacturer of the Hib vaccinations the child has received. Beginning with the 2009 NIS-Child public-use data file, new up-to-date variables were added to indicate up-to-date status based on Hib recommendation (i.e., the primary series recommended during the shortage vs. the full series) and on the Hib manufacturer.

Table 7 shows the Hib up-to-date variables appearing on the public-use data file beginning in 2009: in addition to the existing up-to-date indicator based on 3+ Hib of any type (**P_UTDHIB**), an indicator based on the “shortage” (i.e., primary series) recommendations accounting for manufacturer (3+ Hib of

any type or 2+ Hib of Merck types) and an indicator based on the "routine" (i.e., full series) recommendations accounting for manufacturer (4+ Hib of any type or 2 Hib of Merck types followed by 1 Hib of any type) were added. Table 8 shows the up-to-date series variables that include Hib appearing on the public-use-date file beginning in 2009: in addition to the existing vaccine series up-to-date variables based on 3+ Hib of any type (**PUTD4313**, **PUT43133**, **PU431331**, **PU4313313**, **PU4313314**), variables based on the "routine" (i.e., full series) Hib recommendations accounting for manufacturer (4+ Hib of any type or 2 Hib of Merck types followed by 1 Hib of any type) were added (**P_UTD431H_ROUT_S**, **P_UTD431H3_ROUT_S**, **P_UTD431H31_ROUT_S**, **P_UTD431H313_ROUT_S**, **P_UTD431H314_ROUT_S**).

Note that for these Hib up-to-date variables that account for the manufacturer, if the manufacturer is unknown because the provider failed to check a type box on the IHQ, it has been assumed that the manufacturer of the Hib vaccine is not Merck; that is, these variables are based on a "strict" treatment of Hib vaccinations of unknown type, erring on the side of classifying the child as not up-to-date.

Beginning with the 2010 NIS-Child public-use data file, two new vaccination series up-to-date indicators were added that ignore the Hib component altogether. These are **PU431_31** (indicates up-to-date status as measured by **PU431331**, but excluding the Hib component) and **PU431_314** (indicates up-to-date status as measured by **PU4313314**, but excluding the Hib component).

Table 7: Up-To-Date Variables for Hib, National Immunization Survey - Child, 2009-2018

Name	Description	Up-To-Date Criteria
P_UTDHIB	Historical UTD flag for Hib.	3+ of any type (07,43,44,D3,HG,HI,HM,HS,HY)
P_UTDHIB_SHORT_S	UTD flag for Hib-shortage (i.e., primary series) recommendation, accounting for manufacturer. Introduced in 2009.	3+ of any type (07,43,44,D3,HG,HI,HM,HS,HY) OR 2+ Merck types (HM,43)
P_UTDHIB_ROUT_S	UTD flag for routine (i.e., full series) Hib recommendation, accounting for manufacturer. Introduced in 2009.	4+ of any type (07,43,44,D3,HG,HI,HM,HS,HY) OR 2 Merck types (HM,43) followed by 1 of any type (07,43,44,D3,HG,HI,HM,HS,HY)

Table 8: Up-To-Date Variables for Vaccine Series Including Hib, National Immunization Survey - Child, 2009-2018

Name	Description
PUTD4313	UTD flag for the 4:3:1:3 series using the 3+ any type UTD definition for HIB
P_UTD431H_ROUT_S	UTD flag for the 4:3:1:3 series using the routine (i.e., full series) UTD definition for HIB
PUT43133	UTD flag for the 4:3:1:3:3 series using the 3+ any type UTD definition for HIB
P_UTD431H3_ROUT_S	UTD flag for the 4:3:1:3:3 series using the routine (i.e., full series) UTD definition for HIB
PU431331	UTD flag for the 4:3:1:3:3:1 series using the 3+ any type UTD definition for HIB
P_UTD431H31_ROUT_S	UTD flag for the 4:3:1:3:3:1 series using the routine (i.e., full series) UTD definition for HIB
PU4313313	UTD flag for the 4:3:1:3:3:1:3 series using the 3+ any type UTD definition for HIB
P_UTD431H313_ROUT_S	UTD flag for the 4:3:1:3:3:1:3 series using the routine (i.e., full series) UTD definition for HIB
PU4313314	UTD flag for the 4:3:1:3:3:1:4 series using the 3+ any type UTD definition for HIB
P_UTD431H314_ROUT_S	UTD flag for the 4:3:1:3:3:1:4 series using the routine (i.e., full series) UTD definition for HIB

7.8.2. Rotavirus Up-To-Date Variables

The up-to-date status for rotavirus vaccine depends on the manufacturer of the vaccines received; the requirement is two or more doses of Rotarix® (GSK) or three or more doses of rotavirus vaccine of any type. Beginning with the 2009 NIS-Child public-use data file, an up-to-date variable for rotavirus vaccine (**P_UTDROT_S**) was added to indicate up-to-date status, accounting for the manufacturer (3+ rotavirus doses of any type or 2+ Rotarix® doses).

Note that for this rotavirus up-to-date variable, if the manufacturer is unknown because the provider failed to check a type box on the IHQ, it has been assumed that the rotavirus vaccine dose is not Rotarix®; that is, this variable is based on a "strict" treatment of rotavirus vaccinations of unknown type, erring on the side of classifying the child as not up-to-date.

7.9. Section 9: Provider-Reported Age-At-Vaccination Variables

This section contains variables storing the child's age in days and months at each vaccination in the synthesized provider-reported vaccination history, along with the vaccine types of those vaccinations.

For each vaccine category, variables named **D*YYY*1 - D*YYY*9** and ***YYY*_AGE1 - *YYY*_AGE9** store the age in days and months, respectively, of the child when the vaccination was administered for up to nine vaccinations in the child's synthesized provider-reported vaccination history, where "YYY" is the vaccine category abbreviation given in Table 6. For vaccine categories that contain multiple vaccine types, variables **X*YYY*TY1 - X*YYY*TY9** give the corresponding vaccine type code (see Table 6).

Unlike the vaccination count and up-to-date variables in Section 8 of the public-use data file, the variables in Section 9 include vaccinations given both before and after the household interview was completed. If desired, users can limit the Section 9 variables to only those before the household interview date by examining the corresponding Section 8 "P_NUM" variable and limiting the analysis of the Section 9 variables to only the first *n* variables, where *n* is equal to the number of vaccinations in the vaccine category before the household interview date as indicated by the corresponding "P_NUM" variable.

Users of the public-use data file should be aware that the age-at-vaccination variables included in Section 9 may contain a small number of vaccination ages that are implausible according to the recommended immunization schedules (http://www.cdc.gov/vaccines/schedules/hcp/child-adolescent.html). Such ages may arise if a medical provider inadvertently records an erroneous vaccination date or if a vaccination date is incorrectly transcribed onto an IHQ. The quality control procedures of the NIS-Child address implausible ages to every extent possible. Suspicious dates are manually reviewed and corrected if there is evidence either from the household interview or from another provider that the date is incorrect. In rare cases, however, when there is no further information with which to correct the reported vaccination date, the vaccination is treated as having actually occurred and the implausible age at vaccination persists on the data file. The data user should consider these issues in deciding how to analyze the NIS-Child data.

7.10. Section 10: Health Insurance Module Variables

The Health Insurance Module (HIM) (Section E) was introduced in 2006 to gather information on the health insurance coverage of the child. HIM data were included in the NIS-Child public-use data file for the first time in 2007. Prior to 2016, seven variables containing HIM data were included in the NIS-Child public-use data file:

- INS_1 – "Is child covered by health insurance provided through employer or union?";
- INS_2 – "Is child covered by any MEDICAID plan?";
- INS_3 – "Is child covered by S-CHIP?";
- INS_3A – "Is child covered by any MEDICAID plan or S-CHIP?";
- INS_4_5 – "Is the child covered by Indian Health Service, Military Health Care, TRICARE, CHAMPUS, or CHAMP-VA?";
- INS_6 – "Is child covered by any other health insurance or health care plan?"; and
- INS_11 - "Anytime when child was not covered by health insurance?"

In 2016, these variables were replaced by two health insurance variables, INS_STAT_I and INS_BREAK_I, which summarize the child's health insurance status and history across all of the insurance questions listed above, while also incorporating the imputation of missing values and recoding of verbatim responses. In 2017, INS_STAT_I was replaced with INS_STAT2_I, which provides a different categorization of children with both private and non-private, non-Medicaid insurance.

INS_STAT2_I identifies the child's current health insurance coverage status. If the child has a form of private health insurance and is not covered by any other type of health insurance, he/she is classified as (1) Private only. If the child is on any form of Medicaid, alone or in addition to other forms of insurance, he/she is classified as (2) Any Medicaid. If the child is not covered by Medicaid but is covered by some other type of health insurance (including, but not limited to, CHIP, Indian Health Service, Military Health Care, TRICARE, CHAMPUS, or CHAMP-VA), either alone or in combination with private insurance, he/she is classified as (3) Other. If the child is not covered by any kind of health insurance, he/she is classified as (4) Uninsured.

INS_BREAK_I describes the child's coverage history since birth and indicates whether there have been any breaks in coverage during this period. A child may be (1) currently insured but uninsured at some point since birth, (2) currently insured and never uninsured since birth, (3) currently uninsured but insured at some point since birth, or (4) currently uninsured and never insured since birth.

Both of these variables are only available for children with adequate provider data who live in the non-territory United States.

8. Analytic and Reporting Guidelines

Data from the NIS-Child public-use data file can be used to produce national, state, and estimation-area estimates of vaccination coverage for children age 19-35 months surveyed in 2018 using the **PROVWT_C** weight. (As noted in Section 1 of this user's guide, beginning in 2018 vaccination coverage

estimates appearing on *ChildVaxView* and in the MMWR are based on a birth-cohort estimation approach. That is, the estimates are derived from the combination of 2 or 3 years of NIS-Child surveys (e.g., 2016-2018), and the estimates apply to the population of children born in particular years (e.g., 2015 or 2016). Therefore, estimates produced using the 2018 public-use file, which are based on 2018 NIS-Child data alone and apply to the population of 19-35 month old children, will differ from those appearing on *ChildVaxView* and in the MMWR.)

Information in the data file can also be used to calculate standard errors of the vaccination coverage estimates that reflect the complex sample design of the NIS-Child. The sample is stratified by the 59 estimation areas. The stratum identifier (**STRATUM**) and the coded household identifier (**SEQNUMHH**) are key variables for obtaining standard errors for estimation area, state, and national estimates of vaccination coverage rates. The estimation area variable **ESTIAP18** defines mutually exclusive and exhaustive geographic areas, while **STRATUM** is a combination of the estimation area variable for that year and the sampling frame (**as of 2018, all sample is from the cell-phone sample frame**).

Demographic and socioeconomic variables in the file can be used to obtain national vaccination coverage estimates for sub-groups of the population. Data users should, however, be aware that estimates for such sub-groups at the state or estimation area level will generally have large standard errors because of small sample sizes. The CDC standard for precision of sub-group estimates is that the ratio of the standard error to the estimate should be less than or equal to 0.3, and each analytic cell should contain at least 30 respondents.

8.1. Use of NIS-Child Sampling Weights

The 2018 NIS-Child public-use data file contains two child-level weights. The **RDDWT_C** variable gives the household-phase weight for all children 19 through 35 months in the United States. These weights should be used to form estimates from children with completed household interviews. The weights reflect the stratified sample design and also have been adjusted for unit non-response, for the

number of cell phones in the household, for post-stratification to population control totals, and for the exclusion of households without cell phones.

The weight variable that applies to children with adequate provider data is **PROVWT_C**. These weights should be used to form estimates of vaccination coverage. Each child with adequate provider data (**PDAT** = 1) has a positive value for **PROVWT_C**. Starting with the 2002 file, the definition of children with adequate provider data was expanded to include unvaccinated children (as discussed in Section 2). Table 9 presents a summary of the appropriate weights and stratum variables to use for various types of analyses.

The 2018 NIS-Child public-use data file does not contain any provider-level weights. The NIS-Child does not sample providers directly; rather, they are included in the survey through the children they vaccinate. A user of the file should not attempt provider-level analyses (e.g., estimate the percentage of providers in the U.S. that are private providers), because the NIS-Child sample was not designed for that purpose.

Table 9: Summary of Weights and Stratum Variables, National Immunization Survey - Child, 2018

Weight Variable	Population*	Sample Frame	Strata	Stratum Variable
RDDWT_C	United States excluding territories	Single Frame Cell-Phone	Sample Type by Estimation Area	STRATUM
PROVWT_C	United States excluding territories, children with adequate provider data	Single Frame Cell-Phone	Sample Type by Estimation Area	STRATUM

* Each weight will contain a missing value for all records that are not included in the population covered by the weight.

8.2. Estimation and Analysis

8.2.1. Estimating Vaccination Coverage Rates

Vaccination coverage rates are ratio estimators, as described in the statistical literature on methods for complex sample surveys. Because of the adjustment to the sampling weights for provider-phase non-response, statistical analyses require only data from children with adequate provider data (**PDAT** = 1),

along with their final provider sampling weights (**PROVWT_C**). To summarize the statistical methodology by which vaccination coverage rates and their standard errors are obtained from these data, let Y_{hij} be an indicator, for the *j*th child with adequate provider data in the *i*th sampled household in the *h*th stratum of the NIS-Child sampling design, equal to 1 if the child is up-to-date according to the provider data and 0 otherwise. Also, let W_{hij} denote the value of **PROVWT_C** for this child. Then, letting $\hat{Y}_h = \sum_{i=1}^{n_h}\sum_{j=1}^{m_{hi}} W_{hij}Y_{hij}$ and $\hat{T}_h = \sum_{i=1}^{n_h}\sum_{j=1}^{m_{hi}} W_{hij}$, the national estimator of the vaccination coverage rate may be expressed as

$$\hat{\theta} = \frac{\sum_{h=1}^{L}\hat{Y}_h}{\sum_{h=1}^{L}\hat{T}_h}$$

where *L* denotes the number of strata, n_h denotes the number of sampled households containing children with adequate provider data in the *h*th stratum, and m_{hi} denotes the number of age-eligible children with adequate provider data in the *i*th household in the *h*th stratum.

Letting *L* instead denote the number of strata in a state, the above formula can also be used to calculate vaccination coverage rates for states (regardless of whether the state contains only one or more than one stratum).

8.2.2. Estimating Standard Errors of Vaccination Coverage Rates

The Taylor-series method can be used to estimate the sampling variance of vaccination coverage rates for the U.S., the states, and estimation areas. Letting $Z_{hij} = \frac{W_{hij}(Y_{hij} - \hat{\theta})}{\sum_{h=1}^{L}\hat{T}_h}$, $Z_{hi} = \sum_{j=1}^{m_{hi}} Z_{hij}$, and $\overline{Z}_h = \frac{\sum_{i=1}^{n_h} Z_{hi}}{n_h}$ yields an estimator of the variance of the estimated vaccination coverage rate, $\hat{\theta}$, equal to

$$v(\hat{\theta}) = \sum_{h=1}^{L} \frac{n_h}{n_h - 1} \sum_{i=1}^{n_h} (Z_{hi} - \bar{Z}_h)^2$$

(Wolter, 2007). The standard error is the square root of the variance. The estimation of standard errors for estimates of vaccination coverage rates in the NIS-Child can be implemented in specialized statistical software such as SUDAAN (Research Triangle Institute 2008), SAS (SAS Institute Inc. 2003), R (Lumley, 2010), and Stata (Stata Corporation 2009). Appendix D gives several examples of the use of SAS, R, and SUDAAN to estimate vaccination coverage rates and their standard errors for estimation areas and states. For all procedures, the option of with-replacement sampling of primary sampling units within strata is used, because the sampling fractions for households within an estimation area are all quite small. For all estimates, the variable **STRATUM** is used as the stratum variable and the household identifier (**SEQNUMHH**) is used as the primary sampling unit identifier. The data file should be sorted first on **STRATUM** and then on **SEQNUMHH** before running the programs for SUDAAN and SAS.

8.3. Combining Multiple Years of NIS-Child Data

8.3.1. Estimation of Multi-Year Means

With release of the 2018 NIS-Child public-use data file, 23 years of public-use NIS-Child data are now available. The precision of estimates of vaccination coverage for sub-domains (e.g., by race/ethnicity of child) within estimation areas or states can be improved by combining two or more years of NIS-Child data. Data users should, however, be aware that estimates from combined years of NIS-Child data represent an average over two or more years. Although combining several years of NIS-Child data will yield a larger sample size for estimation areas and states, the composition of the population in a geographic area may change over time, making interpretation of the results difficult. Furthermore, if vaccination administration schedules or vaccination coverage changes over time, the estimate of vaccination coverage for the combined time period applies to a hypothetical population that existed at the middle of the time period, making interpretation of the results even more difficult. Given the use of

independent RDD samples in the NIS-Child, it is also possible that a child could appear in more than one public-use data file.

To estimate a multi-year mean for a given NIS-Child variable, the weights in each participating file (RDD-phase weights HY_WGT in 1995-2001, RDD_WT in 2002, WGT_RDD in 2003-2004, RDDWT in 2005-2010, RDDWT_D/RDDWT_LL in 2011, RDDWT_D/RDDWTVI_D in 2012, RDDWT_D/RDDWTVIGU_D in 2013, RDDWT_D/RDDWT_D_TERR in 2014-2016, RDDWT_D in 2017, and RDDWT_C in 2018**;** and provider-phase weights W0 in 1995-2001, WT in 2002, WGT in 2003-2004, PROVWT in 2005-2010, PROVWT_D/PROVWT_LL in 2011, PROVWT_D/PROVWTVI_D in 2012, PROVWT_D/PROVWTVIGU_D in 2013, PROVWT_D/PROVWT_D_TERR in 2014-2016, PROVWT_D in 2017, and PROVWT_C in 2018) should be divided by the number of years being combined. For example, if data for 2016, 2017, and 2018 for children in the United States (excluding territories) with adequate provider data are to be combined, then the weights that exclude the territories in the three files – called **PROVWT_D** in 2016-2017 and **PROVWT_C** in 2018 – should be divided by 3 to obtain revised weights, which should be saved as a new variable, say **NEWWT**. It is necessary to use **NEWWT** in the analysis to obtain correct weighted estimates for children aged 19 through 35 months. Furthermore, the child and household ID numbers (**SEQNUMC** and **SEQNUMHH**) in the files are unique only within a year, not across years. It is important for the user to create revised, unique ID numbers when combining data from multiple years.

The following SAS code can be used:

YRSEQC = 1 * (**YEAR** || **SEQNUMC**);

YRSEQHH = 1 * (**YEAR** || **SEQNUMHH**);

YEAR is the 4-digit year variable for the NIS-Child data year (e.g., 2018).

To produce valid estimates of sampling variability and valid confidence intervals for multi-year coverage rates and other multi-year means, it is necessary to use specialized software such as SAS or SUDAAN.

Beginning in 2005, an important new complication was introduced for variance estimation not encountered in previous NIS-Child years, because some traditional estimation areas were removed and other new areas were defined and introduced to the survey (see Section 2 above for more information about rotating estimation areas). The variance strata for 2004 and all prior years are defined by the variable **ITRUEIAP**, while the variance strata for 2005-2018 are defined by the variables **ESTIAP** for 2005, **ESTIAP06** for 2006, **ESTIAP07** for 2007, **ESTIAP08** for 2008, **ESTIAP09** for 2009, **ESTIAP10** for 2010, **STRATUM_D/ESTIAP11** for 2011, and **STRATUM** for 2012-2018, with **STRATUM_D** and **STRATUM** being a combination of the estimation area variable for that year and the sampling frame (landline or cell-phone). The estimation area variables **ITRUEIAP**, **ESTIAP**, and **ESTIAP06**-**ESTIAP18** define mutually exclusive and exhaustive geographic areas. However, they are not exactly the same areas. **For example, Dallas County, TX, was a separate estimation area in 2005-2012 and 2016-2017 but not in 2013-2015 and 2018. Other areas, such as New York City, NY and Rest of New York, are estimation areas in all years, including 2005-2018.**

To make inferences concerning multi-year means, the user must take two actions. First, he/she must define and save a new stratum variable with a common name for all years included in the analysis. Second, he/she must define a common set of estimation domains that can be supported by each of the files included in the multi-year analysis. To take these actions, the user should follow the following seven-step procedure (or its equivalent):

i. Compute and save the new, common variance-stratum variable for each year participating in the analysis. The variable should be defined by the equation

   STRATUMV = **ITRUEIAP**, for children in the 2004 or prior years' public-use data files

   = **ESTIAP**, for children in the 2005 public-use data file

= **ESTIAP06**, for children in the 2006 public-use data file

= **ESTIAP07**, for children in the 2007 public-use data file

= **ESTIAP08**, for children in the 2008 public-use data file

= **ESTIAP09**, for children in the 2009 public-use data file

= **ESTIAP10**, for children in the 2010 public-use data file

= STRATUM_D if using **PROVWT_D** or

ESTIAP11 if using **PROVWT_LL**, for children in the 2011 public-use data file

= STRATUM, for children in the 2012-2018 public-use data files

ii. Compute and save the new, common weight variable, **NEWWT**, as instructed above for each year participating in the analysis.

iii. Compute and save the new, unique child and household identification numbers, **YRSEQC** and **YRSEQHH**, as instructed above for each year participating in the analysis.

iv. Compute and save a variable defining the common estimation domains to be studied for each year participating in the analysis. For example, one could use the CDIAP (Common Denominator Estimation Area) variable set forth in Table 10 or states as geographic domains.

v. Merge the multiple files into one consolidated file in a format compatible with the specialized software to be used.

vi. Sort the consolidated file by **YEAR**, **STRATUMV**, and **YRSEQHH**.

vii. Run the specialized software on the consolidated file, computing estimates, variance estimates, and confidence intervals. For SUDAAN users, sampling levels or stages may be specified by the statement

NEST YEAR STRATUMV YRSEQHH / PSULEV = 3;

the specification of weights by

WEIGHT NEWWT;

and the specification of estimation domains, for example, by the two statements

CLASS YEAR CDIAP STATE;

```
TABLES CDIAP;

or

CLASS YEAR CDIAP STATE;
TABLES STATE;
```

8.3.2. Estimation of Multi-Year Contrasts

Considerations similar to those for multi-year means arise in the estimation of contrasts between NIS-Child years. For example, a typical contrast of interest would be the difference between the immunization coverage parameters in 2017 and in 2018.

To make inferences concerning a multi-year contrast, the user will need to work with the original weights reported on the files and store them in a common variable. One must not divide the original weights by the number of years included in the contrast. For example, one may define the new, common weight variable as

NEWWT2	=	**PROVWT_D/PROVWT_LL**	, if the child is in the 2011 PUF
	=	**PROVWT_D**	, if the child is in the 2012-2017 PUF
	=	**PROVWT_C**	, if the child is in the 2018 PUF.

The user should follow the seven-step procedure set forth in the section on multi-year means, using **NEWWT2** in lieu of **NEWWT**. In SUDAAN, the user should also specify the contrast of interest through use of a CONTRAST statement or an appropriate regression model. For example, to compare the 4:3:1:3:3:1 up-to-date estimate from 2017 to the 2018 estimate, SUDAAN users can use the following WEIGHT, VAR, and CONTRAST statements:

```
WEIGHT NEWWT2;
VAR PU431331;
CONTRAST YEAR = (-1 1);
```

Table 10: Cross-Walk Between ITRUEIAP, ESTIAP, ESTIAP06-ESTIAP18, and Common Denominator Estimation Area (CDIAP), National Immunization Survey - Child, 2018

CDIAP	Area Name	ITRUEIAP (1995-2004)	ESTIAP (2005)	ESTIAP06 (2006)	ESTIAP07 (2007)	ESTIAP08 (2008)	ESTIAP09 (2009)	ESTIAP10 (2010)	ESTIAP11 (2011)
	Alabama								
20	AL-Jefferson County	21	21	20	20	20	20	20	20
20	AL-Rest of State	20	20	20	20	20	20	20	20
74	Alaska	74	74	74	74	74	74	74	74
	Arizona								
66	AZ-Maricopa County	67	67	67	66	66	66	66	66
66	AZ-Rest of State	66	66	66	66	66	66	66	66
46	Arkansas	46	46	46	46	46	46	46	46
	California								
68	CA-Fresno County	68	68	84	68	68	68	68	68
68	CA-Los Angeles County	69	69	69	69	69	69	69	68
68	CA-Northern CA	68	68	85	68	85	68	68	68
68	CA-San Diego County	71	68	71	68	68	68	68	68
68	CA-Santa Clara County	70	68	70	68	70	68	68	68
68	CA-San Bernardino County	68	80	68	80	68	68	68	68
68	CA-Alameda County	68	79	68	79	68	68	68	68
68	CA-Rest of State	68	68	68	68	68	68	68	68
	Colorado								
60	CO-Denver	60	81	60	60	60	60	60	60
60	CO-Rest of State	60	60	60	60	60	60	60	60
1	Connecticut	1	1	1	1	1	1	1	1
13	Delaware	13	13	13	13	13	13	13	13
12	District of Columbia	12	12	12	12	12	12	12	12
	Florida								
22	FL-Miami-Dade County	24	22	24	24	24	22	22	22
22	FL-Duval County	23	23	23	22	22	22	22	22
22	FL-Orange County	22	22	22	22	91	22	22	22
22	FL-Rest of State	22	22	22	22	22	22	22	22
	Georgia								
25	GA-Fulton/DeKalb Counties	26	26	26	25	25	25	25	25
25	GA-Rest of State	25	25	25	25	25	25	25	25
72	Hawaii	72	72	72	72	72	72	72	72
75	Idaho	75	75	75	75	75	75	75	75
	Illinois								
35	IL-City of Chicago	35	35	35	35	35	35	35	35
34	IL-Madison and St. Clair Counties	34	34	34	34	92	34	34	34
34	IL-Rest of State	34	34	34	34	34	34	34	34
	Indiana								
36	IN-Lake County	36	36	36	36	36	96	36	36
36	IN-Marion County	37	36	37	37	36	37	36	36
36	IN-Rest of State	36	36	36	36	36	36	36	36
56	Iowa	56	56	56	56	56	56	56	56
	Kansas								
57	KS-Eastern KS	57	57	86	57	57	57	57	57
57	KS-Rest of State	57	57	57	57	57	57	57	57
27	Kentucky	27	27	27	27	27	27	27	27
	Louisiana								
47	LA-Orleans Parish	48	47	47	47	47	47	47	47
47	LA-Rest of State	47	47	47	47	47	47	47	47
4	Maine	4	4	4	4	4	4	4	4
	Maryland								
14	MD-City of Baltimore	15	15	15	14	15	15	14	14
14	MD-Prince George's County	14	14	14	14	14	14	14	103
14	MD-Rest of State	14	14	14	14	14	14	14	14

CDIAP	Area Name	ITRUEIAP (1995-2004)	ESTIAP (2005)	ESTIAP06 (2006)	ESTIAP07 (2007)	ESTIAP08 (2008)	ESTIAP09 (2009)	ESTIAP10 (2010)	ESTIAP11 (2011)
	Massachusetts								
2	MA-City of Boston	3	2	3	2	2	2	2	2
2	MA-Rest of State	2	2	2	2	2	2	2	2
	Michigan								
38	MI-City of Detroit	39	39	39	38	38	38	38	38
38	MI-Rest of State	38	38	38	38	38	38	38	38
	Minnesota								
40	MN-Twin Cities	40	40	40	40	93	40	40	40
40	MN-Rest of State	40	40	40	40	40	40	40	40
28	Mississippi	28	28	28	28	28	28	28	28
	Missouri								
58	MO-St. Louis County/City	58	82	58	58	58	58	58	58
58	MO-Rest of State	58	58	58	58	58	58	58	58
61	Montana	61	61	61	61	61	61	61	61
59	Nebraska	59	59	59	59	59	59	59	59
	Nevada								
73	NV-Clark County	73	83	73	73	73	73	73	73
73	NV-Rest of State	73	73	73	73	73	73	73	73
5	New Hampshire	5	5	5	5	5	5	5	5
	New Jersey								
8	NJ-City of Newark	9	9	9	8	8	8	8	8
8	NJ-Rest of State	8	8	8	8	8	8	8	8
	New Mexico								
49	NM-Southern NM	49	49	88	49	49	49	49	49
49	NM-Rest of State	49	49	49	49	49	49	49	49
	New York								
11	NY-City of New York	11	11	11	11	11	11	11	11
10	NY-Rest of State	10	10	10	10	10	10	10	10
29	North Carolina	29	29	29	29	29	29	29	29
62	North Dakota	62	62	62	62	62	62	62	62
	Ohio								
41	OH-Cuyahoga County	42	42	42	41	41	41	41	41
41	OH-Franklin County	43	43	41	41	41	41	41	41
41	OH-Rest of State	41	41	41	41	41	41	41	41
50	Oklahoma	50	50	50	50	50	50	50	50
76	Oregon	76	76	76	76	76	76	76	76
	Pennsylvania								
16	PA-Allegheny County	16	16	87	16	16	16	16	16
17	PA-Philadelphia County	17	17	17	17	17	17	17	17
16	PA-Rest of State	16	16	16	16	16	16	16	16
6	Rhode Island	6	6	6	6	6	6	6	6
30	South Carolina	30	30	30	30	30	30	30	30
63	South Dakota	63	63	63	63	63	63	63	63
	Tennessee								
31	TN-Davidson County	33	33	31	31	31	31	31	31
31	TN-Shelby County	32	32	32	31	31	31	31	31
31	TN-Rest of State	31	31	31	31	31	31	31	31
	Texas								
55	TX-Bexar County	55	55	55	55	55	55	55	55
54	TX-City of Houston	54	54	54	54	54	54	54	54
51	**TX-Dallas County**	52	52	52	52	52	52	52	52
51	**TX-El Paso County**	53	53	53	53	53	53	53	53
51	**TX-Hidalgo County**	51	51	51	51	51	51	51	51
51	**TX-Travis County**	51	51	51	51	51	51	51	51
51	**TX-Tarrant County**	51	51	51	51	51	51	51	51
51	TX-Rest of State	51	51	51	51	51	51	51	51
64	Utah	64	64	64	64	64	64	64	64

CDIAP	Area Name	ITRUEIAP (1995-2004)	ESTIAP (2005)	ESTIAP06 (2006)	ESTIAP07 (2007)	ESTIAP08 (2008)	ESTIAP09 (2009)	ESTIAP10 (2010)	ESTIAP11 (2011)
7	Vermont	7	7	7	7	7	7	7	7
18	Virginia	18	18	18	18	18	18	18	18
	Washington*								
77	WA-Eastern WA	77	77	771	77	774	774	97	77
77	WA-Western WA	77	77	77	773	774	774	102	77
77	WA-King County	78	78	78	77	77	77	102	77
77	WA-Rest of State	77	77	772	77	77	77	-	77
19	West Virginia	19	19	19	19	19	19	19	19
	Wisconsin								
44	WI-Milwaukee County	45	45	45	44	44	44	44	44
44	WI-Rest of State	44	44	44	44	44	44	44	44
65	Wyoming	65	65	65	65	65	65	65	65
-	Puerto Rico	-	-	-	-	-	-	-	-

* The estimation area WA-Eastern WA was introduced in 2006, and while this estimation area also existed in 2010, the county definition of the area changed, making cross-year comparisons inadvisable. The estimation area WA-Western WA, introduced in 2007, presents the same issue. The counties included in the area changed (e.g., in 2010 it included King County). Analysis of Washington state data across years should use the entire state as the "Common Denominator".

Table 10 (continued): Cross-Walk Between ITRUEIAP, ESTIAP, ESTIAP06-ESTIAP18, and Common Denominator Estimation Area (CDIAP), National Immunization Survey - Child, 2018

CDIAP	Area Name	ESTIAP12 (2012)	ESTIAP13 (2013)	ESTIAP14 (2014)	ESTIAP15 (2015)	ESTIAP16 (2016)	ESTIAP17 (2017)	ESTIAP18 (2018)
	Alabama							
20	AL-Jefferson County	20	20	20	20	20	20	20
20	AL-Rest of State	20	20	20	20	20	20	20
74	Alaska	74	74	74	74	74	74	74
	Arizona							
66	AZ-Maricopa County	66	66	66	66	66	66	66
66	AZ-Rest of State	66	66	66	66	66	66	66
46	Arkansas	46	46	46	46	46	46	46
	California							
68	CA-Fresno County	68	68	68	68	68	68	68
68	CA-Los Angeles County	68	68	68	68	68	68	68
68	CA-Northern CA	68	68	68	68	68	68	68
68	CA-San Diego County	68	68	68	68	68	68	68
68	CA-Santa Clara County	68	68	68	68	68	68	68
68	CA-San Bernardino County	68	68	68	68	68	68	68
68	CA-Alameda County	68	68	68	68	68	68	68
68	CA-Rest of State	68	68	68	68	68	68	68
	Colorado							
60	CO-Denver	60	60	60	60	60	60	60
60	CO-Rest of State	60	60	60	60	60	60	60
1	Connecticut	1	1	1	1	1	1	1
13	Delaware	13	13	13	13	13	13	13
12	District of Columbia	12	12	12	12	12	12	12
	Florida							
22	FL-Miami-Dade County	22	22	22	22	22	22	22
22	FL-Duval County	22	22	22	22	22	22	22
22	FL-Orange County	22	22	22	22	22	22	22
22	FL-Rest of State	22	22	22	22	22	22	22
	Georgia							
25	GA-Fulton/DeKalb Counties	25	25	25	25	25	25	25
25	GA-Rest of State	25	25	25	25	25	25	25
72	Hawaii	72	72	72	72	72	72	72
75	Idaho	75	75	75	75	75	75	75
	Illinois							
35	IL-City of Chicago	35	35	35	35	35	35	35
34	IL-Madison and St. Clair Counties	34	34	34	34	34	34	34
34	IL-Rest of State	34	34	34	34	34	34	34
	Indiana							
36	IN-Lake County	36	36	36	36	36	36	36
36	IN-Marion County	36	36	36	36	36	36	36
36	IN-Rest of State	36	36	36	36	36	36	36
56	Iowa	56	56	56	56	56	56	56
	Kansas							
57	KS-Eastern KS	57	57	57	57	57	57	57
57	KS-Rest of State	57	57	57	57	57	57	57
27	Kentucky	27	27	27	27	27	27	27
	Louisiana							
47	LA-Orleans Parish	47	47	47	47	47	47	47
47	LA-Rest of State	47	47	47	47	47	47	47
4	Maine	4	4	4	4	4	4	4
	Maryland							
14	MD-City of Baltimore	14	14	14	14	14	14	14
14	MD-Prince George's County	14	14	14	14	14	14	14

CDIAP	Area Name	ESTIAP12 (2012)	ESTIAP13 (2013)	ESTIAP14 (2014)	ESTIAP15 (2015)	ESTIAP16 (2016)	ESTIAP17 (2017)	ESTIAP18 (2018)
14	MD-Rest of State	14	14	14	14	14	14	14
	Massachusetts							
2	MA-City of Boston	2	2	2	2	2	2	2
2	MA-Rest of State	2	2	2	2	2	2	2
	Michigan							
38	MI-City of Detroit	38	38	38	38	38	38	38
38	MI-Rest of State	38	38	38	38	38	38	38
	Minnesota							
40	MN-Twin Cities	40	40	40	40	40	40	40
40	MN-Rest of State	40	40	40	40	40	40	40
28	Mississippi	28	28	28	28	28	28	28
	Missouri							
58	MO-St. Louis County/City	58	58	58	58	58	58	58
58	MO-Rest of State	58	58	58	58	58	58	58
61	Montana	61	61	61	61	61	61	61
59	Nebraska	59	59	59	59	59	59	59
	Nevada							
73	NV-Clark County	73	73	73	73	73	73	73
73	NV-Rest of State	73	73	73	73	73	73	73
5	New Hampshire	5	5	5	5	5	5	5
	New Jersey							
8	NJ-City of Newark	8	8	8	8	8	8	8
8	NJ-Rest of State	8	8	8	8	8	8	8
	New Mexico							
49	NM-Southern NM	49	49	49	49	49	49	49
49	NM-Rest of State	49	49	49	49	49	49	49
	New York							
11	NY-City of New York	11	11	11	11	11	11	11
10	NY-Rest of State	10	10	10	10	10	10	10
29	North Carolina	29	29	29	29	29	29	29
62	North Dakota	62	62	62	62	62	62	62
	Ohio							
41	OH-Cuyahoga County	41	41	41	41	41	41	41
41	OH-Franklin County	41	41	41	41	41	41	41
41	OH-Rest of State	41	41	41	41	41	41	41
50	Oklahoma	50	50	50	50	50	50	50
76	Oregon	76	76	76	76	76	76	76
	Pennsylvania							
16	PA-Allegheny County	16	16	16	16	16	16	16
17	PA-Philadelphia County	17	17	17	17	17	17	17
16	PA-Rest of State	16	16	16	16	16	16	16
6	Rhode Island	6	6	6	6	6	6	6
30	South Carolina	30	30	30	30	30	30	30
63	South Dakota	63	63	63	63	63	63	63
	Tennessee							
31	TN-Davidson County	31	31	31	31	31	31	31
31	TN-Shelby County	31	31	31	31	31	31	31
31	TN-Rest of State	31	31	31	31	31	31	31
	Texas							
55	TX-Bexar County	55	55	55	55	55	55	55
54	TX-City of Houston	54	54	54	54	54	54	54
51	**TX-Dallas County**	52	51	51	51	52	52	**51**
51	**TX-El Paso County**	53	53	53	53	53	53	**51**
51	**TX-Hidalgo County**	51	51	51	107	51	51	**107**
51	**TX-Travis County**	51	51	51	51	51	108	**51**
51	**TX-Tarrant County**	51	51	51	109	51	51	**109**
51	TX-Rest of State	51	51	51	51	51	51	51

CDIAP	Area Name	ESTIAP12 (2012)	ESTIAP13 (2013)	ESTIAP14 (2014)	ESTIAP15 (2015)	ESTIAP16 (2016)	ESTIAP17 (2017)	ESTIAP18 (2018)
64	Utah	64	64	64	64	64	64	64
7	Vermont	7	7	7	7	7	7	7
18	Virginia	18	18	18	18	18	18	18
	Washington*							
77	WA-Eastern WA	77	77	77	77	77	77	77
77	WA-Western WA	77	77	77	77	77	77	77
77	WA-King County	77	77	77	77	77	77	77
77	WA-Rest of State	77	77	77	77	77	77	77
19	West Virginia	19	19	19	19	19	19	19
	Wisconsin							
44	WI-Milwaukee County	44	44	44	44	44	44	44
44	WI-Rest of State	44	44	44	44	44	44	44
65	Wyoming	65	65	65	65	65	65	65
-	Puerto Rico	-	-	106	106	106	-	-

* The estimation area WA-Eastern WA was introduced in 2006, and while this estimation area also existed in 2010, the county definition of the area changed, making cross-year comparisons inadvisable. The estimation area WA-Western WA, introduced in 2007, presents the same issue. The counties included in the area changed (e.g., in 2010 it included King County). Analysis of Washington state data across years should use the entire state as the "Common Denominator".

9. Summary Tables

Appendix F contains seven tables. Appendix Table F.1 lists the 59 estimation areas for the 2018 NIS-Child by state. At the national level and for each state and estimation area, it provides the estimated population total of children aged 19 through 35 months of age in 2018, and (from 2018 NIS-Child data collection) the number of children with completed household interviews and number of children with adequate provider data.

Appendix Tables F.2 through F.6 summarize pairs of variables: age group of child by maternal education (Appendix Table F.2), age group by family poverty status (Appendix Table F.3), race/ethnicity by family poverty status (Appendix Table F.4), age group by race/ethnicity (Appendix Table F.5), and age group by sex (Appendix Table F.6). Each of these tables gives the unweighted and weighted counts of children who have completed household interviews and the unweighted and weighted counts of children with adequate provider data.

Appendix Table F.7 presents estimates of vaccination coverage and symmetric 95% confidence intervals obtained from SUDAAN. The data user should obtain the same estimates from the 2018 NIS-Child public-use data file. (As noted in Section 1 of this report, these estimates will differ from those appearing

on *ChildVaxView* and in the MMWR, which use multiple years of NIS-Child data and apply to the population of children born in particular years rather than using a single year of NIS-Child data and applying to the population of children age 19-35 months.)

Appendix G contains four tables and time-series charts. Table G.1 and Figure G.1 show key components of the NIS-Child response rates and the CASRO response rates for the landline sample by year of the survey. Table G.2 and Figure G.2 show key components of the NIS-Child response rates and the CASRO response rates for the cell-phone sample by year of the survey. Table G.3 and Figure G.3 show the CASRO response rates for the combined landline and cell-phone samples. Table G.4 and Figure G.4 show vaccination coverage estimates since 1995.

Appendix H shows the vaccine type codes used in the 2018 NIS-Child public-use data file.

Appendix I presents key response rate components and the overall CASRO response rate by estimation area in the 2018 NIS-Child.

10. Assessment of Total Survey Error

Assessing the validity of the NIS-Child estimates of vaccination coverage is a critical and ongoing aspect of the NIS-Child surveillance program. CDC frequently conducts evaluation studies and controlled experiments to understand the causes and impacts of sampling and nonsampling errors on the estimates and to enable formulation of methodological refinements that have the demonstrated capacity to improve data quality. As landline phone use decreased and cell phone use increased dramatically over the past decade, and the NIS-Child transitioned first from a single-frame landline RDD sampling design to a dual-frame landline and cell phone RDD design and then to a single-frame cell phone RDD design, CDC has monitored the NIS-Child estimates utilizing a Total Survey Error (TSE) approach.

TSE is the sum of the errors that arise at every step of a survey, including both sampling error and nonsampling errors such as coverage, nonresponse, and measurement errors (Mulry and Spencer, 1991).

Pooling information from multiple evaluations of their precision and accuracy, we have conducted TSE analyses for the 2009-2013 and 2018 NIS-Child and NIS-Teen data (Molinari et al. 2011; NORC 2011; Pineau et al. 2012; Pineau et al. 2013; Skalland et al. 2016; Wolter et al. 2017b).

An assessment based on 2018 NIS-Child data was conducted in 2019, with results summarized in this report.

***Comparison of Demographic Distributions*. Demographic distributions (age, sex, mother's race/ethnicity, mother's education, mother's age) among children with adequate provider data were compared to benchmark values derived from natality data supplied by the National Vital Statistics System. When using design weights that have not been adjusted for nonresponse or calibrated to external population totals, demographic distributions as estimated in the NIS-Child were generally close to the population distributions. Before calibration of the weights to external population totals, the 2018 NIS-Child somewhat overrepresented children whose mothers are college graduates, non-Hispanic White, or age 30 or greater, and somewhat underrepresented children whose mothers are not college graduates, are non-Hispanic Black, or are under age 30. When using the final weights that have been adjusted for nonresponse and calibrated to external population totals, the demographic differences between survey and population are greatly reduced, but the 2018 NIS-Child still slightly overrepresented children whose mothers are college graduates (38.3% in survey, 31.7% in population) or are age 30 or greater (64.8% in survey, 61.9% in population).**

***Comparison to IISAR Vaccination Coverage Rates*. Next, NIS-Child vaccination coverage rate estimates were compared to vaccination coverage rates set forth in the Immunization Information Systems Annual Report (IISAR). The IISAR is an annual assessment sponsored and conducted by**

NCIRD of Immunization Information Systems (IIS)[1] activity among the 64 immunization program awardees, which include the 50 states, 6 cities (Chicago, District of Columbia, Houston, New York City, Philadelphia and San Antonio), and 8 U.S. territories. To evaluate each awardee's performance, the immunization program manager in the awardee area is asked to complete a self-administered and web-based questionnaire asking for demographic and immunization information, public and private provider site participation levels, and information about fulfillment of IIS functional standards. NCIRD provides competitive supplemental funds to awardees that have achieved consistently high standards. During the period 2013-2017 six awardees have been recognized as *sentinel sites*, including Michigan, Minnesota, North Dakota, New York City, Oregon, and Wisconsin. Because of the higher standards they achieve, vaccination coverage rates reported in IISAR by sentinel sites are thought to be relatively more accurate than vaccination rates reported by non-sentinel sites.

NIS-Child vaccination coverage rate estimates were found to be generally higher than IISAR vaccination coverage rates. For the six sentinel sites, good agreement was observed between NIS-Child and IISAR rates, with the difference between the NIS-Child and IISAR vaccination coverage rate for the combined 7-vaccine series in 2017 ranging from -7.5 to 6.7 percentage points across the six sentinel sites. Further, it was established that the child participation rate – the proportion of children in the IIS jurisdiction with two or more vaccine doses in the IIS database – is a reasonable indicator of the quality of the corresponding IIS database, as the IIS vaccination coverage rate was found to increase as the child participation rate increases. Furthermore, it was observed that the difference between NIS-Child and IISAR vaccination coverage rates declines as the child participation rate increases (i.e., as the quality of the IIS increases). These findings are consistent

[1] State IIS's are computer databases that aspire to contain information about all of the doses of all vaccines administered to all children resident within the state. It is known that different state IIS's vary in their completeness of both children and the doses they received.

with the view that IIS vaccination coverage rates converge towards NIS-Child vaccination coverage rates as the quality of the IIS increases.

***Comparison of Health Insurance Distributions*. NIS-Child health insurance distributions were compared to similar distributions produced by the Current Population Survey (CPS), the National Health Interview Survey (NHIS), and the American Community Survey (ACS). All of these surveys use somewhat different definitions of insurance status and report for different age ranges of children. Nevertheless, we found the NIS-Child distributions to be broadly similar to those from the CPS, NHIS, and ACS, but with some differences. NIS-Child estimates of percent of children with any public insurance (54.5% in 2017, 52.9% in 2018) were higher than the corresponding benchmark estimates (41.3% (NHIS), 44.9% (CPS), and 46.7% (ACS) in 2017, 41.8% (NHIS) in 2018), and the NIS-Child estimates of uninsured children (2.7% in 2017, 3.3% in 2018) were lower than the estimates from the benchmark surveys (5.0% (NHIS), 6.0% (CPS), and 3.9% (ACS) in 2017, 5.2% (NHIS) in 2018).**

***Comparison to State Immunization Surveys*. A comparison of NIS-Child vaccination coverage rate estimates to estimates from the Tennessee Immunization Status Survey (TIS) was undertaken. NIS-Child and TIS vaccination coverage rates were found to be broadly similar in 2017 and 2018. Across the time period 2011-2018, the NIS-Child vaccination coverage rates exhibited greater random fluctuation from year to year than the TIS vaccination rates, likely due to TIS having a six-fold larger sample size.**

Next, an assessment of all sources of error in the 2018 NIS-Child was conducted, including sample-frame coverage error, nonresponse error, and measurement error; the component errors were then combined to assess total survey error. The change in total survey error between the 2017 NIS-Child and 2018 NIS-Child was also estimated.

Coverage Error. **The NIS-Child cell-phone RDD sampling frame fails to cover only the landline only and phoneless populations; vaccination coverage rates in the former were estimated using data collected in the 2017 NIS-Child and vaccination coverage rates in the latter were estimated using data collected in the 2012 NHIS Provider Record Check. The vaccination coverage rates in the population covered by the sampling-frame were found to be greater than the vaccination rates in the uncovered population. Because the sampling-frame uncovered population is so small relative to the covered population, however, mean sampling-frame coverage error was estimated to be only around 0.5 percentage points for most vaccines/series.**

Nonresponse Error**. Nonresponse error in the 2018 NIS-Child was assessed through comparison to the cell-phone domain within the 2018 NHIS. NHIS does not offer direct estimates of vaccination coverage rates. Instead, a model-based technique was used to impute NHIS vaccination status, and then the resulting NHIS vaccination coverage rates (treated as vaccination coverage rates void of nonresponse error) were compared to NIS-Child vaccination coverage rates, with the difference treated as nonresponse error in the NIS-Child. Despite nonresponse in the 2018 NIS-Child, including household nonresponse, non-consent to contact vaccination providers, and provider nonresponse, mean nonresponse error in vaccination rates was estimated to be quite small (0.2 to 2.0 percentage points when using design weights for NIS-Child, 0.6 to 1.1 percentage when using final weights that account for the survey's nonresponse adjustments) and not statistically significant.**

Measurement Error**. A form of measurement error called "provider under-reporting" was assessed. Sometimes called "under-ascertainment," provider under-reporting error arises when a child with adequate provider data is truly vaccinated but is reported as unvaccinated in the child's provider-reported vaccination history. Under-reporting error can occur if the household respondent fails to nominate all of the child's vaccination providers, if one or more of the child's nominated vaccination providers fails to report a vaccination history for the child, or if one or more of the**

child's nominated providers reports a vaccination history but fails to report all of the vaccinations the child has received. Underreporting error was estimated using data from projects sponsored by CDC in which the 2017 NIS-Child sample of children in selected states was matched to the state IIS. In this work, the standard of truth for a given child is taken to be the synthesis of the NIS-Child and IIS vaccination histories. In prior studies conducted in 2012 and 2013 using similar methods, measurement error was found to be by far the largest component of error in the NIS-Child vaccination rates. Similar conclusions were reached for the 2018 NIS-Child, where it was estimated that measurement error depressed observed vaccination rates by about 4 to 9 percentage points.

***Total Survey Error*. Finally, all of the component errors were combined to assess the distribution of total error in the NIS-Child vaccination coverage rates, using a Monte Carlo technique. The mean of the distribution is an estimate of the total error, and the 2.5 and 97.5 percentiles of the distribution form a 95% credible interval for the total error. The estimated component errors and total survey errors are presented in Table 11. For the 4+ DTaP vaccination coverage rate, the mean of the TSE distribution was found to be -3.8 percentage points with a 95% credible interval of (-8.3, 2.3) percentage points. That is, the NIS-Child vaccination coverage rate was on average about 3.8 percentage points too low. For the 1+ MMR vaccination coverage rate, the mean of the TSE distribution was found to be -2.2 percentage points with a 95% credible interval of (-5.5, 3.6) percentage points, and for the combined 7-vaccine series, the mean of the TSE distribution was found to be –9.0 percentage points with a credible interval of (-14.2, -2.7) percentage points. Under-ascertainment of the provider-reported vaccination history dominated total survey error.**

***Change in Total Survey Error*. Change in TSE between the 2017 and 2018 NIS-Child was measured using the bridging cohort method pioneered by Yankey, Hill, Elam-Evans, et al. (2015). Each survey quarter includes children born in 20 monthly birth cohorts. Every pair of adjacent survey quarters spans 23 monthly birth cohorts, of which 17 are in common and 6 are not in common. In turn, every survey year represents 29 monthly birth cohorts. Every pair of adjacent survey years**

spans 39 monthly birth cohort, of which 17 are in common and 22 are not in common. The 17 common months comprise the *bridging cohort,* and for 2017 and 2018, the bridging cohort extends from children born in January 2015 through children born in May 2016.

Consider a vaccination coverage rate estimated from the bridging cohort as of a given child age, such as 19 months or 24 months. Two estimates are possible, one using the sample of children in the bridging cohort within the 2017 NIS-Child sample and the second using the corresponding sample of children within the 2018 NIS-Child sample. Ideally, the two estimators should exhibit the same expectation. A large difference between the two estimates may signal a change in the expectation from one survey year to the next, which could result from a change in the distribution of sampling-frame coverage error, nonresponse error, or measurement error. Differences may also result simply from the effects of random sampling error.

None of the differences between 2017 and 2018 in national-level vaccination coverage rate estimates for the bridging cohort were found to be statistically significant at the 0.05 level (Hill et al., 2019b). Overall, the results suggest there is little statistical evidence of a change in the expectation of total survey error between 2017 and 2018.

Table 11: Mean and 95% Credible Interval for the Estimated Total Survey Error (TSE) Distribution and Component Error Distributions for National Vaccination Coverage Rate Estimates, National Immunization Survey - Child, 2018

Vaccine or Series	Component	Mean TSE (pct points)	95% Credible Interval (pct points)
4+ DTaP	TSE (final weighted)	-3.8	(-8.3, 2.3)
	TSE (design weighted)	-2.8	(-7.3, 3.3)
	Noncoverage error	0.2	(-0.6 1.3)
	Nonresponse error	2.3	(-3.0, 9.1)
	Measurement error	-5.3	(-7.4, -3.0)
	Sampling error	0.1	(-2.5, 3.1)
1+ MMR	TSE (final weighted)	-2.2	(-5.5, 3.6)
	TSE (design weighted)	-2.5	(-5.7, 3.3)
	Noncoverage error	0.2	(-0.4, 1.1)
	Nonresponse error	1.0	(-3.1, 7.4)

Vaccine or Series	Component	Mean TSE (pct points)	95% Credible Interval (pct points)
	Measurement error	-3.6	(-5.2, -1.6)
	Sampling error	0.2	(-2.0, 2.8)
7-vaccine series	TSE (final weighted)	-9.0	(-14.2, -2.7)
	TSE (design weighted)	-8.2	(-13.4, -1.9)
	Noncoverage error	0.6	(-0.4, 1.9)
	Nonresponse error	0.4	(-5.8, 7.7)
	Measurement error	-9.2	(-11.9, -6.3)
	Sampling error	0.1	(-3.3, 3.8)

11. Limitations

The findings in this report are subject to at least four limitations. First, because NIS-Child is a telephone survey, results are weighted to be representative of all children aged 19 through 35 months. Although statistical adjustments were made to account for non-response and households without cell phones, some bias might remain. Second, underestimates of vaccination coverage might have resulted from the exclusive use of provider-reported vaccination histories because completeness of these records is unknown. Third, although national estimates of vaccination coverage are precise, estimates for state and local areas should be interpreted with caution because their sample sizes are smaller and their confidence intervals generally are wider than those for national estimates. Finally, analysis of trends across data years that span from 2010 and earlier to 2011-2017 and from 2011-2017 to 2018 are subject to potential bias that may remain after weighting adjustments because of the switch from landline to dual landline and cell-phone frames in 2011, and from dual landline and cell-phone frames to a single cell-phone frame in 2018 (Hill et al., 2019a). In addition, analysis of trends across data years that span from 2011 to 2017 are subject to potential bias that may remain after weighting adjustments because of the expansions and reductions of the share of the total sample that came from the cell-phone frame across these years.

12. Citations for NIS-Child Data

In publications, please acknowledge the original data source. The citation for the 2018 NIS-Child public-use data file is:

U.S. Department of Health and Human Services (DHHS). National Center for Immunization and Respiratory Diseases . The 2018 National Immunization Survey-Child, Atlanta, GA : Centers for Disease Control and Prevention, 2020.

Information about the NIS-Child is located at http://www.cdc.gov/vaccines/imz-managers/nis/about.html.

The NIS-Child public-use data files are located at http://www.cdc.gov/vaccines/imz-managers/nis/datasets.html.

Please place the acronym "NIS-Child" in the titles, keywords, or abstracts of journal articles and other publications in order to facilitate retrieval of such materials in bibliographic searches.

The following publications use NIS-Child data, published from 2010 or later:

2019

Beauregard JL, Hamner HC, Chen J, Avila-Rodriguez W, Elam-Evans LD, Perrine CG. Racial Disparities in Breastfeeding Initiation and Duration Among U.S. Infants Born in 2015. MMWR Morb Mortal Wkly Rep 2019;68:745–748. DOI: http://dx.doi.org/10.15585/mmwr.mm6834a3

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Sederdahl BK, Orenstein WA, Yi J, Anderson EJ, Bednarczyk RA. Missed opportunities for rotavirus vaccination. Pediatrics 2019;143(5) (online)

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Appendix A: Glossary of Abbreviations and Terms

3:3:1	The series of 3 or more DTaP vaccinations, 3 or more polio vaccinations, and 1 or more MCV vaccinations
4:3:1	The series of 4 or more DTaP vaccinations, 3 or more polio vaccinations, and 1 or more MCV vaccinations
4:3:1:3	The series of 4 or more DTaP vaccinations, 3 or more polio vaccinations, 1 or more MCV vaccinations, and 3 or more Hib vaccinations of any type
4:3:1:3* (routine Hib)	The series of 4 or more DTaP vaccinations, 3 or more polio vaccinations, 1 or more MCV vaccinations, and 3 or 4 Hib vaccinations depending on manufacturer (routine recommendation)
4:3:1:3:3	The series of 4 or more DTaP vaccinations, 3 or more polio vaccinations, 1 or more MCV vaccinations, 3 or more Hib vaccinations of any type, and 3 or more hepatitis B vaccinations
4:3:1:3*:3 (routine Hib)	The series of 4 or more DTaP vaccinations, 3 or more polio vaccinations, 1 or more MCV vaccinations, 3 or 4 Hib vaccinations depending on manufacturer (routine recommendation), and 3 or more hepatitis B vaccinations
4:3:1:3:3:1	The series of 4 or more DTaP vaccinations, 3 or more polio vaccinations, 1 or more MCV vaccinations, 3 or more Hib vaccinations of any type, 3 or more hepatitis B vaccinations, and 1 or more varicella vaccinations given at age 12 months or older
4:3:1:3*:3:1 (routine Hib)	The series of 4 or more DTaP vaccinations, 3 or more polio vaccinations, 1 or more MCV vaccinations, 3 or 4 Hib vaccinations depending on manufacturer (routine recommendation), 3 or more hepatitis B vaccinations, and 1 or more varicella vaccinations given at age 12 months or older
4:3:1:3:3:1:3	The series of 4 or more DTaP vaccinations, 3 or more polio vaccinations, 1 or more MCV vaccinations, 3 or more Hib vaccinations of any type, 3 or more hepatitis B vaccinations, 1 or more varicella vaccinations given at age 12 months or older, and 3 or more pneumococcal vaccinations
4:3:1:3*:3:1:3 (routine Hib)	The series of 4 or more DTaP vaccinations, 3 or more polio vaccinations, 1 or more MCV vaccinations, 3 or 4 Hib vaccinations depending on manufacturer (routine recommendation), 3 or more hepatitis B vaccinations, 1 or more varicella vaccinations given at age 12 months or older, and 3 or more pneumococcal vaccinations
4:3:1:3:3:1:4	The series of 4 or more DTaP vaccinations, 3 or more polio vaccinations, 1 or more MCV vaccinations, 3 or more Hib vaccinations of any type, 3 or more hepatitis B vaccinations, 1 or more varicella vaccinations given at age 12 months or older, and 4 or more pneumococcal vaccinations

4:3:1:3*:3:1:4 (routine Hib)	The series of 4 or more DTaP vaccinations, 3 or more polio vaccinations, 1 or more MCV vaccinations, 3 or 4 Hib vaccinations depending on manufacturer (routine recommendation), 3 or more hepatitis B vaccinations, 1 or more varicella vaccinations given at age 12 months or older, and 4 or more pneumococcal vaccinations
CATI	Computer-assisted telephone interviewing
CDC	Centers for Disease Control and Prevention
CII	Childhood Immunization Initiative
DOB	Date of birth
DTaP	Diphtheria and tetanus toxoids and acellular pertussis vaccine adsorbed
DTP	Diphtheria and tetanus toxoids and pertussis vaccine
DT	Diphtheria and tetanus toxoids adsorbed
H1N	Monovalent 2009 H1N1 influenza
Hep A	Hepatitis A vaccine
Hep B	Hepatitis B vaccine
Hib	*Haemophilus influenzae* type b conjugate vaccine
Hib routine recommendation	Four or more doses of Hib vaccine of any type, or two or more doses of Hib vaccine of Merck types followed by one dose of Hib vaccine of any type
Hib shortage recommendation	Three or more doses of Hib vaccine of any type or two or more doses of Hib vaccine of Merck types
IAP	Immunization Action Plan
IHQ	Immunization history questionnaire
IPV	Inactivated poliovirus vaccine
MCV	Measles-containing vaccine
MMR	Measles, mumps, and rubella vaccine
NCHS	National Center for Health Statistics
NCIRD	National Center for Immunization and Respiratory Diseases
NIS	National Immunization Surveys

NIS-Child	National Immunization Survey-Child
NHIS	National Health Interview Survey
NIP	National Immunization Program
OPV	Oral poliovirus vaccine
PCV	Pneumococcal conjugate vaccine
PRC	Provider Record Check
PUF	Public-use (Data) File
RDD	Random digit dialing
RV	Rotavirus
SC	Shot card
UTD	Up-to-date
VFC	Vaccines for Children
VAR	Varicella vaccine

Appendix B: Summary Statistics for Sampling Weights by Estimation Area

Table B.1: Distribution of Sampling Weights* for Children with Completed Household Interviews, National Immunization Survey - Child, 2018

State/Estimation Area	n	Sum	Minimum	Maximum	Mean	Coefficient of Variation
U.S. National†	28,971	5,747,343.07	3.28	6,015.94	198.38	175.46
Alabama	566	85,379.93	16.71	468.44	150.85	70.64
Alaska	396	15,505.30	8.42	91.52	39.15	42.41
Arizona	488	124,239.58	51.99	726.48	254.59	55.95
Arkansas	452	54,645.63	14.84	337.02	120.90	60.20
California	626	712,397.48	7.71	6,015.94	1138.02	145.54
Colorado	446	96,712.66	4.98	948.29	216.84	91.56
Connecticut	319	52,334.23	7.61	529.88	164.06	70.32
Delaware	481	16,320.43	6.58	91.56	33.93	60.93
District of Columbia	589	12,396.19	3.62	76.73	21.05	82.68
Florida	601	338,703.79	5.80	2,600.94	563.57	97.74
Georgia	632	191,697.36	7.39	966.30	303.32	78.80
Hawaii	448	25,823.79	14.76	153.24	57.64	54.47
Idaho	363	32,655.44	5.26	246.89	89.96	55.79
Illinois	924	218,288.08	5.76	698.75	236.24	65.18
IL-City of Chicago	292	54,337.02	5.76	600.72	186.09	78.69
IL-Rest of State	632	163,951.06	19.65	698.75	259.42	58.58
Indiana	517	121,149.84	8.97	652.78	234.33	62.47
Iowa	346	56,468.19	45.21	407.92	163.20	47.34
Kansas	318	56,384.38	10.11	481.50	177.31	54.54
Kentucky	343	78,767.91	19.84	584.22	229.64	53.97
Louisiana	457	88,894.59	9.33	589.89	194.52	68.32
Maine	464	18,079.45	4.09	103.70	38.96	54.36
Maryland	722	105,972.90	10.31	562.29	146.78	107.72
Massachusetts	466	104,137.89	6.98	1,045.44	223.47	96.79
Michigan	499	163,285.68	8.14	960.07	327.23	62.39
Minnesota	397	101,670.23	3.28	1,239.78	256.10	93.09
Mississippi	662	54,222.59	12.26	235.12	81.91	60.29
Missouri	440	107,821.16	10.21	684.28	245.05	53.93
Montana	477	17,869.74	8.31	101.21	37.46	56.59
Nebraska	393	38,625.82	8.32	297.44	98.28	60.45
Nevada	499	54,665.36	10.07	319.28	109.55	57.04
New Hampshire	427	19,279.73	11.20	132.70	45.15	58.95
New Jersey	653	151,337.84	7.27	823.12	231.76	72.70
New Mexico	537	35,485.05	5.52	204.34	66.08	68.83
New York	995	332,890.80	6.53	1,468.98	334.56	77.83
NY-City of New York	576	166,527.65	9.21	953.73	289.11	66.63
NY-Rest of State	419	166,363.15	6.53	1,468.98	397.05	80.99
North Carolina	647	178,989.90	10.28	862.67	276.65	70.70
North Dakota	424	17,360.45	14.83	102.45	40.94	46.92
Ohio	540	197,266.37	8.01	1,020.80	365.31	67.02
Oklahoma	601	75,779.31	23.78	362.23	126.09	49.58
Oregon	319	66,738.80	4.61	721.16	209.21	70.48
Pennsylvania	1,011	201,717.16	6.97	1,194.49	199.52	132.10

State/Estimation Area	n	Sum	Minimum	Maximum	Mean	Coefficient of Variation
PA-Philadelphia County	443	31,448.19	6.97	203.23	70.99	56.98
PA-Rest of State	568	170,268.97	15.52	1,194.49	299.77	105.22
Rhode Island	420	16,017.31	10.42	88.51	38.14	38.32
South Carolina	580	82,845.46	5.46	421.55	142.84	67.88
South Dakota	407	18,166.38	10.10	110.27	44.63	54.26
Tennessee	381	119,714.84	9.72	1,079.05	314.21	77.97
Texas	3,236	594,185.65	13.97	952.37	183.62	109.73
TX-Bexar County	441	41,296.35	19.07	250.50	93.64	56.61
TX-City of Houston	369	81,827.53	69.02	504.56	221.75	40.20
TX-Hidalgo County	444	22,763.26	13.97	147.84	51.27	49.56
TX-Tarrant County	461	42,163.96	23.98	237.50	91.46	46.72
TX-Rest of State	1,521	406,134.55	17.21	952.37	267.02	95.89
Utah	453	73,916.75	31.41	395.57	163.17	50.55
Vermont	392	8,009.99	4.74	55.11	20.43	57.70
Virginia	687	147,173.66	3.46	1,057.42	214.23	140.62
Washington	431	132,488.85	5.68	1,394.35	307.40	90.10
West Virginia	567	28,462.11	20.65	118.73	50.20	35.00
Wisconsin	505	94,874.25	15.93	484.76	187.87	51.08
Wyoming	427	9,526.76	8.92	54.94	22.31	47.98

* Distribution of RDDWT_C.

† Excludes U.S. territories.

Table B.2: Distribution of Sampling Weights* for Children with Adequate Provider Data, National Immunization Survey - Child, 2018

State/Estimation Area	n	Sum	Minimum	Maximum	Mean	Coefficient of Variation
U.S. National†	15,657	5,747,343.07	3.77	13,286.81	367.08	191.10
Alabama	303	85,379.93	35.91	908.03	281.78	84.72
Alaska	228	15,505.30	10.73	192.29	68.01	63.33
Arizona	255	124,239.58	80.60	1,439.07	487.21	62.05
Arkansas	244	54,645.63	24.24	668.79	223.96	68.65
California	296	712,397.48	9.41	13,286.81	2406.75	149.54
Colorado	245	96,712.66	7.58	1,713.68	394.75	94.94
Connecticut	166	52,334.23	15.94	1,015.66	315.27	68.52
Delaware	247	16,320.43	6.67	181.76	66.07	63.52
District of Columbia	312	12,396.19	3.77	155.60	39.73	98.06
Florida	306	338,703.79	9.24	5,164.44	1106.88	101.87
Georgia	324	191,697.36	10.27	2,027.81	591.66	87.95
Hawaii	230	25,823.79	25.77	323.99	112.28	59.91
Idaho	202	32,655.44	6.54	524.07	161.66	69.08
Illinois	474	218,288.08	8.10	1,573.65	460.52	73.19
IL-City of Chicago	158	54,337.02	8.10	1,333.10	343.91	91.03
IL-Rest of State	316	163,951.06	37.40	1,573.65	518.83	64.36
Indiana	279	121,149.84	12.20	1,420.57	434.23	69.84
Iowa	207	56,468.19	66.34	700.85	272.79	56.32
Kansas	193	56,384.38	15.33	838.05	292.15	62.08
Kentucky	175	78,767.91	51.03	1,305.85	450.10	69.52
Louisiana	235	88,894.59	15.27	1,386.13	378.27	99.46
Maine	263	18,079.45	9.71	199.13	68.74	59.48
Maryland	367	105,972.90	14.25	1,166.20	288.75	110.72
Massachusetts	282	104,137.89	8.45	1,721.34	369.28	106.08
Michigan	294	163,285.68	13.11	1,636.75	555.39	67.78
Minnesota	217	101,670.23	5.19	2,165.24	468.53	105.64
Mississippi	299	54,222.59	34.86	575.14	181.35	71.14
Missouri	243	107,821.16	15.29	1,432.00	443.71	64.17
Montana	280	17,869.74	8.31	189.55	63.82	57.58
Nebraska	230	38,625.82	25.71	603.69	167.94	70.59
Nevada	260	54,665.36	18.75	572.76	210.25	59.87
New Hampshire	220	19,279.73	19.95	274.44	87.64	59.95
New Jersey	313	151,337.84	8.18	1,731.89	483.51	84.68
New Mexico	313	35,485.05	8.25	385.22	113.37	75.39
New York	504	332,890.80	9.35	3,194.87	660.50	88.89
NY-City of New York	291	166,527.65	11.21	1,987.11	572.26	84.07
NY-Rest of State	213	166,363.15	9.35	3,194.87	781.05	88.33
North Carolina	351	178,989.90	14.18	1,694.40	509.94	80.78
North Dakota	241	17,360.45	20.34	206.85	72.04	53.42
Ohio	282	197,266.37	14.33	2,174.62	699.53	75.96
Oklahoma	329	75,779.31	40.05	639.57	230.33	50.53
Oregon	192	66,738.80	7.14	1,246.30	347.60	85.18
Pennsylvania	548	201,717.16	10.22	2,457.22	368.10	137.66
PA-Philadelphia County	235	31,448.19	10.22	385.17	133.82	67.70
PA-Rest of State	313	170,268.97	26.68	2,457.22	543.99	112.07
Rhode Island	249	16,017.31	18.51	153.58	64.33	43.42
South Carolina	296	82,845.46	7.67	913.26	279.88	82.10
South Dakota	209	18,166.38	25.27	232.32	86.92	61.34

State/Estimation Area	n	Sum	Minimum	Maximum	Mean	Coefficient of Variation
Tennessee	228	119,714.84	15.25	1,804.86	525.07	76.63
Texas	1,747	594,185.65	23.93	1,895.47	340.12	116.69
TX-Bexar County	243	41,296.35	41.85	466.88	169.94	57.25
TX-City of Houston	169	81,827.53	77.87	1,239.30	484.19	58.33
TX-Hidalgo County	251	22,763.26	23.93	272.35	90.69	60.39
TX-Tarrant County	240	42,163.96	32.12	485.89	175.68	61.05
TX-Rest of State	844	406,134.55	26.34	1,895.47	481.20	102.82
Utah	277	73,916.75	39.46	722.48	266.85	60.04
Vermont	232	8,009.99	7.16	104.25	34.53	67.38
Virginia	384	147,173.66	6.96	1,882.02	383.26	141.10
Washington	240	132,488.85	9.13	2,495.77	552.04	96.03
West Virginia	298	28,462.11	32.37	227.41	95.51	44.73
Wisconsin	307	94,874.25	18.79	840.46	309.04	58.88
Wyoming	241	9,526.76	12.65	98.54	39.53	52.03

* Distribution of PROVWT_C.

† Excludes U.S. territories.

Appendix C: Flags for Inconsistent Values in the Breastfeeding Data

Two different types of inconsistency can arise in breastfeeding data. The first is that the duration of any breastfeeding can exceed the age of the child, and the second is that the age of the child when first fed formula can exceed the age of child. BF_ENDR06 stores the duration of any breastfeeding, and BF_ENDFL06 flags the inconsistency; BF_FORMR08 stores the age of the child when first fed formula, and BF_FORMFL06 flags the inconsistency.

1. **Both BF_ENDR06 and BF_FORMR08 are formulated using the following conversion factors:**

   if unit=1(days) then BF_ENDR06 = number x 1
   if unit=2(weeks) then BF_ENDR06 = number x 7
   if unit=3(months) then BF_ENDR06 = number x 30.4375
   if unit=4(years) then BF_ENDR06 = number x 365.25

   if unit=1(days) then BF_FORMR08 = number x 1
   if unit=2(weeks) then BF_FORMR08 = number x 7
   if unit=3(months) then BF_FORMR08 = number x 30.4375
   if unit=4(years) then BF_FORMR08 = number x 365.25

2. **Flagging BF_ENDR06 when the duration of any breastfeeding exceeds the age in days with a buffer for different units:**

   if unit=1(days) flag when BF_ENDR06 > age + 1
   if unit=2(weeks) flag when BF_ENDR06 > age + 3
   if unit=3(months) flag when BF_ENDR06 > age + 15
   if unit=4(years) flag when BF_ENDR06 > age + 182

The different buffers allow for the impact of rounding durations upward in the specified units (for example, 50 days might be reported as 2 months).

3. **Flagging BF_FORMR08 when the age when first fed formula exceeds the age in days with a buffer for different units:**

   if unit=1(days) flag when BF_FORMR08 > age + 1
   if unit=2(weeks) flag when BF_FORMR08 > age + 3
   if unit=3(months) flag when BF_FORMR08 > age + 15
   if unit=4(years) flag when BF_FORMR08 > age + 182

The different buffers allow for the impact of rounding durations upward in the specified units (for example, 50 days might be reported as 2 months).

Appendix D: Programs for Estimation: Examples of the Use of SUDAAN, SAS, and R to Estimate Vaccination Coverage Rates and Their Standard Errors, and an Example of the Production of a Cross-Tabulation and Chart

A. SUDAAN

```
**********************;
title1 'SUD_IAP.SAS';
*************************************************************************
THIS PROGRAM WILL PRODUCE ESTIMATION AREA ESTIMATES AND STANDARD ERRORS FOR
P_UTD431H314_ROUT_S USING SAS CALLABLE SUDAAN.
SUDAAN NOTES:
1. ALL VARIABLES USED MUST BE NUMERIC.
2. VARIABLES IN THE SUBGROUP STATEMENT MUST HAVE VALUES 1,2,..K
WHERE K IS THE NUMBER OF LEVELS FOR EACH VARIABLE.
3. DATA MUST BE SORTED ACCORDING TO THE SAMPLE DESIGN VARIABLES
(STRATUM AND PRIMARY SAMPLING UNIT), SPECIFIED IN THE
NEST STATEMENT.
*************************************************************************;
options ps=78 ls=90 obs= max;

libname dd 'c:\nispuf18'; *--- SPECIFY PATH TO SAS DATASET ---*;
libname library 'c:\nispuf18'; *--- IF DATASET WAS CREATED WITH FORMATS
STORED ---*;

*--- PERMANENTLY SPECIFY PATH TO LIBRARY ---*;
*--- OTHERWISE COMMENT THIS STATEMENT OUT ---*;
%let in_file=dd.nispuf18; *--- NAME OF SAS DATASET ---*;
%let estiap=estiap18; * --- ESTIMATION AREA VARIABLE TO USE ---*;
%let wt=provwt_c; * --- WEIGHT TO USE (PROVWT_C is the single-frame cell-phone weight excluding territories) --*;
%let strat=stratum; * --- STRATUM VARIABLE TO USE FOR VARIANCE ESTIMATION;

proc format;
/*
THE FOLLOWING FORMAT WILL BE USED FOR P_UTD431H314_ROUT_S.
ORIGINAL VALUES OF P_UTD431H314_ROUT_S ARE 1,0.
MUST BE CONVERTED TO 1,2 IN SUDAAN.
*/
value putd431h314f
1='4:3:1:3:3:1:4 Up-to-Date'
2='Not 4:3:1:3:3:1:4 Up-to-Date';

value estiapf
. = "Missing"
 0 = "US Total"
 1 = "CT"
 2 = "MA"
 4 = "ME"
 5 = "NH"
 6 = "RI"
 7 = "VT"
 8 = "NJ"
10 = "NY-Rest of State"
11 = "NY-City of New York"
12 = "DC"
13 = "DE"
```

```
14 = "MD"
16 = "PA-Rest of State"
17 = "PA-Philadelphia County"
18 = "VA"
19 = "WV"
20 = "AL"
22 = "FL"
25 = "GA"
27 = "KY"
28 = "MS"
29 = "NC"
30 = "SC"
31 = "TN"
34 = "IL-Rest of State"
35 = "IL-City of Chicago"
36 = "IN"
38 = "MI"
40 = "MN"
41 = "OH"
44 = "WI"
46 = "AR"
47 = "LA"
49 = "NM"
50 = "OK"
51 = "TX-Rest of State"
54 = "TX-City of Houston"
55 = "TX-Bexar County"
56 = "IA"
57 = "KS"
58 = "MO"
59 = "NE"
60 = "CO"
61 = "MT"
62 = "ND"
63 = "SD"
64 = "UT"
65 = "WY"
66 = "AZ"
68 = "CA"
72 = "HI"
73 = "NV"
74 = "AK"
75 = "ID"
76 = "OR"
77 = "WA"
107 = "TX-Hidalgo County"
109 = "TX-Tarrant County"
;
run;

data sud_file;
set &in_file(keep= seqnumhh seqnumc P_UTD431H314_ROUT_S &estiap &wt &strat);
```

```
if P_UTD431H314_ROUT_S=0 then P_UTD431H314_ROUT_S=2; *--- CONVERT P_UTD431H314_ROUT_S=0 TO
P_UTD431H314_ROUT_S=2 ---*;
nseqnumh=1*seqnumhh; *---CONVERT HOUSEHOLD ID SEQNUMHH FROM CHARACTER TO NUMERIC ---*;
run;

*=== SORT BY NEST VARIABLES: STRATUM (STRATUM) NSEQNUMH (PRIMARY SAMPLING UNIT) ===*;
proc sort;
by &strat nseqnumh;
run;

proc crosstab data=sud_file filetype=sas design=wr;
weight &wt;
nest &strat nseqnumh;
subgroup &estiap P_UTD431H314_ROUT_S ;
levels 109 2 ;
tables &estiap * P_UTD431H314_ROUT_S ;
print nsum wsum rowper serow/style=nchs ;
rtitle "4:3:1:3:3:1:4 ESTIMATES BY ESTIMATION AREA";
rformat &estiap estiapf.;
rformat P_UTD431H314_ROUT_S putd431h314f.;
output rowper serow/filename=sud_est filetype=sas replace;
run;

proc print data=sud_est(where=(P_UTD431H314_ROUT_S=1 and rowper ne .)) noobs label;
format &estiap estiapf.;
var &estiap rowper serow ;
label
rowper='Percent 4:3:1:3:3:1:4 Up-to-Date'
serow='Standard Error'
;
title "4:3:1:3:3:1:4 ESTIMATES BY ESTIMATION AREA";
run;


**********;
title1 'SUDSTATE.SAS';
********************************************************************************
THIS PROGRAM WILL PRODUCE STATE ESTIMATES AND STANDARD ERRORS
FOR P_UTD431H314_ROUT_S USING SAS CALLABLE SUDAAN.
NOTE: THE STATE VARIABLE IS BASED ON FIPSTATE CODES, THERE ARE
NO STATES WITH FIPS CODES 3,7,14,43,52,57-71,73-78.
SUDAAN NOTES:
1. ALL VARIABLES USED MUST BE NUMERIC.
2. VARIABLES IN THE SUBGROUP STATEMENT MUST HAVE VALUES 1,2,..K
WHERE K IS THE NUMBER OF LEVELS FOR EACH VARIABLE.
3. DATA MUST BE SORTED ACCORDING TO THE SAMPLE DESIGN VARIABLES
(STRATUM AND PRIMARY SAMPLING UNIT), SPECIFIED IN THE
NEST STATEMENT.
********************************************************************************;
options ps=78 ls=90 obs= max;

libname dd 'c:\nispuf18'; *--- SPECIFY PATH TO SAS DATASET ---*;
libname library 'c:\nispuf18'; *--- IF DATASET WAS CREATED WITH FORMATS STORED ---*;
```

```
*--- PERMANENTLY SPECIFY PATH TO LIBRARY ---*;
*--- OTHERWISE COMMENT THIS STATEMENT OUT ---*;
%let in_file=dd.nispuf18; *--- NAME OF SAS DATASET ---*;
%let wt=provwt_c; *--- WEIGHT TO USE (PROVWT_C is the single-frame cell-phone weight excluding territories) --*;
%let strat=stratum; * --- STRATUM VARIABLE TO USE FOR VARIANCE ESTIMATION;

proc format;
/*
THE FOLLOWING FORMAT WILL BE USED FOR P_UTD431H314_ROUT_S.
ORIGINAL VALUES OF P_UTD431H314_ROUT_S ARE 1,0.
MUST BE CONVERTED TO 1,2 IN SUDAAN.
*/
value putd431h314f
1='4:3:1:3:3:1:4 Up-to-Date'
2='Not 4:3:1:3:3:1:4 Up-to-Date'
;
value statef
0 ='U.S. Total'
1 ='Alabama '
2 ='Alaska '
4 ='Arizona '
5 ='Arkansas '
6 ='California '
8 ='Colorado '
9 ='Connecticut '
10 ='Delaware '
11 ='District of Columbia'
12 ='Florida '
13 ='Georgia '
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 '
44 ='Rhode Island '
45 ='South Carolina '
46 ='South Dakota '
47 ='Tennessee '
48 ='Texas '
49 ='Utah '
50 ='Vermont '
51 ='Virginia '
53 ='Washington '
54 ='West Virginia '
55 ='Wisconsin '
56 ='Wyoming '
;
run;

data sud_file;
set &in_file(keep= seqnumhh seqnumc P_UTD431H314_ROUT_S state &wt &strat);
if P_UTD431H314_ROUT_S=0 then P_UTD431H314_ROUT_S=2; *** CONVERT P_UTD431H314_ROUT_S=0 TO
P_UTD431H314_ROUT_S=2 ***;
nseqnumh=1*seqnumhh; *** CONVERT HOUSEHOLD ID SEQNUMH FROM CHARACTER TO NUMERIC ***;
run;

*=== SORT BY NEST VARIABLES: STRATUM (STRATUM) NSEQNUMH (PRIMARY SAMPLING UNIT) ===*;
proc sort;
by &strat nseqnumh;
run;

proc crosstab data=sud_file filetype=sas design=wr;
weight &wt;
nest &strat nseqnumh;
subgroup state P_UTD431H314_ROUT_S ;
levels 56 2 ;
tables state * P_UTD431H314_ROUT_S ;
print nsum wsum rowper serow/style=nchs ;
rtitle "4:3:1:3:3:1:4 ESTIMATES BY STATE";
rformat state statef.;
rformat P_UTD431H314_ROUT_S putd431h314f.;
output rowper serow / filename=sud_est2 filetype=sas replace;
run;

*** EXCLUDE 3,7,14,43,52 THERE ARE NO STATES WITH THESE FIPS CODES *** ;
option spool;
proc print data=sud_est2(where=(P_UTD431H314_ROUT_S=1 and rowper ne .
& state notin (3,7,14,43,52))) label noobs;
format state statef.;
var state rowper serow ;
label
rowper='Percent 4:3:1:3:3:1:4 Up-to-Date'
```

```
serow='Standard Error'
;
title "4:3:1:3:3:1:4 ESTIMATES BY STATE";
run;
option nospool;


**********;
title1 'PROG_3.SAS';
*******************************************************************************
THIS PROGRAM WILL PRODUCE A TABLE OF HAD_CPOX BY STATE FOR ALL RDD
COMPLETES USING RDDWT_C. THE PROGRAM USES SAS CALLABLE SUDAAN.
SUDAAN NOTES:
1. ALL VARIABLES USED MUST BE NUMERIC.
2. VARIABLES IN THE SUBGROUP STATEMENT MUST HAVE VALUES 1,2,..K
WHERE K IS THE NUMBER OF LEVELS FOR EACH VARIABLE.
3. DATA MUST BE SORTED ACCORDING TO THE SAMPLE DESIGN VARIABLES
(STRATUM AND PRIMARY SAMPLING UNIT), SPECIFIED IN THE
NEST STATEMENT.
*******************************************************************************;
options ps=78 ls=90 obs= max;

libname dd 'c:\nispuf18'; *--- SPECIFY PATH TO SAS DATASET ---*;
libname library 'c:\nispuf18'; *--- IF DATASET WAS CREATED WITH FORMATS STORED ---*;

*--- PERMANENTLY SPECIFY PATH TO LIBRARY ---*;
*--- OTHERWISE COMMENT THIS STATEMENT OUT ---*;
%let in_file=dd.nispuf18; *--- NAME OF SAS DATASET ---*;
%let wt=rddwt_c; * --- WEIGHT TO USE (RDDWT_C is the single-frame cell-phone weight excluding territories) ---*;
%let strat=stratum; * --- STRATUM VARIABLE TO USE FOR VARIANCE ESTIMATION;

proc format;
/*
THE FOLLOWING FORMAT WILL BE USED FOR HAD_CPOX.
*/
value hadcpoxf
1='Yes'
2='No'
;
value statef
0 ='U.S. Total '
1 ='Alabama '
2 ='Alaska '
4 ='Arizona '
5 ='Arkansas '
6 ='California '
8 ='Colorado '
9 ='Connecticut '
10 ='Delaware '
11 ='District of Columbia'
12 ='Florida '
13 ='Georgia '
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 '
44 ='Rhode Island '
45 ='South Carolina '
46 ='South Dakota '
47 ='Tennessee '
48 ='Texas '
49 ='Utah '
50 ='Vermont '
51 ='Virginia '
53 ='Washington '
54 ='West Virginia '
55 ='Wisconsin '
56 ='Wyoming '
;
run;

data sud_file;
set &in_file(keep= seqnumhh seqnumc state had_cpox &wt &strat);
nseqnumh=1*seqnumhh; *** CONVERT HOUSEHOLD ID SEQNUMH FROM CHARACTER TO NUMERIC ***;
run;

*=== SORT BY NEST VARIABLES: STRATUM (STRATUM) NSEQNUMH (PRIMARY SAMPLING UNIT) ===*;
proc sort;
by &strat nseqnumh;
run;

proc crosstab data=sud_file filetype=sas design=wr;
```

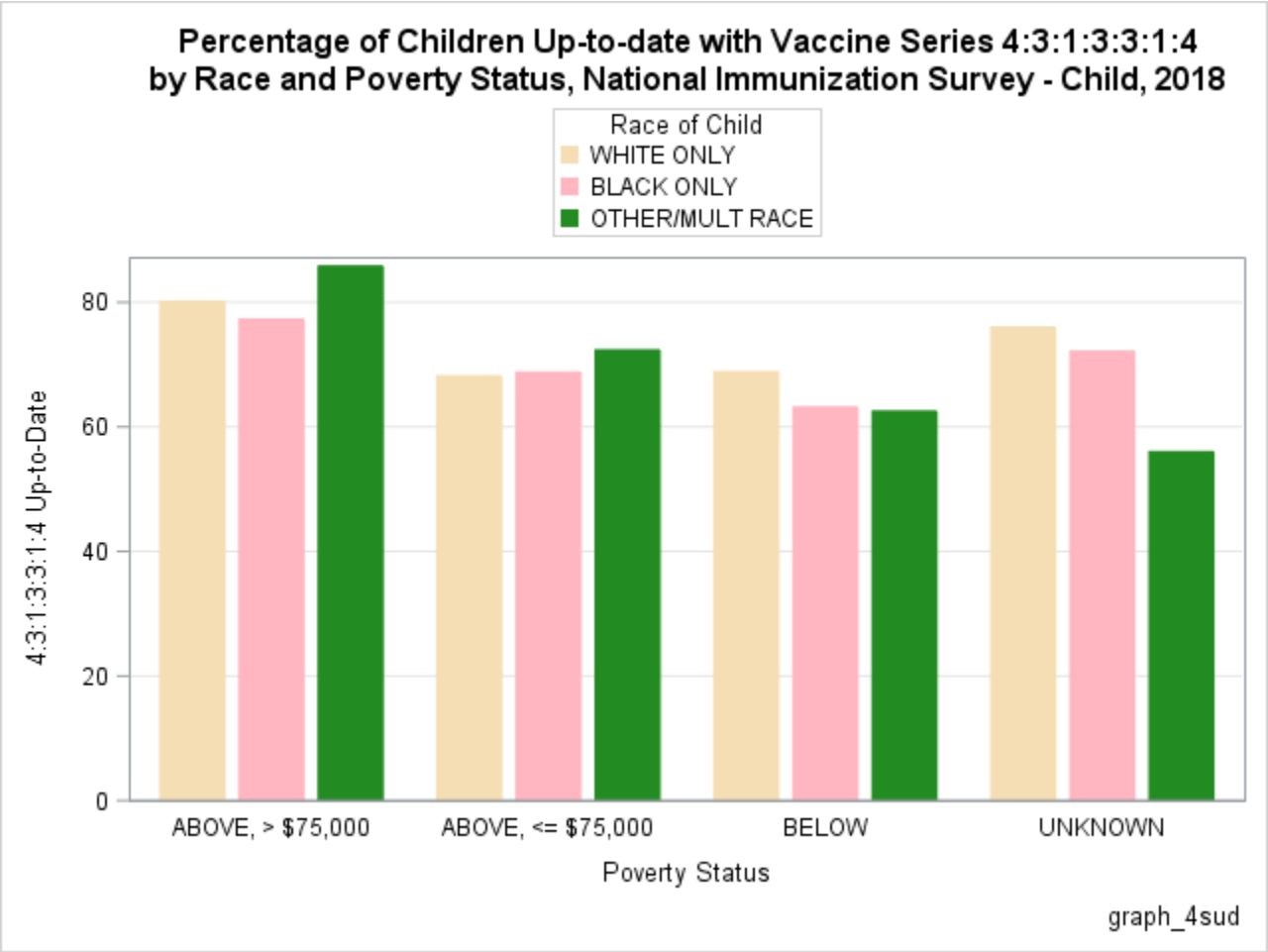
```
weight &wt;
nest &strat nseqnumh;
subgroup state had_cpox ;
levels 56 2 ;
tables state * had_cpox ;
print nsum wsum rowper serow/style=nchs ;
rtitle "HAD_CPOX ESTIMATES BY STATE";
rtitle "WEIGHT = &WT";
rformat state statef.;
rformat had_cpox hadcpoxf.;
output rowper serow / filename=sud_est3 filetype=sas replace;
run;

*** EXCLUDE 3,7,14,43,52 THERE ARE NO STATES WITH THESE FIPS CODES *** ;
option spool;
proc print data=sud_est3(where=(had_cpox=1 and rowper ne .
& state notin (3,7,14,43,52))) label noobs;
format state statef.;
var state rowper serow ;
label
rowper='Percent HAD_CPOX = Yes'
serow='Standard Error'
;
title "CHILD HAD CHICKEN POX BY STATE";
run;
option nospool;


**********;
title1 'PROG_4.SAS';
*************************************************************************
TABLE OF P_UTD431H314_ROUT_S BY INCPOV1 BY RACE_K. SAVE % UTD
ESTIMATES (NOT S.E.'S) FOR USE IN THE PROGRAM CHART_4.
THIS PROGRAM WILL PRODUCE ESTIMATES USING SAS CALLABLE SUDAAN.
SUDAAN NOTES:
1. ALL VARIABLES USED MUST BE NUMERIC.
2. VARIABLES IN THE SUBGROUP STATEMENT MUST HAVE VALUES 1,2,..K
WHERE K IS THE NUMBER OF LEVELS FOR EACH VARIABLE.
3. DATA MUST BE SORTED ACCORDING TO THE SAMPLE DESIGN VARIABLES
(STRATUM AND PRIMARY SAMPLING UNIT), SPECIFIED IN THE
NEST STATEMENT.
*************************************************************************;
options ps=78 ls=90 obs= max;

libname dd 'c:\nispuf18'; *--- SPECIFY PATH TO SAS DATASET ---*;
libname library 'c:\nispuf18'; *--- IF DATASET WAS CREATED WITH FORMATS
STORED ---*;

*--- PERMANENTLY SPECIFY PATH TO LIBRARY ---*;
*--- OTHERWISE COMMENT THIS STATEMENT OUT ---*;

libname out 'c:\nispuf18'; *--- SPECIFY THE PATH FOR WHERE YOU WANT THE CHART OUTPUT TO GO ---*;
```

```
%let in_file=dd.nispuf18; *--- NAME OF SAS DATASET ---*;
%let wt=provwt_c; *--- WEIGHT TO USE (PROVWT_C is the single-frame cell-phone weight excluding territories) ---
*;
%let strat=stratum; * --- STRATUM VARIABLE TO USE FOR VARIANCE ESTIMATION;
%let qtr_lab=Q1/2018 - Q4/2018; *NIS 4 QUARTER PERIOD*;

proc format;
/*
THE FOLLOWING FORMAT WILL BE USED FOR P_UTD431H314_ROUT_S.
ORIGINAL VALUES OF P_UTD431H314_ROUT_S ARE 1,0.
MUST BE CONVERTED TO 1,2 IN SUDAAN.
*/
value putd431h314f
1='4:3:1:3:3:1:4 Up-to-date'
2='Not 4:3:1:3:3:1:4 Up-to-date'
;
VALUE race_kf
1 = "WHITE ONLY"
2 = "BLACK ONLY"
3 = "OTHER AND MULTIPLE RACE"
;
VALUE incpvr2f
1 = "ABOVE, > $75,000"
2 = "ABOVE, <= $75,000"
3 = "BELOW"
4 = "UNKNOWN"
;
value statef
0 ='U.S. Total '
1 ='Alabama '
2 ='Alaska '
4 ='Arizona '
5 ='Arkansas '
6 ='California '
8 ='Colorado '
9 ='Connecticut '
10 ='Delaware '
11 ='District of Columbia'
12 ='Florida '
13 ='Georgia '
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 '
44 ='Rhode Island '
45 ='South Carolina '
46 ='South Dakota '
47 ='Tennessee '
48 ='Texas '
49 ='Utah '
50 ='Vermont '
51 ='Virginia '
53 ='Washington '
54 ='West Virginia '
55 ='Wisconsin '
56 ='Wyoming '
;
run;

data sud_file;
set &in_file(keep= seqnumhh seqnumc P_UTD431H314_ROUT_S race_k incpov1 &wt &strat);
nseqnumh=1*seqnumhh; *** CONVERT HOUSEHOLD ID SEQNUMH FROM CHARACTER TO NUMERIC ***;
if P_UTD431H314_ROUT_S=0 then P_UTD431H314_ROUT_S=2; *** CONVERT P_UTD431H314_ROUT_S=0 TO
P_UTD431H314_ROUT_S=2 ***;
run;

*=== SORT BY NEST VARIABLES: STRATUM (STRATUM) NSEQNUMH (PRIMARY SAMPLING UNIT) ===*;
proc sort;
by &strat nseqnumh;
run;

proc freq;
tables P_UTD431H314_ROUT_S incpov1 race_k;
title1 "Table 4A. &qtr_lab: Unweighted Frequencies";
run;

proc crosstab data=sud_file filetype=sas design=wr;
weight &wt;
nest &strat nseqnumh;
subgroup incpov1 race_k P_UTD431H314_ROUT_S ;
levels 4 3 2 ;
tables (incpov1 * race_k * P_UTD431H314_ROUT_S) ;
```

```
print nsum wsum rowper="4:3:1:3:3:1:4 Up-to-Date (ROWPER)"
serow="Standard Error (SEROW)" /style=nchs ;
rtitle "Table 4B. &qtr_lab, Percent 4:3:1:3:3:1:4 Up-to-Date and Estimated Standard Errors";
rtitle "WEIGHT = &WT";
rformat P_UTD431H314_ROUT_S putd431h314f.;
rformat incpov1 incpvr2f.;
rformat race_k race_kf.;
output rowper serow / filename=sud_est4 filetype=sas replace;
run;

data out.sud_est4;
set sud_est4(where=(P_UTD431H314_ROUT_S=1 & incpov1 > 0 & race_k > 0));
keep incpov1 race_k rowper serow;
label rowper='4:3:1:3:3:1:4 Up-to-Date';
format rowper 5.2;
format serow 5.2;
run;

proc print data=out.sud_est4 label;
format race_k race_kf.;
format incpov1 incpvr2f.;
title "Table 4B. &qtr_lab, 4:3:1:3:3:1:4 ESTIMATES AND STANDARD ERRORS BY INCPOV1 BY RACE_K";
run;


**********;
title1 'SAS_GRAPH_4.SAS';
********************************************************************************
THIS PROGRAM BUILDS OFF OF THE PROGRAM SAS_PROG_4. IT PRODUCES A CHART OF
P_UTD431H314_ROUT_S BY INCPOV1 BY RACE_K. IT CREATES A BAR CHART IN SAS GRAPH FOR
THE 4X3 = 12 CELLS. THE OUTPUT OF THE FOLLOWING EXAMPLE IS ATTACHED AT THE
END.
********************************************************************************;
options ps=78 ls=90 obs= max;

libname dd 'c:\nispuf18'; *--- SPECIFY PATH TO SAS DATASET ---*;

%let out='c:\nispuf18'; *--- SPECIFY THE PATH FOR WHERE YOU WANT THE CHART
OUTPUT TO GO ---*;

%let in_file=dd.sud_est4; *--- NAME OF SAS DATASET OUTPUT FROM PROG_4 ---*;
%let qtr_lab=Q1/2018 - Q4/2018; *NIS 4 QUARTER PERIOD*;

proc format;
value incpvr2f
1 = "ABOVE, > $75,000"
2 = "ABOVE, <= $75,000"
3 = "BELOW"
4 = "UNKNOWN"
;
value race_kf
1 = "WHITE ONLY"
2 = "BLACK ONLY"
```

```
3 = "OTHER/MULT RACE"
;
run;

data sud_est4;
set &in_file;
format rowper 3.
race_k race_kf.
incpov1 incpvr2f.
;
label
race_k = 'Race of Child'
incpov1 = 'Poverty Status'
;
filename odsout &out;
ods listing close;
/* SET THE GRAPHICS ENVIRONMENT */
goptions reset=global gunit=pct border
ftext=swissb htitle=4 htext=1.5
device=gif
;
ods html body='graph_4_sud.html' path=odsout;
run;

title1 h=12pt "Percentage of Children Up-to-date with Vaccine Series 4:3:1:3:3:1:4";
title2 h=12pt "by Race and Poverty Status, National Immunization Survey - Child, 2018";
footnote j=r 'graph_4sud';

proc sgplot data=sud_est4;
styleattrs datacolors=(wheat lightpink forestgreen) datacontrastcolors=(wheat lightpink forestgreen)
datalinepatterns=(solid);
vbar INCPOV1 / response=rowper group=RACE_K groupdisplay=cluster stat=mean barwidth=0.8;
xaxis display=(noticks);
yaxis grid;
keylegend / across=1 position=top;
run;

ods html close;
ods listing;
```


Percentage of Children Up-to-date with Vaccine Series 4:3:1:3:3:1:4
by Race and Poverty Status, National Immunization Survey - Child, 2018
Race of Child
WHITE ONLY
BLACK ONLY
OTHER/MULT RACE
4:3:1:3:3:1:4 Up-to-Date
0
20
40
60
80
ABOVE, > $75,000
ABOVE, <= $75,000
BELOW
UNKNOWN
Poverty Status
graph_4sud

B. SAS

```
**********************;
title1 'SAS_IAP.SAS';
*************************************************************************
THIS PROGRAM WILL PRODUCE ESTIMATION AREA ESTIMATES AND STANDARD ERRORS
FOR P_UTD431H314_ROUT_S USING SAS.
*************************************************************************;
options ps=78 ls=90 obs= max;

libname dd 'c:\nispuf18'; *--- SPECIFY PATH TO SAS DATASET ---*;
libname library 'c:\nispuf18'; *--- IF DATASET WAS CREATED WITH FORMATS STORED ---*;

*--- PERMANENTLY SPECIFY PATH TO LIBRARY ---*;
*--- OTHERWISE COMMENT THIS STATEMENT OUT ---*;
%let in_file=dd.nispuf18; *--- NAME OF SAS DATASET ---*;
%let estiap=estiap18; * --- ESTIMATION AREA VARIABLE TO USE ---*;
%let wt=provwt_c; * --- WEIGHT TO USE (PROVWT_C is the single-frame cell-phone weight excluding territories) --*;
%let strat=stratum; * --- STRATUM VARIABLE TO USE FOR VARIANCE ESTIMATION;

proc format;
value putd431h314f
0='Not 4:3:1:3:3:1:4 Up-To-Date'
1='4:3:1:3:3:1:4 Up-To-Date';

value estiapf
. = "Missing"
 0 = "US Total"
 1 = "CT"
 2 = "MA"
 4 = "ME"
 5 = "NH"
 6 = "RI"
 7 = "VT"
 8 = "NJ"
10 = "NY-Rest of State"
11 = "NY-City of New York"
12 = "DC"
13 = "DE"
14 = "MD"
16 = "PA-Rest of State"
17 = "PA-Philadelphia County"
18 = "VA"
19 = "WV"
20 = "AL"
22 = "FL"
25 = "GA"
27 = "KY"
28 = "MS"
29 = "NC"
30 = "SC"
```

```
31 = "TN"
34 = "IL-Rest of State"
35 = "IL-City of Chicago"
36 = "IN"
38 = "MI"
40 = "MN"
41 = "OH"
44 = "WI"
46 = "AR"
47 = "LA"
49 = "NM"
50 = "OK"
51 = "TX-Rest of State"
54 = "TX-City of Houston"
55 = "TX-Bexar County"
56 = "IA"
57 = "KS"
58 = "MO"
59 = "NE"
60 = "CO"
61 = "MT"
62 = "ND"
63 = "SD"
64 = "UT"
65 = "WY"
66 = "AZ"
68 = "CA"
72 = "HI"
73 = "NV"
74 = "AK"
75 = "ID"
76 = "OR"
77 = "WA"
107 = "TX-Hidalgo County"
109 = "TX-Tarrant County"
;
run;

data sas_file;
set &in_file(keep= seqnumhh seqnumc P_UTD431H314_ROUT_S &estiap &wt &strat);
run;

proc sort data = sas_file;
by &estiap;
run;

title1 '4:3:1:3:3:1:4 ESTIMATES BY ESTIMATION AREA';
ods output Statistics=sas_est;
proc surveymeans data = sas_file nobs sum mean stderr;
stratum &strat;
cluster seqnumhh;
weight &wt;
class P_UTD431H314_ROUT_S;
```

```
var P_UTD431H314_ROUT_S;
by &estiap;
format P_UTD431H314_ROUT_S putd431h314f.;
format &estiap estiapf.;
run;

data sas_est;
set sas_est;
mean = mean*100; *CONVERT TO PERCENT ESTIMATES;
stderr = stderr*100;
run;

proc print data=sas_est(where=(varlevel='4:3:1:3:3:1:4 Up-To-Date')) noobs
label;
format &estiap estiapf.;
format mean stderr 5.2;
var &estiap mean stderr;
label
mean='Percent 4:3:1:3:3:1:4 Up-to-Date'
stderr='Standard Error';
title "4:3:1:3:3:1:4 ESTIMATES BY ESTIMATION AREA";
run;


**********;
title1 'SASSTATE.SAS';
********************************************************************************
THIS PROGRAM WILL PRODUCE STATE ESTIMATES AND STANDARD ERRORS
FOR P_UTD431H314_ROUT_S USING SAS.
NOTE: THE STATE VARIABLE IS BASED ON FIPSTATE CODES, THERE ARE
NO STATES WITH FIPS CODES 3,7,14,43,52,57-71,73-77.
********************************************************************************;
options ps=78 ls=90 obs= max;

libname dd 'c:\nispuf18'; *--- SPECIFY PATH TO SAS DATASET ---*;
libname library 'c:\nispuf18'; *--- IF DATASET WAS CREATED WITH FORMATS
STORED ---*;
*--- PERMANENTLY SPECIFY PATH TO LIBRARY ---*;
*--- OTHERWISE COMMENT THIS STATEMENT OUT ---*;

%let in_file=dd.nispuf18; *--- NAME OF SAS DATASET ---*;
%let wt=provwt_c; * --- WEIGHT TO USE (PROVWT_C is the single-frame cell-phone weight excluding territories) --*;
%let strat=stratum; * --- STRATUM VARIABLE TO USE FOR VARIANCE ESTIMATION;

proc format;
value putd431h314f
0='Not 4:3:1:3:3:1:4 Up-To-Date'
1='4:3:1:3:3:1:4 Up-To-Date';
value statef
. ="Missing"
0 ='U.S. Total '
1 ='Alabama '
2 ='Alaska '
```

```
4 ='Arizona '
5 ='Arkansas '
6 ='California '
8 ='Colorado '
9 ='Connecticut '
10 ='Delaware '
11 ='District of Columbia'
12 ='Florida '
13 ='Georgia '
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 '
44 ='Rhode Island '
45 ='South Carolina '
46 ='South Dakota '
47 ='Tennessee '
48 ='Texas '
49 ='Utah '
50 ='Vermont '
51 ='Virginia '
53 ='Washington '
54 ='West Virginia '
55 ='Wisconsin '
56 ='Wyoming '
;
run;

data sas_file;
```

```
set &in_file(keep= seqnumhh seqnumc P_UTD431H314_ROUT_S state &wt &strat);
run;

proc sort data = sas_file;
by state;
title1 '4:3:1:3:3:1:4 ESTIMATES BY STATE';
ods output Statistics=sas_est2;
run;

proc surveymeans data = sas_file nobs sum mean stderr;
stratum &strat;
cluster seqnumhh;
weight &wt;
class P_UTD431H314_ROUT_S;
var P_UTD431H314_ROUT_S;
by state;
format P_UTD431H314_ROUT_S putd431h314f.;
format state statef.;
run;

data sas_est2;
set sas_est2;
mean = mean*100; *CONVERT TO PERCENT ESTIMATES;
stderr = stderr*100;
run;

proc print data=sas_est2(where=(varlevel='4:3:1:3:3:1:4 Up-To-Date')) noobs
label;
format state statef.;
format mean stderr 5.2;
var state mean stderr;
label
mean='Percent 4:3:1:3:3:1:4 Up-to-Date'
stderr='Standard Error';
title "4:3:1:3:3:1:4 ESTIMATES BY STATE";
run;


**********;
title1 'SAS_PROG_3.SAS';
*******************************************************************************
THIS PROGRAM WILL PRODUCE A TABLE OF HAD_CPOX BY STATE FOR ALL RDD
COMPLETES USING RDDWT. THE PROGRAM USES SAS.
*******************************************************************************;
options ps=78 ls=90 obs= max;

libname dd 'c:\nispuf18'; *--- SPECIFY PATH TO SAS DATASET ---*;
libname library 'c:\nispuf18'; *--- IF DATASET WAS CREATED WITH FORMATS
STORED ---*;
*--- PERMANENTLY SPECIFY PATH TO LIBRARY ---*;
*--- OTHERWISE COMMENT THIS STATEMENT OUT ---*;

%let in_file=dd.nispuf18; *--- NAME OF SAS DATASET ---*;
```

```
%let wt=rddwt_c; *--- WEIGHT TO USE (RDDWT_C is the single-frame cell-phone weight excluding territories) ---*;
%let strat=stratum; * --- STRATUM VARIABLE TO USE FOR VARIANCE ESTIMATION;

proc format;
value hadcpoxf
1='Yes'
2='No'
;
value statef
0 ='U.S. Total '
1 ='Alabama '
2 ='Alaska '
4 ='Arizona '
5 ='Arkansas '
6 ='California '
8 ='Colorado '
9 ='Connecticut '
10 ='Delaware '
11 ='District of Columbia'
12 ='Florida '
13 ='Georgia '
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 '
44 ='Rhode Island '
45 ='South Carolina '
46 ='South Dakota '
47 ='Tennessee '
```

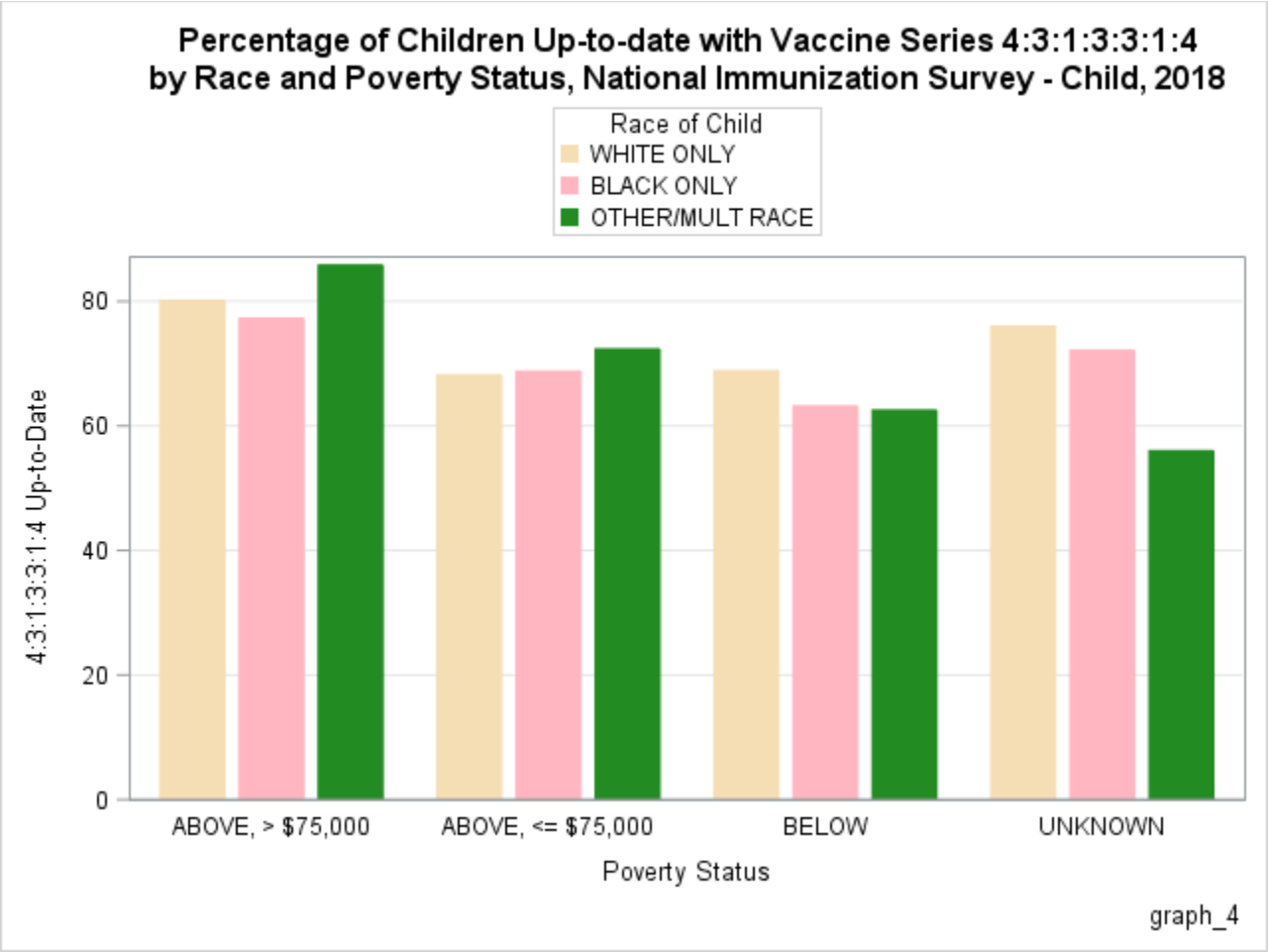
```
48 ='Texas '
49 ='Utah '
50 ='Vermont '
51 ='Virginia '
53 ='Washington '
54 ='West Virginia '
55 ='Wisconsin '
56 ='Wyoming '
;
run;

data sas_file;
set &in_file(keep= seqnumhh seqnumc state had_cpox &wt &strat);
run;

proc sort data = sas_file;
by state;
title1 'HAD_CPOX ESTIMATES BY STATE';
ods output Statistics=sas_est3;
run;

proc surveymeans data = sas_file nobs sum mean stderr;
stratum &strat;
cluster seqnumhh;
weight &wt;
class had_cpox;
var had_cpox;
by state;
format had_cpox hadcpoxf.;
format state statef.;
run;

data sas_est3;
set sas_est3;
mean = mean*100; *CONVERT TO PERCENT ESTIMATES;
stderr = stderr*100;
run;

proc print data=sas_est3(where=(varlevel='Yes')) noobs label;
format state statef.;
format mean stderr 5.2;
var state mean stderr;
label
mean='Percent HAD_CPOX = Yes'
stderr='Standard Error';
title "CHILD HAD CHICKEN POX BY STATE";
run;


**********;
title1 'SAS_PROG_4.SAS';
********************************************************************************
TABLE OF P_UTD431H314_ROUT_S BY INCPOV1 BY RACE_K. SAVE % UTD
```

```
ESTIMATES (NOT S.E.'S) FOR USE IN THE PROGRAM SAS_GRAPH_4.
THIS PROGRAM WILL PRODUCE ESTIMATES USING SAS.
*************************************************************************;
options ps=78 ls=90 obs= max;

libname dd 'c:\nispuf18'; *--- SPECIFY PATH TO SAS DATASET ---*;
libname library 'c:\nispuf18'; *--- IF DATASET WAS CREATED WITH FORMATS
STORED ---*;
*--- PERMANENTLY SPECIFY PATH TO LIBRARY ---*;
*--- OTHERWISE COMMENT THIS STATEMENT OUT ---*;

libname out 'c:\nispuf18'; *--- SPECIFY THE PATH FOR
WHERE YOU WANT THE CHART OUTPUT TO GO ---*;

%let in_file=dd.nispuf18; *--- NAME OF SAS DATASET ---*;
%let wt=provwt_c; *--- WEIGHT TO USE (PROVWT_C is the single-frame cell-phone weight excluding territories) --*;
%let strat=stratum; * --- STRATUM VARIABLE TO USE FOR VARIANCE ESTIMATION;
%let qtr_lab=Q1/2018 - Q4/2018; *NIS 4 QUARTER PERIOD*;

proc format;
value putd431h314f
0='Not 4:3:1:3:3:1:4 Up-To-Date'
1='4:3:1:3:3:1:4 Up-To-Date'
;
value race_kf
1 = "WHITE ONLY"
2 = "BLACK ONLY"
3 = "OTHER AND MULTIPLE RACE"
;
value incpvr2f
1 = "ABOVE, > $75,000"
2 = "ABOVE, <= $75,000"
3 = "BELOW"
4 = "UNKNOWN"
;
run;

data sas_file;
set &in_file(keep= seqnumhh seqnumc P_UTD431H314_ROUT_S race_k incpov1 &wt &strat);
run;

proc sort data = sas_file;
by incpov1 race_k;
run;

proc freq;
tables P_UTD431H314_ROUT_S incpov1 race_k;
title1 "Table 4A. &qtr_lab: Unweighted Frequencies";
run;

data sas_file;
set sas_file;
if P_UTD431H314_ROUT_S < 0 | incpov1 < 0 | race_k < 0 | &wt. < 0 then delete;
```

```
run;

proc surveymeans data = sas_file nobs sum mean stderr;
ods output Domain=sas_est4;
stratum &strat;
cluster seqnumhh;
weight &wt;
class P_UTD431H314_ROUT_S;
var P_UTD431H314_ROUT_S;
domain incpov1*race_k;
format P_UTD431H314_ROUT_S putd431h314f.;
format incpov1 incpvr2f.;
format race_k race_kf.;
run;

data sas_est4;
set sas_est4;
mean = mean*100; *CONVERT TO PERCENT ESTIMATES;
stderr = stderr*100;
run;

proc print data=sas_est4(where=(varlevel='4:3:1:3:3:1:4 Up-To-Date')) noobs
label;
format incpov1 incpvr2f.;
format race_k race_kf.;
format mean stderr 5.2;
var incpov1 race_k mean stderr;
label
mean='4:3:1:3:3:1:4 Up-To-Date'
stderr='Standard Error';
title1 "Table 4B. &qtr_lab, 4:3:1:3:3:1:4 ESTIMATES AND STANDARD ERRORS BY INCPOV1 BY RACE_K";
run;

data out.sas_est4;
set sas_est4(where=('4:3:1:3:3:1:4 Up-To-Date'));
keep incpov1 race_k mean;
label mean='4:3:1:3:3:1:4 Up-to-Date';
format mean 5.2;
run;


**********;
title1 'SAS_GRAPH_4.SAS';
********************************************************************************
THIS PROGRAM BUILDS OFF OF THE PROGRAM SAS_PROG_4. IT PRODUCES A CHART OF
P_UTD431H314_ROUT_S BY INCPOV1 BY RACE_K. IT CREATES A BAR CHART IN SAS GRAPH FOR
THE 4X3 = 12 CELLS. THE OUTPUT OF THE FOLLOWING EXAMPLE IS ATTACHED AT THE
END.
********************************************************************************;
options ps=78 ls=90 obs= max;

libname dd 'c:\nispuf18'; *--- SPECIFY PATH TO SAS DATASET ---*;
```

```
%let out='c:\nispuf18'; *--- SPECIFY THE PATH FOR WHERE YOU WANT THE CHART
OUTPUT TO GO ---*;

%let in_file=dd.sas_est4; *--- NAME OF SAS DATASET OUTPUT FROM PROG_4 ---*;
%let qtr_lab=Q1/2018 - Q4/2018; *NIS 4 QUARTER PERIOD*;

proc format;
value incpvr2f
1 = "ABOVE, > $75,000"
2 = "ABOVE, <= $75,000"
3 = "BELOW"
4 = "UNKNOWN"
;
value race_kf
1 = "WHITE ONLY"
2 = "BLACK ONLY"
3 = "OTHER/MULT RACE"
;
run;

data sas_est4;
set &in_file;
format mean 3.
race_k race_kf.
incpov1 incpvr2f.
;
label
race_k = 'Race of Child'
incpov1 = 'Poverty Status'
;
filename odsout &out;
ods listing close;
/* SET THE GRAPHICS ENVIRONMENT */
goptions reset=global gunit=pct border
ftext=swissb htitle=4 htext=1.5
device=gif
;
ods html body='graph_4.html' path=odsout;
run;

title1 h=12pt "Percentage of Children Up-to-date with Vaccine Series 4:3:1:3:3:1:4 ";
title2 h=12pt "by Race and Poverty Status, National Immunization Survey - Child, 2018";
footnote j=r 'graph_4';

proc sgplot data=sas_est4;
styleattrs datacolors=(wheat lightpink forestgreen) datacontrastcolors=(wheat lightpink forestgreen)
datalinepatterns=(solid);
vbar INCPOV1 / response=mean group=RACE_K groupdisplay=cluster stat=mean barwidth=0.8;
xaxis display=(noticks);
yaxis grid;
keylegend / across=1 position=top;
run;
```

```
ods html close;
ods listing;
```



C. ‘R’

```
#####################
title <- "R_IAP.R"
#########################################################################
#THIS PROGRAM WILL PRODUCE ESTIMATION AREA ESTIMATES AND STANDARD ERRORS
#FOR P_UTD431H314_ROUT_S USING R.
#
#R NOTES:
#1. R IS CASE SENSITIVE.
#2. A FILE PATH IS SEPERATED BY SLASH(/)
#########################################################################
library(survey) #TO USE svydesign(), svymean(), and svyby()
library(Hmisc) #TO USE prn()


dd <- "c:/nispuf18" #"path-to-dataset"


#--- NAME OF R DATASET ---#
in.file <- paste(dd,"/NISPUF18.RData",sep="")
#---READ R DATASET---#
load(in.file)
#---FORMAT---#
UTD431H314levels=c(0,1)
UTD431H314labels=c("NOT 4:3:1:3:3:1:4 UTD", "4:3:1:3:3:1:4 UTD")
ESTIAPlevels=c(0, 1, 2, 4, 5, 6, 7, 8, 10, 11, 12, 13, 14, 16, 17, 18, 19, 20, 22, 25, 27, 28, 29, 30, 31, 34, 35, 36, 38, 40, 41, 44, 46, 47, 49, 50, 51, 54,
55, 56, 57, 58, 59, 60, 61, 62, 63, 64, 65, 66, 68, 72, 73, 74, 75, 76, 77, 107,109)
ESTIAPlabels=c("US Total", "CT", "MA", "ME", "NH", "RI", "VT", "NJ", "NY-Rest of State", "NY-City of New York", "DC", "DE", "MD", "PA-
Rest of State", "PA-Philadelphia County", "VA", "WV", "AL", "FL", "GA", "KY", "MS", "NC", "SC", "TN", "IL-Rest of State", "IL-City of
Chicago", "IN", "MI", "MN", "OH", "WI", "AR", "LA", "NM", "OK", "TX-Rest of State", "TX-City of Houston", "TX-Bexar County", "IA", "KS",
"MO", "NE", "CO", "MT", "ND", "SD", "UT", "WY", "AZ", "CA", "HI", "NV", "AK", "ID", "OR", "WA", "TX-Hidalgo County", "TX-Tarrant
County")

#---PROVWT_C WILL BE USED AS A WEIGHT (PROVWT_C IS THE SINGLE-FRAME CELL-PHONE WEIGHT EXCLUDING
TERRITORIES)---#
#---STRATUM WILL BE USED AS A STRATUM VARIABLE FOR VARIANCE ESTIMATION ---#
R_FILE <- subset(NISPUF18, select=c(SEQNUMHH, SEQNUMC, P_UTD431H314_ROUT_S, ESTIAP18,
PROVWT_C, STRATUM))
names(R_FILE) <- c("SEQNUMHH", "SEQNUMC", "P_UTD431H314_ROUT_S", "ESTIAP", "WT", "STRATUM")
R_FILE <- na.omit(R_FILE)
#---ASSIGN LABELS---#
R_FILE$P_UTD431H314_ROUT_S <- factor(R_FILE$P_UTD431H314_ROUT_S, levels=UTD431H314levels,
labels=UTD431H314labels)
R_FILE$ESTIAP <- factor(R_FILE$ESTIAP, levels=ESTIAPlevels,
labels=ESTIAPlabels)

#---SPECIFY A SAMPLING DESIGN AND FORCE WT AS NUMERIC---#
svydsg <- svydesign(id=~SEQNUMHH, strata=~STRATUM, weights=~(as.numeric(WT)),
data=R_FILE)

#---U.S. TOTAL ESTIMATES AND STANDARD ERRORS---#
r_nation <- svymean(~P_UTD431H314_ROUT_S, svydsg)
PERCENT_UTD <- round(r_nation*100,2) #CONVERT INTO PERCENT ESTIMATES(MEAN)
SE_UTD <- round(SE(r_nation)*100,2) #CONVERT INTO PERCENT ESTIMATES(SE)
r_nation_est <- cbind(PERCENT_UTD, SE_UTD)
title <- "PERCENT 4:3:1:3:3:1:4 ESTIMATES AT A NATIONAL LEVEL"
prn(r_nation_est, title)

#---ESTIMATION AREA ESTIMATES AND STANDARD ERRORS---#
r_est <- svyby(~P_UTD431H314_ROUT_S, ~ESTIAP, svydsg, svymean)
r_est[,-c(1)] <- round(r_est[,-c(1)]*100,2) #CONVERT INTO PERCENT ESTIMATES
r_est <- subset(r_est, select=c(1,3,5))
```

```
#SELECT ESTIMATES FOR UP-TO-DATE CASES
names(r_est) <- c("ESTIMATION AREA", "PERCENT 4:3:1:3:3:1:4 UTD", "STANDARD ERROR UTD")
title <- "PERCENT 4:3:1:3:3:1:4 ESTIMATES BY ESTIMATION AREA"
prn(r_est, title)

######################
title <- "R_STATE.R"
#########################################################################
#THIS PROGRAM WILL PRODUCE STATE ESTIMATES AND STANDARD ERRORS
#FOR P_UTD431H314_ROUT_S USING R.
#
#NOTE : THE STATE VARIABLE IS BASED ON FIPSTATE CODES ,THERE ARE
#NO STATES WITH FIPS CODES 3,7,14,43,52,57-71,73-78.
#
#R NOTES:
#1. R IS CASE SENSITIVE.
#2. A FILE PATH IS SEPERATED BY SLASH(/)
#########################################################################
library(survey) #TO USE svydesign(), svymean(), and svyby()
library(Hmisc) #TO USE prn()


dd <- "c:/nispuf18" #"path-to-data"


#--- NAME OF R DATASET ---#
in.file <- paste(dd,"/NISPUF18.RData",sep="")
#---READ R DATASET---#
load(in.file)
#---FORMAT---#
UTD431H314levels=c(0,1)
UTD431H314labels=c("NOT 4:3:1:3:3:1:4 UTD", "4:3:1:3:3:1:4 UTD")
STATElevels=c(1, 2, 4, 5, 6, 8, 9, 10, 11, 12, 13, 15, 16, 17,
18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35,
36, 37, 38, 39, 40, 41, 42, 44, 45, 46, 47, 48, 49, 50, 51, 53,
54, 55, 56)
STATElabels=c(
"ALABAMA",
"ALASKA",
"ARIZONA",
"ARKANSAS",
"CALIFORNIA",
"COLORADO",
"CONNECTICUT",
"DELAWARE",
"DISTRICT OF COLUMBIA",
"FLORIDA",
"GEORGIA",
"HAWAII",
"IDAHO",
"ILLINOIS",
"INDIANA",
"IOWA",
"KANSAS",
"KENTUCKY",
"LOUISIANA",
"MAINE",
"MARYLAND",
"MASSACHUSETTS",
"MICHIGAN",
"MINNESOTA",
"MISSISSIPPI",
"MISSOURI",
```

```
"MONTANA",
"NEBRASKA",
"NEVADA",
"NEW HAMPSHIRE",
"NEW JERSEY",
"NEW MEXICO",
"NEW YORK",
"NORTH CAROLINA",
"NORTH DAKOTA",
"OHIO",
"OKLAHOMA",
"OREGON",
"PENNSYLVANIA",
"RHODE ISLAND",
"SOUTH CAROLINA",
"SOUTH DAKOTA",
"TENNESSEE",
"TEXAS",
"UTAH",
"VERMONT",
"VIRGINIA",
"WASHINGTON",
"WEST VIRGINIA",
"WISCONSIN",
"WYOMING"
)
#---PROVWT_C WILL BE USED AS A WEIGHT (PROVWT_C IS THE SINGLE-FRAME CELL-PHONE WEIGHT EXCLUDING
TERRITORIES)---#
#---STRATUM WILL BE USED AS A STRATUM VARIABLE FOR VARIANCE ESTIMATION ---#
R_FILE <- subset(NISPUF18, select=c(SEQNUMHH, SEQNUMC, P_UTD431H314_ROUT_S,
STATE, PROVWT_C, STRATUM))
names(R_FILE) <- c("SEQNUMHH", "SEQNUMC", "P_UTD431H314_ROUT_S", "STATE",
"WT","STRATUM")
R_FILE <- na.omit(R_FILE)
#---ASSIGN LABELS---#
R_FILE$P_UTD431H314_ROUT_S <- factor(R_FILE$P_UTD431H314_ROUT_S, levels=UTD431H314levels,
labels=UTD431H314labels)
R_FILE$STATE <- factor(R_FILE$STATE, levels=STATElevels,
labels=STATElabels)
#---SPECIFY A SAMPLING DESIGN AND FORCE WT AS NUMERIC---#
svydsg <- svydesign(id=~SEQNUMHH, strata=~STRATUM, weights=~(as.numeric(WT)),
data=R_FILE)
#---STATE ESTIMATES AND STANDARD ERRORS---#
r_est2 <- svyby(~P_UTD431H314_ROUT_S, ~STATE, svydsg, svymean)
r_est2[,-c(1)] <- round(r_est2[,-c(1)]*100,2) #CONVERT INTO PERCENT ESTIMATES
r_est2 <- subset(r_est2, select=c(1,3,5)) #SELECT ESTIMATES FOR UP-TO-DATE CASES
names(r_est2) <- c("STATE", "PERCENT 4:3:1:3:3:1:4 UTD", "STANDARD ERROR UTD")
prn(r_est2, '4:3:1:3:3:1:4 ESTIMATES BY STATE')

######################
title <- "R_PROG_3.R"
#########################################################################
#THIS PROGRAM WILL PRODUCE A TABLE OF HAD_CPOX BY STATE FOR ALL RDD
#COMPLETES USING RDDWT_C. THE PROGRAM USES R.
#
#R NOTES:
#1. R IS CASE SENSITIVE.
#2. A FILE PATH IS SEPERATED BY SLASH(/)
#########################################################################
library(survey) #TO USE svydesign(), svymean(), and svyby()
library(Hmisc) #TO USE prn()
library(prettyR) #TO USE freq()

dd <- "c:/nispuf18" #"path-to-dataset"
```

```
#--- NAME OF R DATASET ---#
in.file <- paste(dd,"/NISPUF18.RData",sep="")
#---READ R DATASET---#
load(in.file)
#---FORMAT---#
HAD_CPOXlevels=c(1,2,77,99)
HAD_CPOXlabels=c("YES", "NO", "DON'T KNOW", "REFUSED")
STATElevels=c(1, 2, 4, 5, 6, 8, 9, 10, 11, 12, 13, 15, 16, 17,
18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35,
36, 37, 38, 39, 40, 41, 42, 44, 45, 46, 47, 48, 49, 50, 51, 53,
54, 55, 56)
STATElabels=c(
"ALABAMA",
"ALASKA",
"ARIZONA",
"ARKANSAS",
"CALIFORNIA",
"COLORADO",
"CONNECTICUT",
"DELAWARE",
"DISTRICT OF COLUMBIA",
"FLORIDA",
"GEORGIA",
"HAWAII",
"IDAHO",
"ILLINOIS",
"INDIANA",
"IOWA",
"KANSAS",
"KENTUCKY",
"LOUISIANA",
"MAINE",
"MARYLAND",
"MASSACHUSETTS",
"MICHIGAN",
"MINNESOTA",
"MISSISSIPPI",
"MISSOURI",
"MONTANA",
"NEBRASKA",
"NEVADA",
"NEW HAMPSHIRE",
"NEW JERSEY",
"NEW MEXICO",
"NEW YORK",
"NORTH CAROLINA",
"NORTH DAKOTA",
"OHIO",
"OKLAHOMA",
"OREGON",
"PENNSYLVANIA",
"RHODE ISLAND",
"SOUTH CAROLINA",
"SOUTH DAKOTA",
"TENNESSEE",
"TEXAS",
"UTAH",
"VERMONT",
"VIRGINIA",
"WASHINGTON",
"WEST VIRGINIA",
"WISCONSIN",
"WYOMING"
)
```

```
#---RDDWT_C WILL BE USED AS A WEIGHT (RDDWT_C IS THE SINGLE-FRAME CELL-PHONE WEIGHT EXCLUDING
TERRITORIES)---#
#---STRATUM WILL BE USED AS A STRATUM VARIABLE FOR VARIANCE ESTIMATION ---#
R_FILE <- subset(NISPUF18, select=c(SEQNUMHH, SEQNUMC, STATE,
HAD_CPOX, RDDWT_C, STRATUM))
names(R_FILE) <- c("SEQNUMHH", "SEQNUMC", "STATE", "HAD_CPOX",
"WT", "STRATUM")

#---ASSIGN LABELS---#
R_FILE$HAD_CPOX <- factor(R_FILE$HAD_CPOX, levels=HAD_CPOXlevels,
labels=HAD_CPOXlabels)
R_FILE$STATE <- factor(R_FILE$STATE, levels=STATElevels,
labels=STATElabels)
R_FILE <- na.omit(R_FILE)
summary(R_FILE$HAD_CPOX)

#---SPECIFY A SAMPLING DESIGN AND FORCE WT AS NUMERIC---#
svydsg <- svydesign(id=~SEQNUMHH, strata=~STRATUM, weights=~(as.numeric(WT)),
data=R_FILE)

#---U.S. TOTAL ESTIMATES AND STANDARD ERRORS---#
r_nation <- svymean(~HAD_CPOX, svydsg)
PERCENT_UTD <- round(r_nation*100,2) #CONVERT INTO PERCENT ESTIMATES(MEAN)
SE_UTD <- round(SE(r_nation)*100,2) #CONVERT INTO PERCENT ESTIMATES(SE)
r_nation_est3 <- cbind(PERCENT_UTD, SE_UTD)
prn(r_nation_est3, "PERCENT HAD_CPOX = YES ESTIMATES AT A NATIONAL
LEVEL\n")

#---HAD_CPOX = YES ESTIMATES BY STATE---#
r_est3 <- svyby(~HAD_CPOX, ~STATE, svydsg, svymean)
r_est3[,-c(1)] <- round(r_est3[,-c(1)]*100,2) #CONVERT INTO PERCENT ESTIMATES
r_est3 <- subset(r_est3, select=c(1,2,6)) #SELECT ESTIMATES FOR HAD_CPOX=YES
names(r_est3) <- c("STATE", "PERCENT HAD_CPOX=YES", "STANDARD ERROR
HAD_CPOX=Y")
prn(r_est3, 'PERCENT HAD_CPOX ESTIMATES BY STATE')


#####################
title <- "PROG_4.R"
#########################################################################
#TABLE OF P_UTD431H314_ROUT_S BY INCPOV1 BY RACE_K. SAVE % UTD
#ESTIMATES (NOT S.E.'S) FOR USE IN THE PROGRAM GRAPH_4.
#
#THIS PROGRAM WILL PRODUCE ESTIMATES USING R.
#
#R NOTES:
#1. R IS CASE SENSITIVE.
#2. A FILE PATH IS SEPERATED BY SLASH(/)
#########################################################################
library(survey) #TO USE svydesign(), svymean(), and svyby()
library(Hmisc) #TO USE prn()


dd <- "c:/nispuf18" #"path-to-dataset"

out <-"c:/nispuf18" #"path-to-output"



#--- NAME OF R DATASET ---#
in.file <- paste(dd,"/NISPUF18.RData",sep="")
#---READ R DATASET---#
load(in.file)
#---FORMAT---#
UTD431H314levels=c(0,1)
```

```
UTD431H314labels=c("NOT 4:3:1:3:3:1:4 UTD", "4:3:1:3:3:1:4 UTD")
RACE_PUFlevels=c(1,2,3)
RACE_PUFlabels=c("WHITE ONLY", "BLACK ONLY", "OTHER + MULTIPLE RACE")
INCPOVlevels=c(1,2,3,4)
INCPOVlabels=c("ABOVE POVERTY, > $75K", "ABOVE POVERTY, <= $75K", "BELOW POVERTY", "UNKNOWN")
#---PROVWT_C WILL BE USED AS A WEIGHT (PROVWT_C IS THE SINGLE-FRAME CELL-PHONE WEIGHT EXCLUDING
TERRITORIES)---#
#---STRATUM WILL BE USED AS A STRATUM VARIABLE FOR VARIANCE ESTIMATION ---#
R_FILE <- subset(NISPUF18, select=c(SEQNUMHH, SEQNUMC, P_UTD431H314_ROUT_S, RACE_K, INCPOV1, PROVWT_C, STRATUM))
names(R_FILE) <- c("SEQNUMHH", "SEQNUMC", "P_UTD431H314_ROUT_S", "RACE_K", "INCPOV1", "WT", "STRATUM")
#---ASSIGN LABELS---#
R_FILE$P_UTD431H314_ROUT_S <- factor(R_FILE$P_UTD431H314_ROUT_S, levels=UTD431H314levels, labels=UTD431H314labels,
exclude=NULL)
R_FILE$RACE_K <- factor(R_FILE$RACE_K, levels=RACE_PUFlevels, labels=RACE_PUFlabels, exclude=NULL)
R_FILE$INCPOV1 <- factor(R_FILE$INCPOV1, levels=INCPOVlevels,labels=INCPOVlabels, exclude=NULL)
#---UNWEIGHTED FREQUENCIES---#
unwt_freq <- function(UNWT.VAR){#FUNCTION TO PRINT UNWEIGHTED FREQUENCIES
unwt.tab <- wtd.table(UNWT.VAR, weights= NULL, type='table')
unwtd.freq <- data.frame(cbind(
unwt.tab, round(unwt.tab/sum(unwt.tab)*100,2),
cumsum(unwt.tab), cumsum(round(unwt.tab/sum(unwt.tab)*100,2))))
names(unwtd.freq) <- c("Frequency", "Percent", "Cumulative Frequency", "Cumulative Percent")
unwtd.title <- paste('Table 4A. Q1/2018 - Q4/2018', 'UNWEIGHTED FREQUENCIES', label(UNWT.VAR), sep="\n")
label(unwtd.freq) <- unwtd.title
print(unwtd.freq)
}
unwt_freq(R_FILE$P_UTD431H314_ROUT_S)
unwt_freq(R_FILE$INCPOV1)
unwt_freq(R_FILE$RACE_K)
R_FILE <- na.omit(R_FILE)
#---SPECIFY A SAMPLING DESIGN AND FORCE WT AS NUMERIC---#
svydsg <- svydesign(id=~SEQNUMHH, strata=~STRATUM, weights=~(as.numeric(WT)),
data=R_FILE)
#---PERCENT 4:3:1:3:3:1:4 UP-TO-DATE AND ESTIMATED STANDARD ERRORS---#
r_est4 <- svyby(~P_UTD431H314_ROUT_S, ~RACE_K+INCPOV1, svydsg, svymean)
r_est4[,-c(1,2)] <- round(r_est4[,-c(1,2)]*100,2) #CONVERT INTO PERCENT ESTIMATES
r_est4 <- subset(r_est4, select=c(1,2,4,6)) #SELECT ESTIMATES FOR UP-TODATE CASES
names(r_est4) <- c("RACE", "INCOME", "PERCENT_UTD", "STANDARD_ERROR_UTD")
title <- "Table 4B. Q1/2018 - Q4/2018, Percent 4:3:1:3:3:1:4 UTD and Estimated Standard Errors"
prn(r_est4, title)
#---SAVE PERCENT UP-TO-DATE ESTIMATES FOR USE IN THE PROGRAM GRAPH_4---#
r_est4 <- subset(r_est4, select=c(RACE, INCOME, PERCENT_UTD))
save(r_est4, file=paste(out, "/r_est4", sep=""))



######################
title <- "GRAPH_4.R"
#############################################################################
#THIS PROGRAM BUILDS OFF OF THE PROGRAM PROG_4. IT PRODUCES A CHART OF
#P_UTD431H314_ROUT_S BY INCPOV1 BY RACE_K. IT CREATES A BAR CHART IN R GRAPH FOR
#THE 4X3 = 12 CELLS.
#R NOTES:
#1. R IS CASE SENSITIVE.
#2. A FILE PATH IS SEPERATED BY SLASH(/)
#############################################################################
library(survey) #TO USE svydesign(), svymean(), and svyby()
library(Hmisc) #TO USE prn()

dd <- "c:/nispuf18" #---SPECIFY PATH TO R DATASET THAT WAS THE OUTPUT OF R_PROG_4---#

out <- "c:/nispuf18" #---SPECIFY THE PATH FOR WHERE YOU WANT THE CHART OUTPUT TO GO---#


#---NAME OF R DATASET OUTPUT FROM R_PROG_4---#
```

```
in.file <- paste(dd,"/r_est4",sep="")
#---READ R DATASET---#
load(in.file)
#---BARCHART---#
#NOTE:R DOES NOT SUPPORT CREATING A HTML FILE CONTAINING A BARCHART#
#CREATE A DATA MATRIX FOR DRAWING A BARCHART#
utd431H314 <- matrix(r_est4$PERCENT_UTD, nrow=3, ncol=4, byrow=F, dimnames=list(levels(r_est4$RACE), levels(r_est4$INCOME)))
#CREATE GRAPH_4.GIF#
barplot(utd431H314, beside=TRUE, space=c(0.2,1),
      col = c("wheat", "lightpink2", "forestgreen"),
      axis.lty = 1,
      sub="(Graph 4 using 'R')", cex.sub=1, ylim=c(0,120),
      xlab="Poverty Status",
      ylab="4:3:1:3:3:1:4 Up-To-Date (%)", cex=1.1, cex.names=1, cex.lab=1.5, border=NA)
legend("top", rownames(utd431H314), col=c("wheat", "lightpink2",
                                          "forestgreen"), title="Race of Child", pch=15, cex=1.25)
title1 <- "Percentage of Children Up-to-date with Vaccine Series 4:3:1:3:3:1:4 \n"
title2 <- "by Race and Poverty Status, National Immunization Survey - Child, 2018\n"
mtext(paste(title1,title2), cex=1.5)
```

Appendix E: Alphabetical Listing of Variables that are in the 2004-2018 Public-Use Data Files

Table E.1 Alphabetical Listing of Variables that are in the 2004-2018 Public-Use Data Files*

		Year of Data Collection															
Variable Name	**Variable Label†**	**2004**	**2005**	**2006**	**2007**	**2008**	**2009**	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**	**Notes§**
AGECPOXR	AGE IN MONTHS AT CHICKEN POX DISEASE (RECODE)		Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Replaced IAGECPXR starting 2005. This version is not imputed.
AGEGRP	AGE CATEGORY OF CHILD (19-23, 24-29, 30-35 MO) (RECODE)	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	
ALL4SHOT	HH REPORT OF 4:3:1:3 UP-TO-DATE	Y	Y														Dropped starting in 2006 because no longer possible to derive due to questionnaire change.
BF_ENDR	DURATION OF BREASTFEEDING IN DAYS (TOPCODE)	Y	Y														Dropped starting in 2006 because of question wording change. Replaced by BF_ENDR06.
BF_ENDR06	DURATION OF BREASTFEEDING IN DAYS (RECODE)			Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Replaced BF_ENDR starting 2006.
BF_EXCLR	DURATION OF EXCLUSIVE BREASTFEEDING IN DAYS (TOPCODE)	Y	Y														Dropped starting in 2006 because of question wording change. Replaced by BF_EXCLR06.
BF_EXCLR06	DURATION OF EXCLUSIVE BREAST/FORMULA FEEDING IN DAYS (RECODE)			Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Replaced BF_EXCLR starting 2006.
BF_FORMR06	AGE IN DAYS WHEN CHILD FIRST FED FORMULA (TOPCODE)			Y	Y												Question CBF_03_X added starting 2006. Replaced by BF_FORMR06 starting 2008.
BF_FORMR08	AGE IN DAYS WHEN CHILD FIRST FED FORMULA (RECODE)					Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Replaced BF_FORMR06 to add a "never fed formula" code.
BFENDFL	DURATION OF BREAST FEEDING EXCEEDS CHILD AGE IN DAYS, WITH BUFFER	Y	Y														Dropped starting in 2006 because of question wording change. Replaced by BFENDFL06.
BFENDFL06	DURATION OF BREAST FEEDING EXCEEDS CHILD AGE IN DAYS, WITH BUFFER			Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Replaced BFENDFL starting 2006.
BFEXCLFL	DURATION OF EXCLUSIVE BREAST FEEDING EXCEEDS TOTAL BREASTFEEDING, WITH BUFFER	Y	Y														Dropped starting in 2006 because question wording change does not allow it to be derived.
BFFORMFL06	AGE IN DAYS WHEN CHILD FIRST FED FORMULA EXCEEDS CHILD AGE IN DAYS, WITH BUFFER			Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Question CBF_03_X added starting 2006.
C_431	HH REPORT OF 4:3:1 UP-TO-DATE BY SHOT CARD USE	Y	Y														Dropped starting in 2006 because no longer possible to derive due to questionnaire change.
C_4313	HH REPORT OF 4:3:1:3 UP-TO-DATE BY SHOT CARD USE	Y	Y														Dropped starting in 2006 because no longer possible to derive due to questionnaire change.

Variable Name	Variable Label[†]	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	Notes[§]
C_DTP	HH REPORT OF 4+ DT-CONTAINING UP-TO-DATE BY SHOT CARD USE	Y	Y														Dropped starting in 2006 because no longer possible to derive due to questionnaire change.
C_HEP	HH REPORT OF 3+ HEPATITIS B-CONTAINING UP-TO-DATE BY SHOT CARD USE	Y	Y														Dropped starting in 2006 because no longer possible to derive due to questionnaire change.
C_HIB	HH REPORT OF 3+ HIB-CONTAINING UP-TO-DATE BY SHOT CARD USE	Y	Y														Dropped starting in 2006 because no longer possible to derive due to questionnaire change.
C_MMR	HH REPORT OF 1+ MEASLES-CONTAINING UP-TO-DATE BY SHOT CARD USE	Y	Y														Dropped starting in 2006 because no longer possible to derive due to questionnaire change.
C_POL	HH REPORT OF 3+ POLIO-CONTAINING UP-TO-DATE BY SHOT CARD USE	Y	Y														Dropped starting in 2006 because no longer possible to derive due to questionnaire change.
C_VRC	HH REPORT OF 1+ VARICELLA-CONTAINING UP-TO-DATE BY SHOT CARD USE	Y	Y														Dropped starting in 2006 because no longer possible to derive due to questionnaire change.
C1R	NUMBER OF PEOPLE IN HOUSEHOLD (RECODE)	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	
C5R	RELATIONSHIP OF RESPONDENT TO CHILD (RECODE)	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	
CBF_01	WAS CHILD EVER BREASTFED OR FED BREAST MILK?	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	
CEN_REG	CENSUS REGION BASED ON TRUE STATE OF RESIDENCE	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	
CHILDNM	NUMBER OF CHILDREN LESS THAN 18 YEARS IN HH (RECODE)	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	
CWIC_01	CHILD EVER RECEIVED WIC BENEFITS?	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	
CWIC_02	CHILD CURRENTLY RECEIVING WIC BENEFITS?	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	
D6R	NUMBER OF VACCINATION PROVIDERS IDENTIFIED BY RESPONDENT (RECODE)	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	
D7	CONSENT TO OBTAIN CHILD'S IMMUNIZATION RECORDS FROM PROVIDERS	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	
DDTP1	AGE IN DAYS OF PROV-REPTD DT-CONTAINING SHOT #1	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	
DDTP2	AGE IN DAYS OF PROV-REPTD DT-CONTAINING SHOT #2	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	
DDTP3	AGE IN DAYS OF PROV-REPTD DT-CONTAINING SHOT #3	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	
DDTP4	AGE IN DAYS OF PROV-REPTD DT-CONTAINING SHOT #4	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	

Variable Name	Variable Label[†]	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	Notes[§]
DDTP5	AGE IN DAYS OF PROV-REPTD DT-CONTAINING SHOT #5	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	
DDTP6	AGE IN DAYS OF PROV-REPTD DT-CONTAINING SHOT #6	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	
DDTP7	AGE IN DAYS OF PROV-REPTD DT-CONTAINING SHOT #7	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	
DDTP8	AGE IN DAYS OF PROV-REPTD DT-CONTAINING SHOT #8	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	
DDTP9	AGE IN DAYS OF PROV-REPTD DT-CONTAINING SHOT #9		Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Starting in 2005, nine shot variables are included for each vaccine category.
DFLU1	AGE IN DAYS OF PROV-REPTD SEASONAL FLU-CONTAINING VACCINATION #1	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	
DFLU2	AGE IN DAYS OF PROV-REPTD SEASONAL FLU-CONTAINING VACCINATION #2	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	
DFLU3	AGE IN DAYS OF PROV-REPTD SEASONAL FLU-CONTAINING VACCINATION #3	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	
DFLU4	AGE IN DAYS OF PROV-REPTD SEASONAL FLU-CONTAINING VACCINATION #4	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	
DFLU5	AGE IN DAYS OF PROV-REPTD SEASONAL FLU-CONTAINING VACCINATION #5	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	
DFLU6	AGE IN DAYS OF PROV-REPTD SEASONAL FLU-CONTAINING VACCINATION #6	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	
DFLU7	AGE IN DAYS OF PROV-REPTD SEASONAL FLU-CONTAINING VACCINATION #7	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	
DFLU8	AGE IN DAYS OF PROV-REPTD SEASONAL FLU-CONTAINING VACCINATION #8	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	
DFLU9	AGE IN DAYS OF PROV-REPTD SEASONAL FLU-CONTAINING VACCINATION #9		Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Starting in 2005, nine shot variables are included for each vaccine category.
DH1N1	AGE IN DAYS OF PROV-REPTD MONOVALENT 2009 H1N1 INFLUENZA VACCINATION #1							Y	Y	Y							H1N1 influenza added to the IHQ shotgrid starting in late 2009, and introduced in the PUF in 2010. Removed from the IHQ and the PUF in 2013.
DH1N2	AGE IN DAYS OF PROV-REPTD MONOVALENT 2009 H1N1 INFLUENZA VACCINATION #2							Y	Y	Y							H1N1 influenza added to the IHQ shotgrid starting in late 2009, and introduced in the PUF in 2010. Removed from the IHQ and the PUF in 2013.

Variable Name	Variable Label[†]	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	Notes[§]
DH1N3	AGE IN DAYS OF PROV-REPTD MONOVALENT 2009 H1N1 INFLUENZA VACCINATION #3							Y	Y	Y							H1N1 influenza added to the IHQ shotgrid starting in late 2009, and introduced in the PUF in 2010. Removed from the IHQ and the PUF in 2013.
DH1N4	AGE IN DAYS OF PROV-REPTD MONOVALENT 2009 H1N1 INFLUENZA VACCINATION #4							Y	Y	Y							H1N1 influenza added to the IHQ shotgrid starting in late 2009, and introduced in the PUF in 2010. Removed from the IHQ and the PUF in 2013.
DH1N5	AGE IN DAYS OF PROV-REPTD MONOVALENT 2009 H1N1 INFLUENZA VACCINATION #5							Y	Y	Y							H1N1 influenza added to the IHQ shotgrid starting in late 2009, and introduced in the PUF in 2010. Removed from the IHQ and the PUF in 2013.
DH1N6	AGE IN DAYS OF PROV-REPTD MONOVALENT 2009 H1N1 INFLUENZA VACCINATION #6							Y	Y	Y							H1N1 influenza added to the IHQ shotgrid starting in late 2009, and introduced in the PUF in 2010. Removed from the IHQ and the PUF in 2013.
DH1N7	AGE IN DAYS OF PROV-REPTD MONOVALENT 2009 H1N1 INFLUENZA VACCINATION #7							Y	Y	Y							H1N1 influenza added to the IHQ shotgrid starting in late 2009, and introduced in the PUF in 2010. Removed from the IHQ and the PUF in 2013.
DH1N8	AGE IN DAYS OF PROV-REPTD MONOVALENT 2009 H1N1 INFLUENZA VACCINATION #8							Y	Y	Y							H1N1 influenza added to the IHQ shotgrid starting in late 2009, and introduced in the PUF in 2010. Removed from the IHQ and the PUF in 2013.
DH1N9	AGE IN DAYS OF PROV-REPTD MONOVALENT 2009 H1N1 INFLUENZA VACCINATION #9							Y	Y	Y							H1N1 influenza added to the IHQ shotgrid starting in late 2009, and introduced in the PUF in 2010. Removed from the IHQ and the PUF in 2013.
DHEPA1	AGE IN DAYS OF PROV-REPTD HEPATITIS A-CONTAINING SHOT #1	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	
DHEPA2	AGE IN DAYS OF PROV-REPTD HEPATITIS A-CONTAINING SHOT #2	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	
DHEPA3	AGE IN DAYS OF PROV-REPTD HEPATITIS A-CONTAINING SHOT #3	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	
DHEPA4	AGE IN DAYS OF PROV-REPTD HEPATITIS A-CONTAINING SHOT #4	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	
DHEPA5	AGE IN DAYS OF PROV-REPTD HEPATITIS A-CONTAINING SHOT #5	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	
DHEPA6	AGE IN DAYS OF PROV-REPTD HEPATITIS A-CONTAINING SHOT #6	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	
DHEPA7	AGE IN DAYS OF PROV-REPTD HEPATITIS A-CONTAINING SHOT #7	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	
DHEPA8	AGE IN DAYS OF PROV-REPTD HEPATITIS A-CONTAINING SHOT #8	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	
DHEPA9	AGE IN DAYS OF PROV-REPTD HEPATITIS A-CONTAINING SHOT #9		Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Starting in 2005, nine shot variables are included for each vaccine category.
DHEPB1	AGE IN DAYS OF PROV-REPTD HEPATITIS B-CONTAINING SHOT #1	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	
DHEPB2	AGE IN DAYS OF PROV-REPTD HEPATITIS B-CONTAINING SHOT #2	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	

Variable Name	Variable Label[†]	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	Notes[§]
DHEPB3	AGE IN DAYS OF PROV-REPTD HEPATITIS B-CONTAINING SHOT #3	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	
DHEPB4	AGE IN DAYS OF PROV-REPTD HEPATITIS B-CONTAINING SHOT #4	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	
DHEPB5	AGE IN DAYS OF PROV-REPTD HEPATITIS B-CONTAINING SHOT #5	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	
DHEPB6	AGE IN DAYS OF PROV-REPTD HEPATITIS B-CONTAINING SHOT #6	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	
DHEPB7	AGE IN DAYS OF PROV-REPTD HEPATITIS B-CONTAINING SHOT #7	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	
DHEPB8	AGE IN DAYS OF PROV-REPTD HEPATITIS B-CONTAINING SHOT #8	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	
DHEPB9	AGE IN DAYS OF PROV-REPTD HEPATITIS B-CONTAINING SHOT #9		Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Starting in 2005, nine shot variables are included for each vaccine category.
DHIB1	AGE IN DAYS OF PROV-REPTD HIB-CONTAINING SHOT #1	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	
DHIB2	AGE IN DAYS OF PROV-REPTD HIB-CONTAINING SHOT #2	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	
DHIB3	AGE IN DAYS OF PROV-REPTD HIB-CONTAINING SHOT #3	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	
DHIB4	AGE IN DAYS OF PROV-REPTD HIB-CONTAINING SHOT #4	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	
DHIB5	AGE IN DAYS OF PROV-REPTD HIB-CONTAINING SHOT #5	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	
DHIB6	AGE IN DAYS OF PROV-REPTD HIB-CONTAINING SHOT #6	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	
DHIB7	AGE IN DAYS OF PROV-REPTD HIB-CONTAINING SHOT #7	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	
DHIB8	AGE IN DAYS OF PROV-REPTD HIB-CONTAINING SHOT #8	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	
DHIB9	AGE IN DAYS OF PROV-REPTD HIB-CONTAINING SHOT #9		Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Starting in 2005, nine shot variables are included for each vaccine category.
DISPCODE	NIS PROVIDER RECORD-CHECK DISPOSITION CODE	Y	Y	Y	Y	Y	Y	Y	Y								Dropped starting in 2012 because no longer possible to derive due to questionnaire change
DMMR1	AGE IN DAYS OF PROV-REPTD MEASLES-CONTAINING SHOT #1	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	
DMMR2	AGE IN DAYS OF PROV-REPTD MEASLES-CONTAINING SHOT #2	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	
DMMR3	AGE IN DAYS OF PROV-REPTD MEASLES-CONTAINING SHOT #3	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	
DMMR4	AGE IN DAYS OF PROV-REPTD MEASLES-CONTAINING SHOT #4	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	

Variable Name	Variable Label[†]	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	Notes[§]
DMMR5	AGE IN DAYS OF PROV-REPTD MEASLES-CONTAINING SHOT #5		Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Starting in 2005, nine shot variables are included for each vaccine category.
DMMR6	AGE IN DAYS OF PROV-REPTD MEASLES-CONTAINING SHOT #6		Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Starting in 2005, nine shot variables are included for each vaccine category.
DMMR7	AGE IN DAYS OF PROV-REPTD MEASLES-CONTAINING SHOT #7		Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Starting in 2005, nine shot variables are included for each vaccine category.
DMMR8	AGE IN DAYS OF PROV-REPTD MEASLES-CONTAINING SHOT #8		Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Starting in 2005, nine shot variables are included for each vaccine category.
DMMR9	AGE IN DAYS OF PROV-REPTD MEASLES-CONTAINING SHOT #9		Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Starting in 2005, nine shot variables are included for each vaccine category.
DMP1	AGE IN DAYS OF PROV-REPTD MUMPS-ONLY SHOT #1	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	
DMP2	AGE IN DAYS OF PROV-REPTD MUMPS-ONLY SHOT #2	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	
DMP3	AGE IN DAYS OF PROV-REPTD MUMPS-ONLY SHOT #3	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	
DMP4	AGE IN DAYS OF PROV-REPTD MUMPS-ONLY SHOT #4	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	
DMP5	AGE IN DAYS OF PROV-REPTD MUMPS-ONLY SHOT #5		Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Starting in 2005, nine shot variables are included for each vaccine category.
DMP6	AGE IN DAYS OF PROV-REPTD MUMPS-ONLY SHOT #6		Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Starting in 2005, nine shot variables are included for each vaccine category.
DMP7	AGE IN DAYS OF PROV-REPTD MUMPS-ONLY SHOT #7		Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Starting in 2005, nine shot variables are included for each vaccine category.
DMP8	AGE IN DAYS OF PROV-REPTD MUMPS-ONLY SHOT #8		Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Starting in 2005, nine shot variables are included for each vaccine category.
DMP9	AGE IN DAYS OF PROV-REPTD MUMPS-ONLY SHOT #9		Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Starting in 2005, nine shot variables are included for each vaccine category.
DMPRB1	AGE IN DAYS OF PROV-REPTD (MUMPS/RUBELLA)-ONLY SHOT #1	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	
DMPRB2	AGE IN DAYS OF PROV-REPTD (MUMPS/RUBELLA)-ONLY SHOT #2	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	
DMPRB3	AGE IN DAYS OF PROV-REPTD (MUMPS/RUBELLA)-ONLY SHOT #3	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	
DMPRB4	AGE IN DAYS OF PROV-REPTD (MUMPS/RUBELLA)-ONLY SHOT #4	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	
DMPRB5	AGE IN DAYS OF PROV-REPTD (MUMPS/RUBELLA)-ONLY SHOT #5		Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Starting in 2005, nine shot variables are included for each vaccine category.
DMPRB6	AGE IN DAYS OF PROV-REPTD (MUMPS/RUBELLA)-ONLY SHOT #6		Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Starting in 2005, nine shot variables are included for each vaccine category.
DMPRB7	AGE IN DAYS OF PROV-REPTD (MUMPS/RUBELLA)-ONLY SHOT #7		Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Starting in 2005, nine shot variables are included for each vaccine category.

Variable Name	Variable Label[†]	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	Notes[§]
DMPRB8	AGE IN DAYS OF PROV-REPTD (MUMPS/RUBELLA)-ONLY SHOT #8		Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Starting in 2005, nine shot variables are included for each vaccine category.
DMPRB9	AGE IN DAYS OF PROV-REPTD (MUMPS/RUBELLA)-ONLY SHOT #9		Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Starting in 2005, nine shot variables are included for each vaccine category.
DPCV1	AGE IN DAYS OF PROV-REPTD PNEUMOCOCCAL-CONTAINING SHOT #1	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	
DPCV2	AGE IN DAYS OF PROV-REPTD PNEUMOCOCCAL-CONTAINING SHOT #2	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	
DPCV3	AGE IN DAYS OF PROV-REPTD PNEUMOCOCCAL-CONTAINING SHOT #3	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	
DPCV4	AGE IN DAYS OF PROV-REPTD PNEUMOCOCCAL-CONTAINING SHOT #4	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	
DPCV5	AGE IN DAYS OF PROV-REPTD PNEUMOCOCCAL-CONTAINING SHOT #5	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	
DPCV6	AGE IN DAYS OF PROV-REPTD PNEUMOCOCCAL-CONTAINING SHOT #6	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	
DPCV7	AGE IN DAYS OF PROV-REPTD PNEUMOCOCCAL-CONTAINING SHOT #7	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	
DPCV8	AGE IN DAYS OF PROV-REPTD PNEUMOCOCCAL-CONTAINING SHOT #8	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	
DPCV9	AGE IN DAYS OF PROV-REPTD PNEUMOCOCCAL-CONTAINING SHOT #9		Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Starting in 2005, nine shot variables are included for each vaccine category.
DPOLIO1	AGE IN DAYS OF PROV-REPTD POLIO-CONTAINING SHOT #1	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	
DPOLIO2	AGE IN DAYS OF PROV-REPTD POLIO-CONTAINING SHOT #2	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	
DPOLIO3	AGE IN DAYS OF PROV-REPTD POLIO-CONTAINING SHOT #3	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	
DPOLIO4	AGE IN DAYS OF PROV-REPTD POLIO-CONTAINING SHOT #4	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	
DPOLIO5	AGE IN DAYS OF PROV-REPTD POLIO-CONTAINING SHOT #5	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	
DPOLIO6	AGE IN DAYS OF PROV-REPTD POLIO-CONTAINING SHOT #6	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	
DPOLIO7	AGE IN DAYS OF PROV-REPTD POLIO-CONTAINING SHOT #7	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	

Variable Name	Variable Label[†]	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	Notes[§]
DPOLIO8	AGE IN DAYS OF PROV-REPTD POLIO-CONTAINING SHOT #8	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	
DPOLIO9	AGE IN DAYS OF PROV-REPTD POLIO-CONTAINING SHOT #9		Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Starting in 2005, nine shot variables are included for each vaccine category.
DRB1	AGE IN DAYS OF PROV-REPTD RUBELLA-ONLY SHOT #1	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	
DRB2	AGE IN DAYS OF PROV-REPTD RUBELLA-ONLY SHOT #2	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	
DRB3	AGE IN DAYS OF PROV-REPTD RUBELLA-ONLY SHOT #3	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	
DRB4	AGE IN DAYS OF PROV-REPTD RUBELLA-ONLY SHOT #4	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	
DRB5	AGE IN DAYS OF PROV-REPTD RUBELLA-ONLY SHOT #5	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	
DRB6	AGE IN DAYS OF PROV-REPTD RUBELLA-ONLY SHOT #6	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	
DRB7	AGE IN DAYS OF PROV-REPTD RUBELLA-ONLY SHOT #7	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	
DRB8	AGE IN DAYS OF PROV-REPTD RUBELLA-ONLY SHOT #8	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	
DRB9	AGE IN DAYS OF PROV-REPTD RUBELLA-ONLY SHOT #9		Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Starting in 2005, nine shot variables are included for each vaccine category.
DROT1	AGE IN DAYS OF PROV-REPTD ROTAVIRUS-CONTAINING SHOT #1	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	
DROT2	AGE IN DAYS OF PROV-REPTD ROTAVIRUS-CONTAINING SHOT #2	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	
DROT3	AGE IN DAYS OF PROV-REPTD ROTAVIRUS-CONTAINING SHOT #3	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	
DROT4	AGE IN DAYS OF PROV-REPTD ROTAVIRUS-CONTAINING SHOT #4	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	
DROT5	AGE IN DAYS OF PROV-REPTD ROTAVIRUS-CONTAINING SHOT #5	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	
DROT6	AGE IN DAYS OF PROV-REPTD ROTAVIRUS-CONTAINING SHOT #6	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	
DROT7	AGE IN DAYS OF PROV-REPTD ROTAVIRUS-CONTAINING SHOT #7	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	
DROT8	AGE IN DAYS OF PROV-REPTD ROTAVIRUS-CONTAINING SHOT #8	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	
DROT9	AGE IN DAYS OF PROV-REPTD ROTAVIRUS-CONTAINING SHOT #9		Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Starting in 2005, nine shot variables are included for each vaccine category.
DTP_SOUR	SHOT CARD USED FOR DTP REPORTING	Y															Dropped starting in 2005 because this variable is redundant with variable SHOTCARD.

Variable Name	Variable Label[†]	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	Notes[§]
DTP1_AGE	AGE IN MONTHS OF PROV-REPTD DT-CONTAINING SHOT #1	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	
DTP2_AGE	AGE IN MONTHS OF PROV-REPTD DT-CONTAINING SHOT #2	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	
DTP3_AGE	AGE IN MONTHS OF PROV-REPTD DT-CONTAINING SHOT #3	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	
DTP4_AGE	AGE IN MONTHS OF PROV-REPTD DT-CONTAINING SHOT #4	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	
DTP5_AGE	AGE IN MONTHS OF PROV-REPTD DT-CONTAINING SHOT #5	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	
DTP6_AGE	AGE IN MONTHS OF PROV-REPTD DT-CONTAINING SHOT #6	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	
DTP7_AGE	AGE IN MONTHS OF PROV-REPTD DT-CONTAINING SHOT #7	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	
DTP8_AGE	AGE IN MONTHS OF PROV-REPTD DT-CONTAINING SHOT #8	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	
DTP9_AGE	AGE IN MONTHS OF PROV-REPTD DT-CONTAINING SHOT #9		Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Starting in 2005, nine shot variables are included for each vaccine category.
DVRC1	AGE IN DAYS OF PROV-REPTD VARICELLA-CONTAINING SHOT #1	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	
DVRC2	AGE IN DAYS OF PROV-REPTD VARICELLA-CONTAINING SHOT #2	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	
DVRC3	AGE IN DAYS OF PROV-REPTD VARICELLA-CONTAINING SHOT #3	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	
DVRC4	AGE IN DAYS OF PROV-REPTD VARICELLA-CONTAINING SHOT #4	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	
DVRC5	AGE IN DAYS OF PROV-REPTD VARICELLA-CONTAINING SHOT #5		Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Starting in 2005, nine shot variables are included for each vaccine category.
DVRC6	AGE IN DAYS OF PROV-REPTD VARICELLA-CONTAINING SHOT #6		Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Starting in 2005, nine shot variables are included for each vaccine category.
DVRC7	AGE IN DAYS OF PROV-REPTD VARICELLA-CONTAINING SHOT #7		Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Starting in 2005, nine shot variables are included for each vaccine category.
DVRC8	AGE IN DAYS OF PROV-REPTD VARICELLA-CONTAINING SHOT #8		Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Starting in 2005, nine shot variables are included for each vaccine category.
DVRC9	AGE IN DAYS OF PROV-REPTD VARICELLA-CONTAINING SHOT #9		Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Starting in 2005, nine shot variables are included for each vaccine category.
EDUC1	EDUCATION OF MOTHER CATEGORIES: IMPUTED (RECODE)	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	
ENTRY2	CHILD LIVES IN STATE WITH HEPATITIS B STATE ENTRY LAW FOR DAY CARE/HEAD START (2001-2002 SCHOOL YEAR)	Y															Dropped starting in 2005.

Variable Name	Variable Label†	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	Notes§
EST_GRANT	AREA OF RESIDENCE ACCORDING TO THE 56 ORIGINAL CORE GRANTEE AREAS									Y	Y	Y	Y	Y	Y	Y	Added in 2012 to facilitate production of estimates for the 56 core areas.
ESTIAP	ESTIMATION IAP AREA OF RESIDENCE		Y														Replaced ITRUEIAP in 2005 because estimation areas were modified. Replaced by ESTIAP06 in 2006.
ESTIAP06	ESTIMATION IAP AREA OF RESIDENCE			Y													Replaced ESTIAP in 2006 because estimation areas were modified. Replaced by ESTIAP07 in 2007.
ESTIAP07	ESTIMATION AREA OF RESIDENCE				Y												Replaced ESTIAP06 in 2007 because estimation areas were modified. Replaced by ESTIAP08 in 2008.
ESTIAP08	ESTIMATION AREA OF RESIDENCE					Y											Replaced ESTIAP07 in 2008 because estimation areas were modified. Replaced by ESTIAP09 in 2009.
ESTIAP09	ESTIMATION AREA OF RESIDENCE						Y										Replaced ESTIAP08 in 2009 because estimation areas were modified. Replaced by ESTIAP10 in 2010.
ESTIAP10	ESTIMATION AREA OF RESIDENCE							Y									Replaced ESTIAP09 in 2010 because estimation areas were modified. Replaced by ESTIAP11 in 2011.
ESTIAP11	ESTIMATION AREA OF RESIDENCE								Y								Replaced ESTIAP10 in 2011 because estimation areas were modified. Replaced by ESTIAP12 in 2012.
ESTIAP12	ESTIMATION AREA OF RESIDENCE									Y							Replaced ESTIAP11 in 2012 because estimation areas were modified. Replaced by ESTIAP13 in 2013.
ESTIAP13	ESTIMATION AREA OF RESIDENCE										Y						Replaced ESTIAP12 in 2013 because estimation areas were modified. Replaced by ESTIAP14 in 2014.
ESTIAP14	ESTIMATION AREA OF RESIDENCE											Y					Replaced ESTIAP13 in 2014 because estimation areas were modified. Replaced by ESTIAP15 in 2015.
ESTIAP15	ESTIMATION AREA OF RESIDENCE												Y				Replaced ESTIAP14 in 2015 because estimation areas were modified. Replaced by ESTIAP16 in 2016.
ESTIAP16	ESTIMATION AREA OF RESIDENCE													Y			Replaced ESTIAP15 in 2016 because estimation areas were modified. Replaced by ESTIAP17 in 2017.
ESTIAP17	**ESTIMATION AREA OF RESIDENCE**														**Y**		**Replaced ESTIAP16 in 2017 because estimation areas were modified. Replaced by ESTIAP18 in 2018.**
ESTIAP18	**ESTIMATION AREA OF RESIDENCE**															**Y**	**Replaced ESTIAP17 in 2018 because estimation areas were modified.**

Variable Name	Variable Label[†]	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	Notes[§]
FLU1_AGE	AGE IN MONTHS OF PROV-REPTD SEASONAL FLU-CONTAINING VACCINATION #1	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	
FLU2_AGE	AGE IN MONTHS OF PROV-REPTD SEASONAL FLU-CONTAINING VACCINATION #2	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	
FLU3_AGE	AGE IN MONTHS OF PROV-REPTD SEASONAL FLU-CONTAINING VACCINATION #3	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	
FLU4_AGE	AGE IN MONTHS OF PROV-REPTD SEASONAL FLU-CONTAINING VACCINATION #4	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	
FLU5_AGE	AGE IN MONTHS OF PROV-REPTD SEASONAL FLU-CONTAINING VACCINATION #5	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	
FLU6_AGE	AGE IN MONTHS OF PROV-REPTD SEASONAL FLU-CONTAINING VACCINATION #6	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	
FLU7_AGE	AGE IN MONTHS OF PROV-REPTD SEASONAL FLU-CONTAINING VACCINATION #7	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	
FLU8_AGE	AGE IN MONTHS OF PROV-REPTD SEASONAL FLU-CONTAINING VACCINATION #8	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	
FLU9_AGE	AGE IN MONTHS OF PROV-REPTD SEASONAL FLU-CONTAINING VACCINATION #9		Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Starting in 2005, nine shot variables are included for each vaccine category.
FRSTBRN	FIRST BORN STATUS OF CHILD: IMPUTED	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	
FUL2_MMR	HOUSEHOLD REPORT OF 1+ MMR AT ANY AGE	Y															Replaced by FULL_MMR starting in 2005.
FULL_CPO	HH REPORT OF 1+ VARICELLA-CONTAINING SHOT AT ANY AGE	Y	Y														Starting 2005, a code of 88 added for children with unknown UTD status. Dropped starting in 2006 because no longer possible to derive due to questionnaire change.
FULL_DTP	HH REPORT OF 4+ DT-CONTAINING SHOT	Y	Y														Starting 2005, a code of 88 added for children with unknown UTD status. Dropped starting in 2006 because no longer possible to derive due questionnaire change.
FULL_HEP	HH REPORT OF 3+ HEPATITIS B-CONTAINING SHOTS	Y	Y														Starting 2005, a code of 88 added for children with unknown UTD status. Dropped starting in 2006 because no longer possible to derive due to questionnaire change.

Variable Name	Variable Label[†]	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	Notes[§]
FULL_HIB	HH REPORT OF 3+ HIB-CONTAINING SHOTS	Y	Y														Starting 2005, a code of 88 added for children with unknown UTD status. Dropped starting in 2006 because no longer possible to derive due to questionnaire change.
FULL_MMR	HH REPORT OF 1+ MEASLES-CONTAINING SHOT AT ANY AGE		Y														Replaced FUL2_MMR starting in 2005. A code of 88 added for children with unknown UTD status. Dropped starting in 2006 because no longer possible to derive due to questionnaire change.
FULL_POL	HH REPORT OF 3+ POLIO-CONTAINING SHOTS	Y	Y														Starting 2005, a code of 88 added for children with unknown UTD status. Dropped starting in 2006 because no longer possible to derive due to questionnaire change.
H1N1_AGE	AGE IN MONTHS OF PROV-REPTD MONOVALENT 2009 H1N1 INFLUENZA VACCINATION #1							Y	Y	Y							H1N1 influenza added to the IHQ shotgrid starting in late 2009, and introduced in the PUF in 2010. Removed from the IHQ and the PUF in 2013.
H1N2_AGE	AGE IN MONTHS OF PROV-REPTD MONOVALENT 2009 H1N1 INFLUENZA VACCINATION #2							Y	Y	Y							H1N1 influenza added to the IHQ shotgrid starting in late 2009, and introduced in the PUF in 2010. Removed from the IHQ and the PUF in 2013.
H1N3_AGE	AGE IN MONTHS OF PROV-REPTD MONOVALENT 2009 H1N1 INFLUENZA VACCINATION #3							Y	Y	Y							H1N1 influenza added to the IHQ shotgrid starting in late 2009, and introduced in the PUF in 2010. Removed from the IHQ and the PUF in 2013.
H1N4_AGE	AGE IN MONTHS OF PROV-REPTD MONOVALENT 2009 H1N1 INFLUENZA VACCINATION #4							Y	Y	Y							H1N1 influenza added to the IHQ shotgrid starting in late 2009, and introduced in the PUF in 2010. Removed from the IHQ and the PUF in 2013.
H1N5_AGE	AGE IN MONTHS OF PROV-REPTD MONOVALENT 2009 H1N1 INFLUENZA VACCINATION #5							Y	Y	Y							H1N1 influenza added to the IHQ shotgrid starting in late 2009, and introduced in the PUF in 2010. Removed from the IHQ and the PUF in 2013.
H1N6_AGE	AGE IN MONTHS OF PROV-REPTD MONOVALENT 2009 H1N1 INFLUENZA VACCINATION #6							Y	Y	Y							H1N1 influenza added to the IHQ shotgrid starting in late 2009, and introduced in the PUF in 2010. Removed from the IHQ and the PUF in 2013.
H1N7_AGE	AGE IN MONTHS OF PROV-REPTD MONOVALENT 2009 H1N1 INFLUENZA VACCINATION #7							Y	Y	Y							H1N1 influenza added to the IHQ shotgrid starting in late 2009, and introduced in the PUF in 2010. Removed from the IHQ and the PUF in 2013.
H1N8_AGE	AGE IN MONTHS OF PROV-REPTD MONOVALENT 2009 H1N1 INFLUENZA VACCINATION #8							Y	Y	Y							H1N1 influenza added to the IHQ shotgrid starting in late 2009, and introduced in the PUF in 2010. Removed from the IHQ and the PUF in 2013.
H1N9_AGE	AGE IN MONTHS OF PROV-REPTD MONOVALENT 2009 H1N1 INFLUENZA VACCINATION #9							Y	Y	Y							H1N1 influenza added to the IHQ shotgrid starting in late 2009, and introduced in the PUF in 2010. Removed from the IHQ and the PUF in 2013.
HAD_CPOX	CHILD EVER HAD CHICKEN POX DISEASE?		Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Replaced I_HADCPX starting in 2005. This version is not imputed.
HEA1_AGE	AGE IN MONTHS OF PROV-REPTD HEPATITIS A-CONTAINING SHOT #1	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	
HEA2_AGE	AGE IN MONTHS OF PROV-REPTD HEPATITIS A-CONTAINING SHOT #2	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	

Variable Name	Variable Label[†]	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	Notes[§]
HEA3_AGE	AGE IN MONTHS OF PROV-REPTD HEPATITIS A-CONTAINING SHOT #3	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	
HEA4_AGE	AGE IN MONTHS OF PROV-REPTD HEPATITIS A-CONTAINING SHOT #4	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	
HEA5_AGE	AGE IN MONTHS OF PROV-REPTD HEPATITIS A-CONTAINING SHOT #5	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	
HEA6_AGE	AGE IN MONTHS OF PROV-REPTD HEPATITIS A-CONTAINING SHOT #6	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	
HEA7_AGE	AGE IN MONTHS OF PROV-REPTD HEPATITIS A-CONTAINING SHOT #7	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	
HEA8_AGE	AGE IN MONTHS OF PROV-REPTD HEPATITIS A-CONTAINING SHOT #8	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	
HEA9_AGE	AGE IN MONTHS OF PROV-REPTD HEPATITIS A-CONTAINING SHOT #9		Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Starting in 2005, nine shot variables are included for each vaccine category.
HEP_BRTH	HEPATITIS B-CONTAINING SHOT GIVEN AT BIRTH FLAG	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	
HEP_FLAG	HEPATITIS B BIRTH SHOT DATE IMPUTATION FLAG	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	
HEP1_AGE	AGE IN MONTHS OF PROV-REPTD HEPATITIS B-CONTAINING SHOT #1	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	
HEP2_AGE	AGE IN MONTHS OF PROV-REPTD HEPATITIS B-CONTAINING SHOT #2	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	
HEP3_AGE	AGE IN MONTHS OF PROV-REPTD HEPATITIS B-CONTAINING SHOT #3	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	
HEP4_AGE	AGE IN MONTHS OF PROV-REPTD HEPATITIS B-CONTAINING SHOT #4	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	
HEP5_AGE	AGE IN MONTHS OF PROV-REPTD HEPATITIS B-CONTAINING SHOT #5	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	
HEP6_AGE	AGE IN MONTHS OF PROV-REPTD HEPATITIS B-CONTAINING SHOT #6	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	
HEP7_AGE	AGE IN MONTHS OF PROV-REPTD HEPATITIS B-CONTAINING SHOT #7	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	
HEP8_AGE	AGE IN MONTHS OF PROV-REPTD HEPATITIS B-CONTAINING SHOT #8	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	
HEP9_AGE	AGE IN MONTHS OF PROV-REPTD HEPATITIS B-CONTAINING SHOT #9		Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Starting in 2005, nine shot variables are included for each vaccine category.
HH_DTP	HH REPORT OF NUMBER OF DT-CONTAINING SHOTS RECEIVED			Y	Y	Y	Y	Y	Y								Added in 2006 as a partial replacement for the "FULL" and "C_" variables. Dropped in 2012 due to questionnaire changes.
HH_FLU	HH REPORT OF NUMBER OF SEASONAL INFLUENZA VACCINATIONS RECEIVED IN THE 12 MONTHS PRIOR TO INTERVIEW				Y	Y		Y									Influenza questions added to the HH questionnaire starting in 2007. Dropped in 2009 due to mid-year questionnaire changes. Reinstated in 2010. Dropped again in 2011 due to mid-year questionnaire changes.

Variable Name	Variable Label†	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	Notes§
HH_H1N	HH REPORT OF NUMBER OF MONOVALENT 2009 H1N1 INFLUENZA VACCINATIONS RECEIVED IN THE 12 MONTHS PRIOR TO INTERVIEW							Y									H1N1 influenza questions added to the HH questionnaire starting in 2009. Introduced in the PUF in 2010. Dropped in 2011 due to mid-year questionnaire changes.
HH_HEPB	HH REPORT OF NUMBER OF HEPATITIS B-CONTAINING SHOTS RECEIVED			Y	Y	Y	Y	Y	Y								Added in 2006 as a partial replacement for the "FULL" and "C_" variables. Dropped in 2012 due to questionnaire changes.
HH_HIB	HH REPORT OF NUMBER OF HIB-CONTAINING SHOTS RECEIVED			Y	Y	Y	Y	Y	Y								Added in 2006 as a partial replacement for the "FULL" and "C_" variables. Dropped in 2012 due to questionnaire changes.
HH_MCV	HH REPORT OF NUMBER OF MEASLES-CONTAINING SHOTS RECEIVED			Y	Y	Y	Y	Y	Y								Added in 2006 as a partial replacement for the "FULL" and "C_" variables. Dropped in 2012 due to questionnaire changes.
HH_POL	HH REPORT OF NUMBER OF POLIO-CONTAINING SHOTS RECEIVED			Y	Y	Y	Y	Y	Y								Added in 2006 as a partial replacement for the "FULL" and "C_" variables. Dropped in 2012 due to questionnaire changes.
HH_VRC	HH REPORT OF NUMBER OF VARICELLA-CONTAINING SHOTS RECEIVED			Y	Y	Y	Y	Y	Y								Added in 2006 as a partial replacement for the "FULL" and "C_" variables. Dropped in 2012 due to questionnaire changes.
HIB1_AGE	AGE IN MONTHS OF PROV-REPTD HIB-CONTAINING SHOT #1	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	
HIB2_AGE	AGE IN MONTHS OF PROV-REPTD HIB-CONTAINING SHOT #2	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	
HIB3_AGE	AGE IN MONTHS OF PROV-REPTD HIB-CONTAINING SHOT #3	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	
HIB4_AGE	AGE IN MONTHS OF PROV-REPTD HIB-CONTAINING SHOT #4	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	
HIB5_AGE	AGE IN MONTHS OF PROV-REPTD HIB-CONTAINING SHOT #5	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	
HIB6_AGE	AGE IN MONTHS OF PROV-REPTD HIB-CONTAINING SHOT #6	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	
HIB7_AGE	AGE IN MONTHS OF PROV-REPTD HIB-CONTAINING SHOT #7	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	
HIB8_AGE	AGE IN MONTHS OF PROV-REPTD HIB-CONTAINING SHOT #8	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	
HIB9_AGE	AGE IN MONTHS OF PROV-REPTD HIB-CONTAINING SHOT #9		Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Starting in 2005, nine shot variables are included for each vaccine category.
HUTD4313	HOUSEHOLD REPORT OF 4:3:1:3 UTD (UP-TO-DATE)	Y															Dropped starting in 2005 because this variable is redundant with variable ALL4SHOT.
I_HADCPX	DID CHILD EVER HAVE CHICKEN POX?	Y															Replaced by HAD_CPOX starting in 2005.
I_HISP_K	HISPANIC ORIGIN OF CHILD: IMPUTED	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	

Variable Name	Variable Label[†]	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	Notes[§]
IAGECPXR	AGE IN MONTHS WHEN CHILD HAD CHICKEN POX (RECODE)	Y															Replaced by AGECPOXR starting in 2005.
INCPORAR	INCOME TO POVERTY RATIO (RECODE)		Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Replaced INCPORAT starting in 2005. INCPORAT used categories whereas INCPORAR is continuous. INCPORAR has been top- and bottom-coded.
INCPORAR_I	INCOME TO POVERTY RATIO: IMPUTED (RECODE)													Y	Y	Y	Imputed version of INCPORAR added in 2016.
INCPORAT	INCOME TO POVERTY RATIO	Y															Replaced by INCPORAR starting in 2005.
INCPOV1	POVERTY STATUS		Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Replaced INCPOV1R starting in 2005. INCPOV1R used two categories whereas INCPOV1 uses three.
INCPOV1R	POVERTY STATUS (RECODE)	Y															Replaced by INCPOV1 starting in 2005.
INCQ298A	FAMILY INCOME CATEGORIES (RECODE)		Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Replaced INCQ298R starting in 2005. INCQ298A uses different categories than were used by INCQ298R.
INCQ298R	FAMILY INCOME CATEGORIES (RECODE)	Y															Replaced by INCQ298A starting in 2005.
INOPHONR	LENGTH OF INTERRUPTION IN TELEPHONE SERVICE IN DAYS (RECODE)	Y	Y	Y	Y	Y	Y										Dropped starting in 2010 due to questionnaire change.
INS_1	IS CHILD COVERED BY HEALTH INSURANCE PROVIDED THROUGH EMPLOYER OR UNION?				Y	Y	Y	Y	Y	Y	Y	Y	Y				Health insurance questions were added to the questionnaire in 2006 and first included on the PUF in 2007. Replaced with INS_STAT_I and INS_BREAK_I in 2016.
INS_11	ANY TIME WHEN CHILD WAS NOT COVERED BY ANY HEALTH INSURANCE?				Y	Y	Y	Y	Y	Y	Y	Y	Y				Health insurance questions were added to the questionnaire in 2006 and first included on the PUF in 2007. Replaced with INS_STAT_I and INS_BREAK_I in 2016.
INS_2	IS CHILD COVERED BY ANY MEDICAID PLAN?				Y	Y	Y	Y	Y	Y	Y	Y	Y				Health insurance questions were added to the questionnaire in 2006 and first included on the PUF in 2007. Replaced with INS_STAT_I and INS_BREAK_I in 2016.
INS_3	IS CHILD COVERED BY S-CHIP?				Y	Y	Y	Y	Y	Y	Y	Y	Y				Health insurance questions were added to the questionnaire in 2006 and first included on the PUF in 2007. Replaced with INS_STAT_I and INS_BREAK_I in 2016.
INS_3A	IS CHILD COVERED BY ANY MEDICAID PLAN OR S-CHIP?				Y	Y	Y	Y	Y	Y	Y	Y	Y				Health insurance questions were added to the questionnaire in 2006 and first included on the PUF in 2007. Replaced with INS_STAT_I and INS_BREAK_I in 2016.
INS_4	IS CHILD COVERED BY INDIAN HEALTH SERVICE?				Y	Y											Health insurance questions were added to the questionnaire in 2006 and first included on the PUF in 2007. Replaced by INS_4_5 starting in 2009.

Variable Name	Variable Label†	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	Notes§
INS_4_5	IS CHILD COVERED BY INDIAN HEALTH SERVICE, MILITARY HEALTH CARE, TRICARE, CHAMPUS, OR CHAMP-VA?						Y	Y	Y	Y	Y	Y	Y				Replaced INS_4 and INS_5 starting in 2009. Replaced with INS_STAT_I and INS_BREAK_I in 2016.
INS_5	IS CHILD COVERED BY MILITARY HEALTH CARE, TRICARE, CHAMPUS, OR CHAMP-VA?				Y	Y											Health insurance questions were added to the questionnaire in 2006 and first included on the PUF in 2007. Replaced by INS_4_5 starting in 2009.
INS_6	IS CHILD COVERED BY ANY OTHER HEALTH INSURANCE OR HEALTH CARE PLAN?				Y	Y	Y	Y	Y	Y	Y	Y	Y				Health insurance questions were added to the questionnaire in 2006 and first included on the PUF in 2007. Replaced with INS_STAT_I and INS_BREAK_I in 2016.
INS_BREAK_I	CONTINUITY OF INSURANCE COVERAGE SINCE BIRTH: IMPUTED													Y	Y	Y	Replaced INS_1-INS_11 starting in 2016.
INS_STAT_I	INSURANCE STATUS: IMPUTED													Y			Replaced INS_1-INS_11 starting in 2016. Replaced by INS_STAT2_I starting in 2017.
INS_STAT2_I	INSURANCE STATUS (PRIVATE ONLY/ANY MEDICAID/OTHER INSURANCE/UNINSURED): IMPUTED														Y	Y	Replaced INS_STAT_I starting in 2017.
INTRP	PHONE INTERRUPTION OF 7 DAYS OR MORE IN PAST YEAR?	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y				Dropped starting in 2016 due to questionnaire change.
ITRUEIAP	IAP AREA OF CURRENT RESIDENCE	Y															Replaced by ESTIAP in 2005 because estimation areas were modified.
LANGUAGE	LANGUAGE IN WHICH INTERVIEW WAS CONDUCTED	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	
M_AGEGRP	AGE OF MOTHER CATEGORIES (RECODE)	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y				Replaced by M_AGEGRP2 starting in 2016.
M_AGEGRP2	AGE OF MOTHER CATEGORIES: IMPUTED (RECODE)													Y	Y	Y	Replaced M_AGEGRP starting in 2016.
MARITAL	MARITAL STATUS OF MOTHER CATEGORIES (RECODE)	Y	Y	Y	Y	Y											Replaced by MARITAL2 starting in 2009.
MARITAL2	MARITAL STATUS OF MOTHER: IMPUTED (RECODE)						Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Replaced MARITAL starting in 2009.
MMR1_AGE	AGE IN MONTHS OF PROV-REPTD MEASLES-CONTAINING SHOT #1	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	
MMR2_AGE	AGE IN MONTHS OF PROV-REPTD MEASLES-CONTAINING SHOT #2	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	
MMR3_AGE	AGE IN MONTHS OF PROV-REPTD MEASLES-CONTAINING SHOT #3	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	
MMR4_AGE	AGE IN MONTHS OF PROV-REPTD MEASLES-CONTAINING SHOT #4	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	
MMR5_AGE	AGE IN MONTHS OF PROV-REPTD MEASLES-CONTAINING SHOT #5		Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Starting in 2005, nine shot variables are included for each vaccine category.

Variable Name	Variable Label[†]	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	Notes[§]
MMR6_AGE	AGE IN MONTHS OF PROV-REPTD MEASLES-CONTAINING SHOT #6		Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Starting in 2005, nine shot variables are included for each vaccine category.
MMR7_AGE	AGE IN MONTHS OF PROV-REPTD MEASLES-CONTAINING SHOT #7		Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Starting in 2005, nine shot variables are included for each vaccine category.
MMR8_AGE	AGE IN MONTHS OF PROV-REPTD MEASLES-CONTAINING SHOT #8		Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Starting in 2005, nine shot variables are included for each vaccine category.
MMR9_AGE	AGE IN MONTHS OF PROV-REPTD MEASLES-CONTAINING SHOT #9		Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Starting in 2005, nine shot variables are included for each vaccine category.
MOBIL	GEOGRAPHIC MOBILITY STATUS: STATE OF RESIDENCE OF CHILD AT BIRTH VERSUS CURRENT STATE	Y															Replaced by MOBIL_I starting in 2005.
MOBIL_I	GEOGRAPHIC MOBILITY STATUS: STATE OF RESIDENCE OF CHILD AT BIRTH VERSUS CURRENT STATE: IMPUTED		Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Replaced MOBIL starting in 2005. This version is imputed.
MP1_AGE	AGE IN MONTHS OF PROV-REPTD MUMPS-ONLY SHOT #1	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	
MP2_AGE	AGE IN MONTHS OF PROV-REPTD MUMPS-ONLY SHOT #2	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	
MP3_AGE	AGE IN MONTHS OF PROV-REPTD MUMPS-ONLY SHOT #3	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	
MP4_AGE	AGE IN MONTHS OF PROV-REPTD MUMPS-ONLY SHOT #4	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	
MP5_AGE	AGE IN MONTHS OF PROV-REPTD MUMPS-ONLY SHOT #5		Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Starting in 2005, nine shot variables are included for each vaccine category.
MP6_AGE	AGE IN MONTHS OF PROV-REPTD MUMPS-ONLY SHOT #6		Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Starting in 2005, nine shot variables are included for each vaccine category.
MP7_AGE	AGE IN MONTHS OF PROV-REPTD MUMPS-ONLY SHOT #7		Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Starting in 2005, nine shot variables are included for each vaccine category.
MP8_AGE	AGE IN MONTHS OF PROV-REPTD MUMPS-ONLY SHOT #8		Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Starting in 2005, nine shot variables are included for each vaccine category.
MP9_AGE	AGE IN MONTHS OF PROV-REPTD MUMPS-ONLY SHOT #9		Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Starting in 2005, nine shot variables are included for each vaccine category.
MPR1_AGE	AGE IN MONTHS OF PROV-REPTD (MUMPS/RUBELLA)-ONLY SHOT #1	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	
MPR2_AGE	AGE IN MONTHS OF PROV-REPTD (MUMPS/RUBELLA)-ONLY SHOT #2	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	
MPR3_AGE	AGE IN MONTHS OF PROV-REPTD (MUMPS/RUBELLA)-ONLY SHOT #3	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	
MPR4_AGE	AGE IN MONTHS OF PROV-REPTD (MUMPS/RUBELLA)-ONLY SHOT #4	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	
MPR5_AGE	AGE IN MONTHS OF PROV-REPTD (MUMPS/RUBELLA)-ONLY SHOT #5		Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Starting in 2005, nine shot variables are included for each vaccine category.

Variable Name	Variable Label[†]	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	Notes[§]
MPR6_AGE	AGE IN MONTHS OF PROV-REPTD (MUMPS/RUBELLA)-ONLY SHOT #6		Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Starting in 2005, nine shot variables are included for each vaccine category.
MPR7_AGE	AGE IN MONTHS OF PROV-REPTD (MUMPS/RUBELLA)-ONLY SHOT #7		Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Starting in 2005, nine shot variables are included for each vaccine category.
MPR8_AGE	AGE IN MONTHS OF PROV-REPTD (MUMPS/RUBELLA)-ONLY SHOT #8		Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Starting in 2005, nine shot variables are included for each vaccine category.
MPR9_AGE	AGE IN MONTHS OF PROV-REPTD (MUMPS/RUBELLA)-ONLY SHOT #9		Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Starting in 2005, nine shot variables are included for each vaccine category.
N_PRVR	NUMBER OF PROVIDERS RESPONDING WITH VACCINATION DATA FOR CHILD (RECODE)	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	
NUM_CELLS_HH	NUMBER OF WORKING CELL PHONES HOUSEHOLD MEMBERS HAVE AVAILABLE FOR PERSONAL USE						Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Question added to household questionnaire in 2009.
NUM_CELLS_PARENTS	NUMBER OF WORKING CELL PHONES USUALLY USED BY PARENTS OR GUARDIANS						Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Question added to household questionnaire in 2009.
NUM_PHONE	NUMBER OF RESIDENTIAL TELEPHONE NUMBERS IN HOUSEHOLD (EXCLUDING CELL PHONES)						Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Question added to household questionnaire in 2009.
P_NUHEPX	NUMBER OF HEPATITIS B-ONLY SHOTS BY 36 MONTHS OF AGE DETERMINED FROM PROVIDER INFO, EXCLUDING ANY VACCINATIONS AFTER THE HH INTERVIEW DATE.	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	
P_NUHIBX	NUMBER OF HIB-ONLY SHOTS BY 36 MONTHS OF AGE DETERMINED FROM PROVIDER INFO, EXCLUDING ANY VACCINATIONS AFTER THE HH INTERVIEW DATE.			Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Added in 2006 so that each vaccine type on the IHQ has a corresponding shot count variable.
P_NUHPHB	NUMBER OF HEPATITIS B/HIB COMBO SHOTS BY 36 MONTHS OF AGE DETERMINED FROM PROVIDER INFO, EXCLUDING ANY VACCINATIONS AFTER THE HH INTERVIEW DATE.	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	
P_NUM1L	NUMBER OF MONOVALENT 2009 H1N1 INFLUENZA VACCINATIONS OF UNKNOWN TYPE BY 36 MONTHS OF AGE DETERMINED FROM PROVIDER INFO, EXCLUDING ANY VACCINATIONS AFTER THE HH INTERVIEW DATE.							Y	Y	Y							H1N1 influenza added to the IHQ shotgrid starting in late 2009, and introduced in the PUF in 2010. Removed from the IHQ and the PUF in 2013.

Variable Name	Variable Label[†]	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	Notes[§]
P_NUM1M	NUMBER OF MONOVALENT 2009 H1N1 INFLUENZA SPRAY VACCINATIONS BY 36 MONTHS OF AGE DETERMINED FROM PROVIDER INFO, EXCLUDING ANY VACCINATIONS AFTER THE HH INTERVIEW DATE.							Y	Y	Y							H1N1 influenza added to the IHQ shotgrid starting in late 2009, and introduced in the PUF in 2010. Removed from the IHQ and the PUF in 2013.
P_NUM1N	NUMBER OF INJECTED MONOVALENT 2009 H1N1 INFLUENZA VACCINATIONS BY 36 MONTHS OF AGE DETERMINED FROM PROVIDER INFO, EXCLUDING ANY VACCINATIONS AFTER THE HH INTERVIEW DATE.							Y	Y	Y							H1N1 influenza added to the IHQ shotgrid starting in late 2009, and introduced in the PUF in 2010. Removed from the IHQ and the PUF in 2013.
P_NUMDAH	NUMBER OF DTAP/HIB COMBO SHOTS BY 36 MONTHS OF AGE DETERMINED FROM PROVIDER INFO, EXCLUDING ANY VACCINATIONS AFTER THE HH INTERVIEW DATE.	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	
P_NUMDHB	NUMBER OF DTP/HIB CONTAINING SHOTS DETERMINED FROM PROVIDER INFO, EXCLUDING ANY VACCINATIONS AFTER THE HH INTERVIEW DATE.	Y	Y	Y	Y	Y											Dropped in 2009 due to change to IHQ shotgrid.
P_NUMDHI	NUMBER OF DTAP/HEPB/IPV COMBO SHOTS BY 36 MONTHS OF AGE DETERMINED FROM PROVIDER INFO, EXCLUDING ANY VACCINATIONS AFTER THE HH INTERVIEW DATE.			Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Added in 2006 so that each vaccine type on the IHQ has a corresponding shot count variable.
P_NUMDHM	NUMBER OF DTP/HIB COMBO SHOTS DETERMINED FROM PROVIDER INFO, EXCLUDING ANY VACCINATIONS AFTER THE HH INTERVIEW DATE.	Y	Y	Y	Y	Y											Dropped in 2009 due to change to IHQ shotgrid.
P_NUMDIH	NUMBER OF DTAP/IPV/HIB COMBO SHOTS BY 36 MONTHS OF AGE DETERMINED FROM PROVIDER INFO, EXCLUDING ANY VACCINATIONS AFTER THE HOUSEHOLD INTERVIEW DATE.						Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Added in 2009 due to change to IHQ shotgrid.
P_NUMDTA	NUMBER OF DTAP-ONLY SHOTS BY 36 MONTHS OF AGE DETERMINED FROM PROVIDER INFO, EXCLUDING ANY VACCINATIONS AFTER THE HH INTERVIEW DATE.	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	

Variable Name	Variable Label†	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	Notes§
P_NUMDTM	NUMBER OF DT-ONLY SHOTS DETERMINED FROM PROVIDER INFO, EXCLUDING ANY VACCINATIONS AFTER THE HH INTERVIEW DATE.	Y	Y	Y	Y	Y											Dropped in 2009 due to change to IHQ shotgrid.
P_NUMDTP	NUMBER OF DT-CONTAINING SHOTS BY 36 MONTHS OF AGE DETERMINED FROM PROVIDER INFO, EXCLUDING ANY VACCINATIONS AFTER THE HH INTERVIEW DATE.	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	
P_NUMFLU	NUMBER OF SEASONAL FLU-CONTAINING VACCINATIONS BY 36 MONTHS OF AGE DETERMINED FROM PROVIDER INFO, EXCLUDING ANY VACCINATIONS AFTER THE HH INTERVIEW DATE.	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	
P_NUMFLUL	NUMBER OF SEASONAL FLU-CONTAINING VACCINATIONS OF UNKNOWN TYPE BY 36 MONTHS OF AGE DETERMINED FROM PROVIDER INFO, EXCLUDING ANY VACCINATIONS AFTER THE HH INTERVIEW DATE.					Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Starting in 2008, influenza type boxes were added to the IHQ shot grid.
P_NUMFLUM	NUMBER OF SEASONAL FLU SPRAY VACCINATIONS BY 36 MONTHS OF AGE DETERMINED FROM PROVIDER INFO, EXCLUDING ANY VACCINATIONS AFTER THE HH INTERVIEW DATE.					Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Starting in 2008, influenza type boxes were added to the IHQ shot grid.
P_NUMFLUN	NUMBER OF INJECTED SEASONAL FLU VACCINATIONS BY 36 MONTHS OF AGE DETERMINED FROM PROVIDER INFO, EXCLUDING ANY VACCINATIONS AFTER THE HH INTERVIEW DATE.					Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Starting in 2008, influenza type boxes were added to the IHQ shot grid.
P_NUMH1N	NUMBER OF MONOVALENT 2009 H1N1 INFLUENZA VACCINATIONS BY 36 MONTHS OF AGE DETERMINED FROM PROVIDER INFO, EXCLUDING ANY VACCINATIONS AFTER THE HH INTERVIEW DATE.							Y	Y	Y							H1N1 influenza added to the IHQ shotgrid starting in late 2009, and introduced in the PUF in 2010. Removed from the IHQ and the PUF in 2013.

Variable Name	Variable Label[†]	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	Notes[§]
P_NUMH2	NUMBER OF HIB-SANOFI or HIB-GLAXOSMITHKLINE SHOTS BY 36 MONTHS OF AGE DETERMINED FROM PROVIDER INFO, EXCLUDING ANY VACCINATIONS AFTER THE HOUSEHOLD INTERVIEW DATE.						Y										Added in 2009 due to change to IHQ shotgrid. Replaced by P_NUMHG and P_NUMHS starting in 2010.
P_NUMHEA	NUMBER OF HEPATITIS A-CONTAINING SHOTS BY 36 MONTHS OF AGE DETERMINED FROM PROVIDER INFO, EXCLUDING ANY VACCINATIONS AFTER THE HH INTERVIEW DATE.	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	
P_NUMHEN	NUMBER OF HEPATITIS B-CONTAINING SHOTS OF UNKNOWN TYPE BY 36 MONTHS OF AGE DETERMINED FROM PROVIDER INFO, EXCLUDING ANY VACCINATIONS AFTER THE HH INTERVIEW DATE.			Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Added in 2006 so that each vaccine type on the IHQ has a corresponding shot count variable.
P_NUMHEP	NUMBER OF HEPATITIS B-CONTAINING SHOTS BY 36 MONTHS OF AGE DETERMINED FROM PROVIDER INFO, EXCLUDING ANY VACCINATIONS AFTER THE HH INTERVIEW DATE.	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	
P_NUMHG	NUMBER OF HIB-GLAXOSMITHKLINE SHOTS BY 36 MONTHS OF AGE DETERMINED FROM PROVIDER INFO, EXCLUDING ANY VACCINATIONS AFTER THE HOUSEHOLD INTERVIEW DATE.							Y	Y	Y	Y	Y	Y	Y	Y	Y	Replaced P_NUMH2 starting in 2010 due to a change to the IHQ shotgrid.
P_NUMHHY	NUMBER OF HIB-MENCY SHOTS BY 36 MONTHS OF AGE DETERMINED FROM PROVIDER INFO, EXCLUDING ANY VACCINATIONS AFTER THE HOUSEHOLD INTERVIEW DATE.											Y	Y	Y	Y	Y	Added in 2014 due to change in IHQ shotgrid.
P_NUMHIB	NUMBER OF HIB-CONTAINING SHOTS BY 36 MONTHS OF AGE DETERMINED FROM PROVIDER INFO, EXCLUDING ANY VACCINATIONS AFTER THE HH INTERVIEW DATE.	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	
P_NUMHIN	NUMBER OF HIB-CONTAINING SHOTS OF UNKNOWN TYPE BY 36 MONTHS OF AGE DETERMINED FROM PROVIDER INFO, EXCLUDING ANY VACCINATIONS AFTER THE HH INTERVIEW DATE.			Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Added in 2006 so that each vaccine type on the IHQ has a corresponding shot count variable.

Variable Name	Variable Label[†]	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	Notes[§]
P_NUMHION	NUMBER OF HIB-ONLY SHOTS OF UNKNOWN TYPE BY 36 MONTHS OF AGE DETERMINED FROM PROVIDER INFO, EXCLUDING ANY VACCINATIONS AFTER THE HOUSEHOLD INTERVIEW DATE.						Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Added in 2009 due to change to IHQ shotgrid.
P_NUMHM	NUMBER OF HIB-MERCK SHOTS BY 36 MONTHS OF AGE DETERMINED FROM PROVIDER INFO, EXCLUDING ANY VACCINATIONS AFTER THE HOUSEHOLD INTERVIEW DATE.						Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Added in 2009 due to change to IHQ shotgrid.
P_NUMHS	NUMBER OF HIB-SANOFI SHOTS BY 36 MONTHS OF AGE DETERMINED FROM PROVIDER INFO, EXCLUDING ANY VACCINATIONS AFTER THE HOUSEHOLD INTERVIEW DATE.							Y	Y	Y	Y	Y	Y	Y	Y	Y	Replaced P_NUMH2 starting in 2010 due to a change in the IHQ shotgrid.
P_NUMIPV	NUMBER OF IPV-ONLY SHOTS BY 36 MONTHS OF AGE DETERMINED FROM PROVIDER INFO, EXCLUDING ANY VACCINATIONS AFTER THE HH INTERVIEW DATE.	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	
P_NUMMCN	NUMBER OF MEASLES-CONTAINING SHOTS OF UNKNOWN TYPE BY 36 MONTHS OF AGE DETERMINED FROM PROVIDER INFO, EXCLUDING ANY VACCINATIONS AFTER THE HH INTERVIEW DATE.			Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Added in 2006 so that each vaccine type on the IHQ has a corresponding shot count variable.
P_NUMMMR	NUMBER OF MEASLES-CONTAINING SHOTS BY 36 MONTHS OF AGE DETERMINED FROM PROVIDER INFO, EXCLUDING ANY VACCINATIONS AFTER THE HH INTERVIEW DATE.	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	
P_NUMMMRX	NUMBER OF MMR-ONLY SHOTS BY 36 MONTHS OF AGE DETERMINED FROM PROVIDER INFO, EXCLUDING ANY VACCINATIONS AFTER THE HH INTERVIEW DATE.			Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Added in 2006 so that each vaccine type on the IHQ has a corresponding shot count variable.
P_NUMMMX	NUMBER OF MMR-CONTAINING SHOTS BY 36 MONTHS OF AGE DETERMINED FROM PROVIDER INFO, EXCLUDING ANY VACCINATIONS AFTER THE HH INTERVIEW DATE.	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	

Variable Name	Variable Label[†]	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	Notes[§]
P_NUMMP	NUMBER OF MUMPS-ONLY SHOTS BY 36 MONTHS OF AGE DETERMINED FROM PROVIDER INFO, EXCLUDING ANY VACCINATIONS AFTER THE HH INTERVIEW DATE.	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	
P_NUMMPR	NUMBER OF (MUMPS/RUBELLA)-ONLY SHOTS BY 36 MONTHS OF AGE DETERMINED FROM PROVIDER INFO, EXCLUDING ANY VACCINATIONS AFTER THE HH INTERVIEW DATE.	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	
P_NUMMRV	NUMBER OF MMR/VARICELLA COMBO SHOTS BY 36 MONTHS OF AGE DETERMINED FROM PROVIDER INFO, EXCLUDING ANY VACCINATIONS AFTER THE HH INTERVIEW DATE.			Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Added in 2006 so that each vaccine type on the IHQ has a corresponding shot count variable.
P_NUMMS	NUMBER OF MEASLES-ONLY SHOTS BY 36 MONTHS OF AGE DETERMINED FROM PROVIDER INFO, EXCLUDING ANY VACCINATIONS AFTER THE HH INTERVIEW DATE.	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	
P_NUMMSM	NUMBER OF MEASLES/MUMPS COMBO SHOTS BY 36 MONTHS OF AGE DETERMINED FROM PROVIDER INFO, EXCLUDING ANY VACCINATIONS AFTER THE HH INTERVIEW DATE.	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	
P_NUMMSR	NUMBER OF MEASLES/RUBELLA COMBO SHOTS BY 36 MONTHS OF AGE DETERMINED FROM PROVIDER INFO, EXCLUDING ANY VACCINATIONS AFTER THE HH INTERVIEW DATE.	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	
P_NUMOLN	NUMBER OF POLIO SHOTS OF UNKNOWN TYPE BY 36 MONTHS OF AGE DETERMINED FROM PROVIDER INFO, EXCLUDING ANY VACCINATIONS AFTER THE HH INTERVIEW DATE.	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	
P_NUMOPV	NUMBER OF OPV-ONLY SHOTS BY 36 MONTHS OF AGE DETERMINED FROM PROVIDER INFO, EXCLUDING ANY VACCINATIONS AFTER THE HH INTERVIEW DATE.	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	

Variable Name	Variable Label[†]	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	Notes[§]
P_NUMPCC	NUMBER OF PNEUMOCOCCAL CONJUGATE SHOTS BY 36 MONTHS OF AGE DETERMINED FROM PROVIDER INFO, EXCLUDING ANY VACCINATIONS AFTER THE HOUSEHOLD INTERVIEW DATE.	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	
P_NUMPCC13	NUMBER OF PNEUMOCOCCAL CONJUGATE-13 SHOTS BY 36 MONTHS OF AGE DETERMINED FROM PROVIDER INFO, EXCLUDING ANY VACCINATIONS AFTER THE HOUSEHOLD INTERVIEW DATE.							Y	Y	Y	Y	Y	Y	Y	Y	Y	Added in 2010 due to new PCV vaccination recommendations.
P_NUMPCC7	NUMBER OF PNEUMOCOCCAL CONJUGATE-7 SHOTS BY 36 MONTHS OF AGE DETERMINED FROM PROVIDER INFO, EXCLUDING ANY VACCINATIONS AFTER THE HOUSEHOLD INTERVIEW DATE.							Y	Y	Y	Y	Y	Y	Y	Y	Y	Added in 2010 due to new PCV vaccination recommendations.
P_NUMPCCN	NUMBER OF PNEUMOCOCCAL CONJUGATE SHOTS OF UNKNOWN TYPE BY 36 MONTHS OF AGE DETERMINED FROM PROVIDER INFO, EXCLUDING ANY VACCINATIONS AFTER THE HOUSEHOLD INTERVIEW DATE.							Y	Y	Y	Y	Y	Y	Y	Y	Y	Added in 2010 due to new PCV vaccination recommendations.
P_NUMPCN	NUMBER OF PNEUMOCOCCAL SHOTS OF UNKNOWN TYPE BY 36 MONTHS OF AGE DETERMINED FROM PROVIDER INFO, EXCLUDING ANY VACCINATIONS AFTER THE HOUSEHOLD INTERVIEW DATE.	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	
P_NUMPCP	NUMBER OF PNEUMOCOCCAL POLYSACCHARIDE SHOTS BY 36 MONTHS OF AGE DETERMINED FROM PROVIDER INFO, EXCLUDING ANY VACCINATIONS AFTER THE HOUSEHOLD INTERVIEW DATE.	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	
P_NUMPCV	NUMBER OF PNEUMOCOCCAL-CONTAINING SHOTS BY 36 MONTHS OF AGE DETERMINED FROM PROVIDER INFO, EXCLUDING ANY VACCINATIONS AFTER THE HOUSEHOLD INTERVIEW DATE.	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	

Variable Name	Variable Label†	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	Notes§
P_NUMPOL	NUMBER OF POLIO-CONTAINING SHOTS BY 36 MONTHS OF AGE DETERMINED FROM PROVIDER INFO, EXCLUDING ANY VACCINATIONS AFTER THE HH INTERVIEW DATE.	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	
P_NUMRB	NUMBER OF RUBELLA-ONLY SHOTS BY 36 MONTHS OF AGE DETERMINED FROM PROVIDER INFO, EXCLUDING ANY VACCINATIONS AFTER THE HH INTERVIEW DATE.	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	
P_NUMRG	NUMBER OF ROTARIX-GSK SHOTS BY 36 MONTHS OF AGE DETERMINED FROM PROVIDER INFO, EXCLUDING ANY VACCINATIONS AFTER THE HOUSEHOLD INTERVIEW DATE.						Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Starting in 2009, rotavirus type boxes were added to the IHQ shot grid.
P_NUMRM	NUMBER OF ROTATEQ-MERCK SHOTS BY 36 MONTHS OF AGE DETERMINED FROM PROVIDER INFO, EXCLUDING ANY VACCINATIONS AFTER THE HOUSEHOLD INTERVIEW DATE.						Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Starting in 2009, rotavirus type boxes were added to the IHQ shot grid.
P_NUMRO	NUMBER OF ROTAVIRUS SHOTS OF UNKNOWN TYPE BY 36 MONTHS OF AGE DETERMINED FROM PROVIDER INFO, EXCLUDING ANY VACCINATIONS AFTER THE HOUSEHOLD INTERVIEW DATE.						Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Starting in 2009, rotavirus type boxes were added to the IHQ shot grid.
P_NUMROT	NUMBER OF ROTAVIRUS-CONTAINING SHOTS BY 36 MONTHS OF AGE DETERMINED FROM PROVIDER INFO, EXCLUDING ANY VACCINATIONS AFTER THE HH INTERVIEW DATE.	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	
P_NUMTPM	NUMBER OF DTP-ONLY SHOTS DETERMINED FROM PROVIDER INFO, EXCLUDING ANY VACCINATIONS AFTER THE HH INTERVIEW DATE.	Y	Y	Y	Y	Y											Dropped in 2009 due to change to IHQ shotgrid.
P_NUMTPN	NUMBER OF DT-CONTAINING SHOTS OF UNKNOWN TYPE BY 36 MONTHS OF AGE DETERMINED FROM PROVIDER INFO, EXCLUDING ANY VACCINATIONS AFTER THE HH INTERVIEW DATE.	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	

Variable Name	Variable Label[†]	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	Notes[§]
P_NUMVRC	NUMBER OF VARICELLA-CONTAINING SHOTS BY 36 MONTHS OF AGE DETERMINED FROM PROVIDER INFO, EXCLUDING ANY VACCINATIONS AFTER THE HH INTERVIEW DATE.	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	
P_NUMVRN	NUMBER OF VARICELLA-CONTAINING SHOTS OF UNKNOWN TYPE BY 36 MONTHS OF AGE DETERMINED FROM PROVIDER INFO, EXCLUDING ANY VACCINATIONS AFTER THE HH INTERVIEW DATE.			Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Added in 2006 so that each vaccine type on the IHQ has a corresponding shot count variable.
P_NUMVRX	NUMBER OF VARICELLA-ONLY SHOTS BY 36 MONTHS OF AGE DETERMINED FROM PROVIDER INFO, EXCLUDING ANY VACCINATIONS AFTER THE HH INTERVIEW DATE.			Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Added in 2006 so that each vaccine type on the IHQ has a corresponding shot count variable.
P_U12VRC	UTD (UP-TO-DATE) FLAG FOR PROVIDER 1+ VARICELLA-CONTAINING SHOT AT 12+ MONTHS OF AGE, BY 36 MONTHS OF AGE, EXCLUDING ANY VACCINATIONS AFTER THE HOUSEHOLD INTERVIEW DATE.	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	
P_UTD331	UTD (UP-TO-DATE) FLAG FOR PROVIDER 3:3:1 BY 36 MONTHS OF AGE, EXCLUDING ANY VACCINATIONS AFTER THE HOUSEHOLD INTERVIEW DATE.	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	
P_UTD431	UTD (UP-TO-DATE) FLAG FOR PROVIDER 4:3:1 BY 36 MONTHS OF AGE, EXCLUDING ANY VACCINATIONS AFTER THE HOUSEHOLD INTERVIEW DATE.	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	
P_UTD431H_ROUT_S	UTD (UP-TO-DATE) FLAG FOR PROVIDER 4:3:1:3 BY 36 MONTHS OF AGE, USING THE ROUTINE, STRICT DEFINITION OF HIB UTD, EXCLUDING ANY VACCINATIONS AFTER THE HOUSEHOLD INTERVIEW DATE.						Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Added in 2009 due to new Hib vaccination recommendations.

Variable Name	Variable Label[†]	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	Notes[§]
P_UTD431H3_ROUT_S	UTD (UP-TO-DATE) FLAG FOR PROVIDER 4:3:1:3:3 BY 36 MONTHS OF AGE, USING THE ROUTINE, STRICT DEFINITION OF HIB UTD, EXCLUDING ANY VACCINATIONS AFTER THE HOUSEHOLD INTERVIEW DATE.						Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Added in 2009 due to new Hib vaccination recommendations.
P_UTD431H31_ROUT_S	UTD (UP-TO-DATE) FLAG FOR PROVIDER 4:3:1:3:3:1 BY 36 MONTHS OF AGE (INCLUDES 1+ VARICELLA-CONTAINING AT AGE 12+ MTHS) USING THE ROUTINE, STRICT DEFINITION OF HIB UTD, EXCLUDING ANY VACCINATIONS AFTER THE HOUSEHOLD INTERVIEW DATE.						Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Added in 2009 due to new Hib vaccination recommendations.
P_UTD431H313_ROUT_S	UTD (UP-TO-DATE) FLAG FOR PROVIDER 4:3:1:3:3:1:3 BY 36 MONTHS OF AGE (INCLUDES 1+ VARICELLA-CONTAINING AT AGE 12+ MTHS) USING THE ROUTINE, STRICT DEFINITION OF HIB UTD, EXCLUDING ANY VACCINATIONS AFTER THE HOUSEHOLD INTERVIEW DATE.						Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Added in 2009 due to new Hib vaccination recommendations.
P_UTD431H314_ROUT_S	UTD (UP-TO-DATE) FLAG FOR PROVIDER 4:3:1:3:3:1:4 BY 36 MONTHS OF AGE (INCLUDES 1+ VARICELLA-CONTAINING AT AGE 12+ MTHS) USING THE ROUTINE, STRICT DEFINITION OF HIB UTD, EXCLUDING ANY VACCINATIONS AFTER THE HOUSEHOLD INTERVIEW DATE.						Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Added in 2009 due to new Hib vaccination recommendations.
P_UTDFL1	UTD (UP-TO-DATE) FLAG FOR PROVIDER SEASONAL INFLUENZA VARIABLE 1 BY 36 MONTHS OF AGE, EXCLUDING ANY VACCINATIONS AFTER THE HOUSEHOLD INTERVIEW DATE.	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y						Dropped starting in 2014 due to change in ACIP recommendations.
P_UTDFL2	UTD (UP-TO-DATE) FLAG FOR PROVIDER SEASONAL INFLUENZA VARIABLE 2 BY 36 MONTHS OF AGE, EXCLUDING ANY VACCINATIONS AFTER THE HOUSEHOLD INTERVIEW DATE.	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y						Dropped starting in 2014 due to change in ACIP recommendations.

Variable Name	Variable Label[†]	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	Notes[§]
P_UTDFL3	UTD (UP-TO-DATE) FLAG FOR PROVIDER SEASONAL INFLUENZA VARIABLE 3 BY 36 MONTHS OF AGE, EXCLUDING ANY VACCINATIONS AFTER THE HOUSEHOLD INTERVIEW DATE.				Y	Y	Y	Y	Y	Y	Y						Added in 2007 due to new influenza vaccination recommendations. Dropped starting in 2014 due to change in ACIP recommendations.
P_UTDH1N_1	UTD (UP-TO-DATE) FLAG FOR PROVIDER 1+ MONOVALENT 2009 H1N1 INFLUENZA VACCINATION BY 36 MONTHS OF AGE, EXCLUDING ANY VACCINATIONS AFTER THE HOUSEHOLD INTERVIEW DATE AND EXCLUDING VACCINATIONS GIVEN PRIOR TO 10/5/2009.							Y	Y	Y							H1N1 influenza added to the IHQ shotgrid starting in late 2009, and introduced in the PUF in 2010. Removed from the IHQ and the PUF in 2013.
P_UTDH1N_2	UTD (UP-TO-DATE) FLAG FOR PROVIDER 2+ MONOVALENT 2009 H1N1 INFLUENZA VACCINATIONS BY 36 MONTHS OF AGE, EXCLUDING ANY VACCINATIONS AFTER THE HOUSEHOLD INTERVIEW DATE AND EXCLUDING VACCINATIONS GIVEN PRIOR TO 10/5/2009.							Y	Y	Y							H1N1 influenza added to the IHQ shotgrid starting in late 2009, and introduced in the PUF in 2010. Removed from the IHQ and the PUF in 2013.
P_UTDHEP	UTD (UP-TO-DATE) FLAG FOR PROVIDER 3+ HEPATITIS B-CONTAINING SHOTS BY 36 MONTHS OF AGE, EXCLUDING ANY VACCINATIONS AFTER THE HOUSEHOLD INTERVIEW DATE.	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	
P_UTDHEPA1	UTD (UP-TO-DATE) FLAG FOR PROVIDER 1+ HEPATITIS A-CONTAINING SHOTS BY 36 MONTHS OF AGE, EXCLUDING ANY VACCINATIONS AFTER THE HOUSEHOLD INTERVIEW DATE.								Y	Y	Y	Y	Y	Y	Y	Y	Added in 2011 to aid analysis.
P_UTDHEPA2	UTD (UP-TO-DATE) FLAG FOR PROVIDER 2+ HEPATITIS A-CONTAINING SHOTS BY 36 MONTHS OF AGE, EXCLUDING ANY VACCINATIONS AFTER THE HOUSEHOLD INTERVIEW DATE.							Y	Y	Y	Y	Y	Y	Y	Y	Y	Added in 2010 to aid analysis.
P_UTDHIB	UTD (UP-TO-DATE) FLAG FOR PROVIDER 3+ HIB-CONTAINING SHOTS BY 36 MONTHS OF AGE, EXCLUDING ANY VACCINATIONS AFTER THE HOUSEHOLD INTERVIEW DATE.	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	

Variable Name	Variable Label[†]	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	Notes[§]
P_UTDHIB_ROUT_S	UTD (UP-TO-DATE) FLAG FOR PROVIDER 3+ HIB DOSES BY 36 MONTHS OF AGE, BASED ON THE ROUTINE (NON-SHORTAGE) HIB RECOMMENDATIONS AND A STRICT TREATMENT OF HIB SHOTS OF UNKNOWN TYPE, EXCLUDING ANY VACCINATIONS AFTER THE HOUSEHOLD INTERVIEW DATE.						Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Added in 2009 due to new Hib vaccination recommendations.
P_UTDHIB_SHORT_S	UTD (UP-TO-DATE) FLAG FOR PROVIDER 3+ HIB DOSES BY 36 MONTHS OF AGE, BASED ON THE HIB SHORTAGE RECOMMENDATIONS AND A STRICT TREATMENT OF HIB SHOTS OF UNKNOWN TYPE, EXCLUDING ANY VACCINATIONS AFTER THE HOUSEHOLD INTERVIEW DATE.						Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Added in 2009 due to new Hib vaccination recommendations.
P_UTDMCV	UTD (UP-TO-DATE) FLAG FOR PROVIDER 1+ MEASLES-CONTAINING SHOT BY 36 MONTHS OF AGE, EXCLUDING ANY VACCINATIONS AFTER THE HOUSEHOLD INTERVIEW DATE.	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	
P_UTDMMX	UTD (UP-TO-DATE) FLAG FOR PROVIDER 1+ MMR COMBO SHOT BY 36 MONTHS OF AGE, EXCLUDING ANY VACCINATIONS AFTER THE HOUSEHOLD INTERVIEW DATE.	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	
P_UTDPC3	UTD (UP-TO-DATE) FLAG FOR PROVIDER 3+ PNEUMOCOCCAL-CONTAINING SHOTS BY 36 MONTHS OF AGE, EXCLUDING ANY VACCINATIONS AFTER THE HOUSEHOLD INTERVIEW DATE.	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	
P_UTDPCV	UTD (UP-TO-DATE) FLAG FOR PROVIDER 4+ PNEUMOCOCCAL-CONTAINING SHOTS BY 36 MONTHS OF AGE, EXCLUDING ANY VACCINATIONS AFTER THE HOUSEHOLD INTERVIEW DATE.	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	

Variable Name	Variable Label†	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	Notes§
P_UTDPCVB13	UTD (UP-TO-DATE) INDICATOR FOR PROVIDER 1+ PNEUMOCOCCAL VACCINATIONS OF TYPE CONJUGATE-13, GIVEN 4+ DOSES OF TYPE CONJUGATE-7, BY 36 MONTHS OF AGE, EXCLUDING ANY VACCINATIONS AFTER THE HOUSEHOLD INTERVIEW DATE.							Y	Y	Y	Y	Y	Y	Y	Y	Y	Added in 2010 due to new PCV vaccination recommendations.
P_UTDPOL	UTD (UP-TO-DATE) FLAG FOR PROVIDER 3+ POLIO-CONTAINING SHOTS BY 36 MONTHS OF AGE, EXCLUDING ANY VACCINATIONS AFTER THE HOUSEHOLD INTERVIEW DATE.	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	
P_UTDROT_S	UTD (UP-TO-DATE) FLAG FOR PROVIDER 3+ ROTAVIRUS DOSES BY 36 MONTHS OF AGE, BASED ON A STRICT TREATMENT OF ROTAVIRUS VACCINATIONS OF UNKNOWN TYPE, EXCLUDING ANY VACCINATIONS AFTER THE HOUSEHOLD INTERVIEW DATE.						Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Added in 2009 to aid analysis.
P_UTDTP3	UTD (UP-TO-DATE) FLAG FOR PROVIDER 3+ DT-CONTAINING SHOTS BY 36 MONTHS OF AGE, EXCLUDING ANY VACCINATIONS AFTER THE HOUSEHOLD INTERVIEW DATE.	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	
P_UTDTP4	UTD (UP-TO-DATE) FLAG FOR PROVIDER 4+ DT-CONTAINING SHOTS BY 36 MONTHS OF AGE, EXCLUDING ANY VACCINATIONS AFTER THE HOUSEHOLD INTERVIEW DATE.	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	
PCV1_AGE	AGE IN MONTHS OF PROV-REPTD PNEUMOCOCCAL-CONTAINING SHOT #1	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	
PCV2_AGE	AGE IN MONTHS OF PROV-REPTD PNEUMOCOCCAL-CONTAINING SHOT #2	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	
PCV3_AGE	AGE IN MONTHS OF PROV-REPTD PNEUMOCOCCAL-CONTAINING SHOT #3	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	
PCV4_AGE	AGE IN MONTHS OF PROV-REPTD PNEUMOCOCCAL-CONTAINING SHOT #4	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	

Variable Name	Variable Label†	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	Notes§
PCV5_AGE	AGE IN MONTHS OF PROV-REPTD PNEUMOCOCCAL-CONTAINING SHOT #5	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	
PCV6_AGE	AGE IN MONTHS OF PROV-REPTD PNEUMOCOCCAL-CONTAINING SHOT #6	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	
PCV7_AGE	AGE IN MONTHS OF PROV-REPTD PNEUMOCOCCAL-CONTAINING SHOT #7	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	
PCV8_AGE	AGE IN MONTHS OF PROV-REPTD PNEUMOCOCCAL-CONTAINING SHOT #8	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	
PCV9_AGE	AGE IN MONTHS OF PROV-REPTD PNEUMOCOCCAL-CONTAINING SHOT #9		Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Starting in 2005, nine shot variables are included for each vaccine category.
PDAT	CHILD HAS ADEQUATE PROVIDER DATA	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	
POL1_AGE	AGE IN MONTHS OF PROV-REPTD POLIO-CONTAINING SHOT #1	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	
POL2_AGE	AGE IN MONTHS OF PROV-REPTD POLIO-CONTAINING SHOT #2	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	
POL3_AGE	AGE IN MONTHS OF PROV-REPTD POLIO-CONTAINING SHOT #3	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	
POL4_AGE	AGE IN MONTHS OF PROV-REPTD POLIO-CONTAINING SHOT #4	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	
POL5_AGE	AGE IN MONTHS OF PROV-REPTD POLIO-CONTAINING SHOT #5	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	
POL6_AGE	AGE IN MONTHS OF PROV-REPTD POLIO-CONTAINING SHOT #6	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	
POL7_AGE	AGE IN MONTHS OF PROV-REPTD POLIO-CONTAINING SHOT #7	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	
POL8_AGE	AGE IN MONTHS OF PROV-REPTD POLIO-CONTAINING SHOT #8	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	
POL9_AGE	AGE IN MONTHS OF PROV-REPTD POLIO-CONTAINING SHOT #9		Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Starting in 2005, nine shot variables are included for each vaccine category.
PROV_FAC	PROVIDER FACILITY TYPES: IMPUTED	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	
PROVWT	WEIGHT FOR CHILDREN WITH ADEQUATE PROVIDER DATA AND UNVACCINATED CHILDREN (EXCLUDING U.S. VIRGIN ISLANDS)		Y	Y	Y	Y	Y	Y									Added in 2005 to replace WGT. Replaced by PROVWT_LL in 2011 due to addition of dual-frame weights.
PROVWT_C	**FINAL SINGLE-FRAME CELL-PHONE PROVIDER-PHASE WEIGHT (EXCLUDES TERRITORIES)**															**Y**	**Replaced PROVWT_D in 2018 due to removal of the landline sample.**

Variable Name	Variable Label[†]	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	Notes[§]
PROVWT_D	**FINAL DUAL-FRAME PROVIDER-PHASE WEIGHT (EXCLUDES TERRITORIES)**								**Y**	**Y**	**Y**	**Y**	**Y**	**Y**	**Y**		**Added in 2011 as dual-frame weight. Replaced by PROVWT_C in 2018 due to removal of the landline sample.**
PROVWT_LL	LANDLINE-FRAME WEIGHT FOR CHILDREN WITH ADEQUATE PROVIDER DATA AND UNVACCINATED CHILDREN (EXCLUDING U.S. VIRGIN ISLANDS)								Y								Replaced PROVWT in 2011 to distinguish from new dual-frame weight PROVWT_D. Removed in 2012.
PROVWTVI	WEIGHT FOR CHILDREN WITH ADEQUATE PROVIDER DATA AND UNVACCINATED CHILDREN (INCLUDING U.S. VIRGIN ISLANDS)						Y	Y									Added in 2009 to include U.S. Virgin Island sample. Replaced by PROVWTVI_LL in 2011 due to addition of dual-frame weights.
PROVWTVI_D	COMBINATION OF THE DUAL-FRAME WEIGHT FOR CHILDREN IN THE U.S. PROPER AND LANDLINE WEIGHT FOR CHILDREN IN THE U.S. VIRGIN ISLANDS FOR CHILDREN WITH ADEQUATE PROVIDER DATA AND UNVACCINATED CHILDREN									Y							Replaced PROVWTVI_LL in 2012. Replaced with PROVWTVIGU_D in 2013 due to the addition of Guam sample.
PROVWTVIGU_D	THE DUAL-FRAME WEIGHT FOR CHILDREN IN THE U.S. PROPER, THE U.S. VIRGIN ISLANDS AND GUAM FOR CHILDREN WITH ADEQUATE PROVIDER DATA AND UNVACCINATED CHILDREN										Y						Replaced PROVWTVI_D in 2013 due to the addition of Guam sample. Replaced with PROVWT_D_TERR in 2014 due to addition of Puerto Rico sample.
PROVWT_D_TERR	FINAL DUAL-FRAME PROVIDER-PHASE WEIGHT INCLUDING TERRITORIES											Y	Y	Y			Replaced PROVWTVIGU_D in 2014 due to addition of Puerto Rico sample. Not available on the 2017 PUF as no data from U.S. territories were included.
PROVWTVI_LL	LANDLINE-FRAME WEIGHT FOR CHILDREN WITH ADEQUATE PROVIDER DATA AND UNVACCINATED CHILDREN (INCLUDING U.S. VIRGIN ISLANDS)								Y								Replaced PROVWTVI in 2011. Replaced with dual-frame weight PROVWTVI_D in 2012.
PU431_31	UTD (UP-TO-DATE) FLAG FOR PROVIDER 4:3:1::3:1 (4:3:1:3:3:1 EXCLUDING HIB; INCLUDES 1+ VARICELLA AT AGE 12+ MTHS) BY 36 MONTHS OF AGE, EXCLUDING ANY VACCINATIONS AFTER THE HOUSEHOLD INTERVIEW DATE.							Y	Y	Y	Y	Y	Y	Y	Y	Y	Added in 2010 to aid analysis.
PU431_314	UTD (UP-TO-DATE) FLAG FOR PROVIDER 4:3:1::3:1:4 (4:3:1:3:3:1:4 EXCLUDING HIB; INCLUDES 1+ VARICELLA AT AGE 12+ MTHS) BY 36 MONTHS OF AGE, EXCLUDING ANY VACCINATIONS AFTER THE HOUSEHOLD INTERVIEW DATE.							Y	Y	Y	Y	Y	Y	Y	Y	Y	Added in 2010 to aid analysis.

Variable Name	Variable Label†	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	Notes§
PU431331	UTD (UP-TO-DATE) FLAG FOR PROVIDER 4:3:1:3:3:1 (INCLUDES 1+ VARICELLA AT AGE 12+ MTHS) BY 36 MONTHS OF AGE, EXCLUDING ANY VACCINATIONS AFTER THE HOUSEHOLD INTERVIEW DATE.	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	
PU4313313	UTD (UP-TO-DATE) FLAG FOR PROVIDER 4:3:1:3:3:1:3 (INCLUDES 1+ VARICELLA AT AGE 12+ MTHS) BY 36 MONTHS OF AGE, EXCLUDING ANY VACCINATIONS AFTER THE HOUSEHOLD INTERVIEW DATE.				Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Added in 2007 to aid analysis.
PU4313314	UTD (UP-TO-DATE) FLAG FOR PROVIDER 4:3:1:3:3:1:4 (INCLUDES 1+ VARICELLA AT AGE 12+ MTHS) BY 36 MONTHS OF AGE, EXCLUDING ANY VACCINATIONS AFTER THE HOUSEHOLD INTERVIEW DATE.				Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Added in 2007 to aid analysis.
PUT43133	UTD (UP-TO-DATE) FLAG FOR PROVIDER 4:3:1:3:3 BY 36 MONTHS OF AGE, EXCLUDING ANY VACCINATIONS AFTER THE HOUSEHOLD INTERVIEW DATE.	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	
PUTD4313	UTD (UP-TO-DATE) FLAG FOR PROVIDER 4:3:1:3 BY 36 MONTHS OF AGE, EXCLUDING ANY VACCINATIONS AFTER THE HOUSEHOLD INTERVIEW DATE.	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	
Q5WEB1	INTEREST IN IHQ ON WEBSITE PROVIDER #1	Y															Question was not asked starting in 2005.
Q5WEB2	INTEREST IN IHQ ON WEBSITE PROVIDER #2	Y															Question was not asked starting in 2005.
Q5WEB3	INTEREST IN IHQ ON WEBSITE PROVIDER #3	Y															Question was not asked starting in 2005.
Q5WEB4	INTEREST IN IHQ ON WEBSITE PROVIDER #4	Y															Question was not asked starting in 2005.
Q5WEB5	INTEREST IN IHQ ON WEBSITE PROVIDER #5	Y															Question was not asked starting in 2005.
RACE_K	RACE OF CHILD: IMPUTED (RECODE)	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	
RACEETHK	RACE/ETHNICITY OF CHILD: IMPUTED (RECODE)	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	
RB1_AGE	AGE IN MONTHS OF PROV-REPTD RUBELLA-ONLY SHOT #1	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	

Variable Name	Variable Label†	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	Notes§
RB2_AGE	AGE IN MONTHS OF PROV-REPTD RUBELLA-ONLY SHOT #2	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	
RB3_AGE	AGE IN MONTHS OF PROV-REPTD RUBELLA-ONLY SHOT #3	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	
RB4_AGE	AGE IN MONTHS OF PROV-REPTD RUBELLA-ONLY SHOT #4	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	
RB5_AGE	AGE IN MONTHS OF PROV-REPTD RUBELLA-ONLY SHOT #5	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	
RB6_AGE	AGE IN MONTHS OF PROV-REPTD RUBELLA-ONLY SHOT #6	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	
RB7_AGE	AGE IN MONTHS OF PROV-REPTD RUBELLA-ONLY SHOT #7	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	
RB8_AGE	AGE IN MONTHS OF PROV-REPTD RUBELLA-ONLY SHOT #8	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	
RB9_AGE	AGE IN MONTHS OF PROV-REPTD RUBELLA-ONLY SHOT #9		Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Starting in 2005, nine shot variables are included for each vaccine category.
RDDWT	HH-PHASE CHILD INTERVIEW WEIGHT (EXCLUDING U.S. VIRGIN ISLANDS)		Y	Y	Y	Y	Y	Y									Added in 2005 to replace WGT_RDD. Replaced by RDDWT_LL in 2011 due to addition of dual-frame weights.
RDDWT_C	**FINAL SINGLE-FRAME CELL-PHONE RDD-PHASE WEIGHT (EXCLUDES TERRITORIES)**															**Y**	**Replaced RDDWT_D in 2018 due to removal of the landline sample.**
RDDWT_D	**FINAL DUAL-FRAME RDD-PHASE WEIGHT (EXCLUDES TERRITORIES)**								**Y**	**Y**	**Y**	**Y**	**Y**	**Y**	**Y**		**Added in 2011 as dual-frame weight. Replaced by RDDWT_C in 2018 due to removal of the landline sample.**
RDDWT_LL	LANDLINE-FRAME HH-PHASE CHILD INTERIVEW WEIGHT (EXCLUDING U.S. VIRGIN ISLANDS)								Y								Replaced RDDWT in 2011 to distinguish from new dual-frame weight RDDWT_D. Removed in 2012.
RDDWTVI	HH-PHASE CHILD INTERVIEW WEIGHT (INCLUDING U.S. VIRGIN ISLANDS)						Y	Y									Added in 2009 to include U.S. Virgin Island sample. Replaced by RDDWTVI_LL in 2011 due to addition of dual-frame weights.
RDDWTVI_D	COMBINATION OF THE DUAL-FRAME HH-PHASE WEIGHT FOR HOUSEHOLDS IN THE U.S. PROPER AND LANDLINE HH-PHASE WEIGHT FOR HOUSEHOLDS IN THE U.S. VIRGIN ISLANDS									Y							Replaced RDDWTVI_LL in 2012. Replaced with RDDWTVIGU_D in 2013 due to the addition of Guam sample.
RDDWTVIGU_D	THE DUAL-FRAME HH-PHASE WEIGHT FOR HOUSEHOLDS IN THE U.S. PROPER, THE U.S. VIRGIN ISLANDS AND GUAM										Y						Replaced RDDWTVI_D in 2013 due to the addition of Guam sample. Replaced with RDDWT_D_TERR in 2014 due to addition of Puerto Rico sample.
RDDWT_D_TERR	FINAL DUAL-FRAME RDD-PHASE WEIGHT INCLUDING TERRITORIES											Y	Y	Y			Replaced RDDWTVIGU_D in 2014 due to addition of Puerto Rico sample. Not available on the 2017 PUF as no data from U.S. territories were included.

Variable Name	Variable Label[†]	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	Notes[§]
RDDWTVI_LL	LANDLINE-FRAME HH-PHASE CHILD INTERIVEW WEIGHT (INCLUDING U.S. VIRGIN ISLANDS)								Y								Replaced RDDWTVI in 2011. Replaced with dual-frame weight RDDWTVI_D in 2012.
REGISTRY	CHILD'S PROVIDERS REPORTED CHILD'S VACCINATIONS TO IMMUNIZATION REGISTRY	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	
RENT_OWN	IS HOME OWNED/BEING BOUGHT, RENTED, OR OCCUPIED BY SOME OTHER ARRANGEMENT?						Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Question added to the questionnaire starting in late 2008, and introduced in the PUF in 2009.
ROT1_AGE	AGE IN MONTHS OF PROV-REPTD ROTAVIRUS-CONTAINING SHOT #1	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	
ROT2_AGE	AGE IN MONTHS OF PROV-REPTD ROTAVIRUS-CONTAINING SHOT #2	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	
ROT3_AGE	AGE IN MONTHS OF PROV-REPTD ROTAVIRUS-CONTAINING SHOT #3	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	
ROT4_AGE	AGE IN MONTHS OF PROV-REPTD ROTAVIRUS-CONTAINING SHOT #4	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	
ROT5_AGE	AGE IN MONTHS OF PROV-REPTD ROTAVIRUS-CONTAINING SHOT #5	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	
ROT6_AGE	AGE IN MONTHS OF PROV-REPTD ROTAVIRUS-CONTAINING SHOT #6	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	
ROT7_AGE	AGE IN MONTHS OF PROV-REPTD ROTAVIRUS-CONTAINING SHOT #7	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	
ROT8_AGE	AGE IN MONTHS OF PROV-REPTD ROTAVIRUS-CONTAINING SHOT #8	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	
ROT9_AGE	AGE IN MONTHS OF PROV-REPTD ROTAVIRUS-CONTAINING SHOT #9		Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Starting in 2005, nine shot variables are included for each vaccine category.
SC_431	HH SHOT CARD REPORT OF 4:3:1 UP-TO-DATE			Y	Y	Y	Y	Y	Y								Added in 2006 as a partial replacement for the "FULL" and "C_" variables. Dropped in 2012 due to questionnaire changes.
SC_4313	HH SHOT CARD REPORT OF 4:3:1:3 UP-TO-DATE			Y	Y	Y	Y	Y	Y								Added in 2006 as a partial replacement for the "FULL" and "C_" variables. Dropped in 2012 due to questionnaire changes.
SC_43133	HH SHOT CARD REPORT OF 4:3:1:3:3 UP-TO-DATE			Y	Y	Y	Y	Y	Y								Added in 2006 as a partial replacement for the "FULL" and "C_" variables. Dropped in 2012 due to questionnaire changes.
SC_DTP	HH SHOT CARD REPORT OF 4+ DT-CONTAINING UP-TO-DATE			Y	Y	Y	Y	Y	Y								Added in 2006 as a partial replacement for the "FULL" and "C_" variables. Dropped in 2012 due to questionnaire changes.
SC_HEPB	HH SHOT CARD REPORT OF 3+ HEPATITIS B-CONTAINING UP-TO-DATE			Y	Y	Y	Y	Y	Y								Added in 2006 as a partial replacement for the "FULL" and "C_" variables. Dropped in 2012 due to questionnaire changes.
SC_HIB	HH SHOT CARD REPORT OF 3+ HIB-CONTAINING UP-TO-DATE			Y	Y	Y	Y	Y	Y								Added in 2006 as a partial replacement for the "FULL" and "C_" variables. Dropped in 2012 due to questionnaire changes.

Variable Name	Variable Label[†]	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	Notes[§]
SC_MCV	HH SHOT CARD REPORT OF 1+ MEASLES-CONTAINING UP-TO-DATE			Y	Y	Y	Y	Y	Y								Added in 2006 as a partial replacement for the "FULL" and "C_" variables. Dropped in 2012 due to questionnaire changes.
SC_POL	HH SHOT CARD REPORT OF 3+ POLIO-CONTAINING UP-TO-DATE			Y	Y	Y	Y	Y	Y								Added in 2006 as a partial replacement for the "FULL" and "C_" variables. Dropped in 2012 due to questionnaire changes.
SC_VRC	HH SHOT CARD REPORT OF 1+ VARICELLA-CONTAINING UP-TO-DATE			Y	Y	Y	Y	Y	Y								Added in 2006 as a partial replacement for the "FULL" and "C_" variables. Dropped in 2012 due to questionnaire changes.
SEQNUMC	UNIQUE CHILD IDENTIFIER	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	
SEQNUMHH	UNIQUE HOUSEHOLD IDENTIFIER	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	
SEX	SEX OF CHILD: IMPUTED	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	
SHORT	Q1/2004 SHORT QUESTIONNAIRE STUDY FLAG	Y															There was no short questionnaire study starting in 2005.
STATE	TRUE STATE OF RESIDENCE (STATE FIPS CODE)	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	
STRATUM	STRATUM VARIABLE FOR VARIANCE ESTIMATION									Y	Y	Y	Y	Y	Y	Y	Replaced STRATUM_D in 2012. Equal to sample frame by estimation area.
STRATUM_D	STRATUM VARIABLE FOR DUAL-FRAME VARIANCE ESTIMATION								Y								Added in 2011. Equal to sample frame by estimation area. Replaced by STRATUM in 2012.
TEL_SAMPFRAME	SAMPLE FRAME INDICATOR								Y								Added in 2011. Dropped in 2012 due to use of only dual-frame weights.
U1D_HEP	BIRTH DOSE HEPATITIS B-CONTAINING GIVEN FROM BIRTH TO DAY 1 FLAG								Y	Y	Y	Y	Y	Y	Y	Y	Added 2011 to aid analysis.
U24_FLU_24D	**UTD (UP-TO-DATE) FLAG FOR PROVIDER 2+ INFLUENZA VACCINATIONS AT LEAST 4 WEEKS-4 DAYS APART BY 24 MONTHS OF AGE, EXCLUDING ANY VACCINATIONS AFTER THE HOUSEHOLD INTERVIEW DATE.**															**Y**	**New up-to-date variable added in 2018.**
U2D_HEP	BIRTH DOSE HEPATITIS B-CONTAINING GIVEN FROM BIRTH TO DAY 2 FLAG								Y	Y	Y	Y	Y	Y	Y	Y	Added 2011 to aid analysis.
U3D_HEP	BIRTH DOSE HEPATITIS B-CONTAINING GIVEN FROM BIRTH TO DAY 3 FLAG								Y	Y	Y	Y	Y	Y	Y	Y	Added 2011 to aid analysis.
VFC_I	DERIVED: IS CHILD VFC ELIGIBLE?						Y	Y	Y								Added in 2009 to aid analysis. Dropped starting in 2012 due to a change in the IHQ.
VFC_ORDER	DO CHILD'S PROVIDERS ORDER VACCINES FROM STATE/LOCAL HEALTH DEPT?			Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Added in 2006 due to a change in the IHQ.

Variable Name	Variable Label[†]	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	Notes[§]
VFC_PRO	PARTICIPATION OF CHILD'S PROVIDERS IN VACCINES FOR CHILDREN PROGRAM	Y	Y														Question was not asked starting in 2006.
VRC1_AGE	AGE IN MONTHS OF PROV-REPTD VARICELLA-CONTAINING SHOT #1	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	
VRC2_AGE	AGE IN MONTHS OF PROV-REPTD VARICELLA-CONTAINING SHOT #2	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	
VRC3_AGE	AGE IN MONTHS OF PROV-REPTD VARICELLA-CONTAINING SHOT #3	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	
VRC4_AGE	AGE IN MONTHS OF PROV-REPTD VARICELLA-CONTAINING SHOT #4	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	
VRC5_AGE	AGE IN MONTHS OF PROV-REPTD VARICELLA-CONTAINING SHOT #5		Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Starting in 2005, nine shot variables are included for each vaccine category.
VRC6_AGE	AGE IN MONTHS OF PROV-REPTD VARICELLA-CONTAINING SHOT #6		Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Starting in 2005, nine shot variables are included for each vaccine category.
VRC7_AGE	AGE IN MONTHS OF PROV-REPTD VARICELLA-CONTAINING SHOT #7		Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Starting in 2005, nine shot variables are included for each vaccine category.
VRC8_AGE	AGE IN MONTHS OF PROV-REPTD VARICELLA-CONTAINING SHOT #8		Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Starting in 2005, nine shot variables are included for each vaccine category.
VRC9_AGE	AGE IN MONTHS OF PROV-REPTD VARICELLA-CONTAINING SHOT #9		Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Starting in 2005, nine shot variables are included for each vaccine category.
WGT	NEW WEIGHT FOR CHILDREN WITH ADEQUATE PROVIDER DATA AND UNVACCINATED CHILDREN	Y															Replaced by PROVWT starting in 2005.
WGT_RDD	RDD CHILD INTERVIEW WEIGHT	Y															Replaced by RDDWT starting in 2005.
XDTPTY1	DT-CONTAINING VACCINATION #1 TYPE CODE	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	
XDTPTY2	DT-CONTAINING VACCINATION #2 TYPE CODE	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	
XDTPTY3	DT-CONTAINING VACCINATION #3 TYPE CODE	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	
XDTPTY4	DT-CONTAINING VACCINATION #4 TYPE CODE	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	
XDTPTY5	DT-CONTAINING VACCINATION #5 TYPE CODE	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	
XDTPTY6	DT-CONTAINING VACCINATION #6 TYPE CODE	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	
XDTPTY7	DT-CONTAINING VACCINATION #7 TYPE CODE	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	
XDTPTY8	DT-CONTAINING VACCINATION #8 TYPE CODE	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	
XDTPTY9	DT-CONTAINING VACCINATION #9 TYPE CODE		Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Starting in 2005, nine shot variables are included for each vaccine category.

Variable Name	Variable Label[†]	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	Notes[§]
XFLUTY1	SEASONAL FLU-CONTAINING VACCINATION #1 TYPE CODE					Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Starting in 2008, influenza type boxes were added to the IHQ shot grid.
XFLUTY2	SEASONAL FLU-CONTAINING VACCINATION #2 TYPE CODE					Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Starting in 2008, influenza type boxes were added to the IHQ shot grid.
XFLUTY3	SEASONAL FLU-CONTAINING VACCINATION #3 TYPE CODE					Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Starting in 2008, influenza type boxes were added to the IHQ shot grid.
XFLUTY4	SEASONAL FLU-CONTAINING VACCINATION #4 TYPE CODE					Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Starting in 2008, influenza type boxes were added to the IHQ shot grid.
XFLUTY5	SEASONAL FLU-CONTAINING VACCINATION #5 TYPE CODE					Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Starting in 2008, influenza type boxes were added to the IHQ shot grid.
XFLUTY6	SEASONAL FLU-CONTAINING VACCINATION #6 TYPE CODE					Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Starting in 2008, influenza type boxes were added to the IHQ shot grid.
XFLUTY7	SEASONAL FLU-CONTAINING VACCINATION #7 TYPE CODE					Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Starting in 2008, influenza type boxes were added to the IHQ shot grid.
XFLUTY8	SEASONAL FLU-CONTAINING VACCINATION #8 TYPE CODE					Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Starting in 2008, influenza type boxes were added to the IHQ shot grid.
XFLUTY9	SEASONAL FLU-CONTAINING VACCINATION #9 TYPE CODE					Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Starting in 2008, influenza type boxes were added to the IHQ shot grid.
XH1NTY1	MONOVALENT 2009 H1N1 INFLUENZA VACCINATION #1 TYPE CODE							Y	Y	Y							H1N1 influenza added to the IHQ shotgrid starting in late 2009, and introduced in the PUF in 2010. Removed from the IHQ and the PUF in 2013.
XH1NTY2	MONOVALENT 2009 H1N1 INFLUENZA VACCINATION #2 TYPE CODE							Y	Y	Y							H1N1 influenza added to the IHQ shotgrid starting in late 2009, and introduced in the PUF in 2010. Removed from the IHQ and the PUF in 2013.
XH1NTY3	MONOVALENT 2009 H1N1 INFLUENZA VACCINATION #3 TYPE CODE							Y	Y	Y							H1N1 influenza added to the IHQ shotgrid starting in late 2009, and introduced in the PUF in 2010. Removed from the IHQ and the PUF in 2013.
XH1NTY4	MONOVALENT 2009 H1N1 INFLUENZA VACCINATION #4 TYPE CODE							Y	Y	Y							H1N1 influenza added to the IHQ shotgrid starting in late 2009, and introduced in the PUF in 2010. Removed from the IHQ and the PUF in 2013.
XH1NTY5	MONOVALENT 2009 H1N1 INFLUENZA VACCINATION #5 TYPE CODE							Y	Y	Y							H1N1 influenza added to the IHQ shotgrid starting in late 2009, and introduced in the PUF in 2010. Removed from the IHQ and the PUF in 2013.
XH1NTY6	MONOVALENT 2009 H1N1 INFLUENZA VACCINATION #6 TYPE CODE							Y	Y	Y							H1N1 influenza added to the IHQ shotgrid starting in late 2009, and introduced in the PUF in 2010. Removed from the IHQ and the PUF in 2013.
XH1NTY7	MONOVALENT 2009 H1N1 INFLUENZA VACCINATION #7 TYPE CODE							Y	Y	Y							H1N1 influenza added to the IHQ shotgrid starting in late 2009, and introduced in the PUF in 2010. Removed from the IHQ and the PUF in 2013.
XH1NTY8	MONOVALENT 2009 H1N1 INFLUENZA VACCINATION #8 TYPE CODE							Y	Y	Y							H1N1 influenza added to the IHQ shotgrid starting in late 2009, and introduced in the PUF in 2010. Removed from the IHQ and the PUF in 2013.
XH1NTY9	MONOVALENT 2009 H1N1 INFLUENZA VACCINATION #9 TYPE CODE							Y	Y	Y							H1N1 influenza added to the IHQ shotgrid starting in late 2009, and introduced in the PUF in 2010. Removed from the IHQ and the PUF in 2013.

Variable Name	Variable Label[†]	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	Notes[§]
XHEPTY1	HEPATITIS B-CONTAINING VACCINATION #1 TYPE CODE	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	
XHEPTY2	HEPATITIS B-CONTAINING VACCINATION #2 TYPE CODE	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	
XHEPTY3	HEPATITIS B-CONTAINING VACCINATION #3 TYPE CODE	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	
XHEPTY4	HEPATITIS B-CONTAINING VACCINATION #4 TYPE CODE	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	
XHEPTY5	HEPATITIS B-CONTAINING VACCINATION #5 TYPE CODE	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	
XHEPTY6	HEPATITIS B-CONTAINING VACCINATION #6 TYPE CODE	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	
XHEPTY7	HEPATITIS B-CONTAINING VACCINATION #7 TYPE CODE	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	
XHEPTY8	HEPATITIS B-CONTAINING VACCINATION #8 TYPE CODE	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	
XHEPTY9	HEPATITIS B-CONTAINING VACCINATION #9 TYPE CODE		Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Starting in 2005, nine shot variables are included for each vaccine category.
XHIBTY1	HIB-CONTAINING VACCINATION #1 TYPE CODE	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	
XHIBTY2	HIB-CONTAINING VACCINATION #2 TYPE CODE	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	
XHIBTY3	HIB-CONTAINING VACCINATION #3 TYPE CODE	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	
XHIBTY4	HIB-CONTAINING VACCINATION #4 TYPE CODE	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	
XHIBTY5	HIB-CONTAINING VACCINATION #5 TYPE CODE	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	
XHIBTY6	HIB-CONTAINING VACCINATION #6 TYPE CODE	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	
XHIBTY7	HIB-CONTAINING VACCINATION #7 TYPE CODE	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	
XHIBTY8	HIB-CONTAINING VACCINATION #8 TYPE CODE	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	
XHIBTY9	HIB-CONTAINING VACCINATION #9 TYPE CODE		Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Starting in 2005, nine shot variables are included for each vaccine category.
XMMRTY1	MEASLES-CONTAINING VACCINATION #1 TYPE CODE	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	
XMMRTY2	MEASLES-CONTAINING VACCINATION #2 TYPE CODE	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	
XMMRTY3	MEASLES-CONTAINING VACCINATION #3 TYPE CODE	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	

Variable Name	Variable Label[†]	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	Notes[§]
XMMRTY4	MEASLES-CONTAINING VACCINATION #4 TYPE CODE	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	
XMMRTY5	MEASLES-CONTAINING VACCINATION #5 TYPE CODE		Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Starting in 2005, nine shot variables are included for each vaccine category.
XMMRTY6	MEASLES-CONTAINING VACCINATION #6 TYPE CODE		Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Starting in 2005, nine shot variables are included for each vaccine category.
XMMRTY7	MEASLES-CONTAINING VACCINATION #7 TYPE CODE		Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Starting in 2005, nine shot variables are included for each vaccine category.
XMMRTY8	MEASLES-CONTAINING VACCINATION #8 TYPE CODE		Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Starting in 2005, nine shot variables are included for each vaccine category.
XMMRTY9	MEASLES-CONTAINING VACCINATION #9 TYPE CODE		Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Starting in 2005, nine shot variables are included for each vaccine category.
XPCVTY1	PNEUMOCOCCAL-CONTAINING VACCINATION #1 TYPE CODE	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	
XPCVTY2	PNEUMOCOCCAL-CONTAINING VACCINATION #2 TYPE CODE	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	
XPCVTY3	PNEUMOCOCCAL-CONTAINING VACCINATION #3 TYPE CODE	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	
XPCVTY4	PNEUMOCOCCAL-CONTAINING VACCINATION #4 TYPE CODE	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	
XPCVTY5	PNEUMOCOCCAL-CONTAINING VACCINATION #5 TYPE CODE	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	
XPCVTY6	PNEUMOCOCCAL-CONTAINING VACCINATION #6 TYPE CODE	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	
XPCVTY7	PNEUMOCOCCAL-CONTAINING VACCINATION #7 TYPE CODE	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	
XPCVTY8	PNEUMOCOCCAL-CONTAINING VACCINATION #8 TYPE CODE	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	
XPCVTY9	PNEUMOCOCCAL-CONTAINING VACCINATION #9 TYPE CODE		Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Starting in 2005, nine shot variables are included for each vaccine category.
XPOLTY1	POLIO-CONTAINING VACCINATION #1 TYPE CODE	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	
XPOLTY2	POLIO-CONTAINING VACCINATION #2 TYPE CODE	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	
XPOLTY3	POLIO-CONTAINING VACCINATION #3 TYPE CODE	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	
XPOLTY4	POLIO-CONTAINING VACCINATION #4 TYPE CODE	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	
XPOLTY5	POLIO-CONTAINING VACCINATION #5 TYPE CODE	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	
XPOLTY6	POLIO-CONTAINING VACCINATION #6 TYPE CODE	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	

Variable Name	Variable Label[†]	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	Notes[§]
XPOLTY7	POLIO-CONTAINING VACCINATION #7 TYPE CODE	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	
XPOLTY8	POLIO-CONTAINING VACCINATION #8 TYPE CODE	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	
XPOLTY9	POLIO-CONTAINING VACCINATION #9 TYPE CODE		Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Starting in 2005, nine shot variables are included for each vaccine category.
XROTTY1	ROTAVIRUS-CONTAINING VACCINATION #1 TYPE CODE						Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Rotavirus vaccination types were added to the IHQ starting 2009.
XROTTY2	ROTAVIRUS-CONTAINING VACCINATION #2 TYPE CODE						Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Rotavirus vaccination types were added to the IHQ starting 2009.
XROTTY3	ROTAVIRUS-CONTAINING VACCINATION #3 TYPE CODE						Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Rotavirus vaccination types were added to the IHQ starting 2009.
XROTTY4	ROTAVIRUS-CONTAINING VACCINATION #4 TYPE CODE						Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Rotavirus vaccination types were added to the IHQ starting 2009.
XROTTY5	ROTAVIRUS-CONTAINING VACCINATION #5 TYPE CODE						Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Rotavirus vaccination types were added to the IHQ starting 2009.
XROTTY6	ROTAVIRUS-CONTAINING VACCINATION #6 TYPE CODE						Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Rotavirus vaccination types were added to the IHQ starting 2009.
XROTTY7	ROTAVIRUS-CONTAINING VACCINATION #7 TYPE CODE						Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Rotavirus vaccination types were added to the IHQ starting 2009.
XROTTY8	ROTAVIRUS-CONTAINING VACCINATION #8 TYPE CODE						Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Rotavirus vaccination types were added to the IHQ starting 2009.
XROTTY9	ROTAVIRUS-CONTAINING VACCINATION #9 TYPE CODE						Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Rotavirus vaccination types were added to the IHQ starting 2009.
XVRCTY1	VARICELLA-CONTAINING VACCINATION #1 TYPE CODE			Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Varicella vaccination types were added to the IHQ starting 2006.
XVRCTY2	VARICELLA-CONTAINING VACCINATION #2 TYPE CODE			Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Varicella vaccination types were added to the IHQ starting 2006.
XVRCTY3	VARICELLA-CONTAINING VACCINATION #3 TYPE CODE			Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Varicella vaccination types were added to the IHQ starting 2006.
XVRCTY4	VARICELLA-CONTAINING VACCINATION #4 TYPE CODE			Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Varicella vaccination types were added to the IHQ starting 2006.
XVRCTY5	VARICELLA-CONTAINING VACCINATION #5 TYPE CODE			Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Varicella vaccination types were added to the IHQ starting 2006.
XVRCTY6	VARICELLA-CONTAINING VACCINATION #6 TYPE CODE			Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Varicella vaccination types were added to the IHQ starting 2006.
XVRCTY7	VARICELLA-CONTAINING VACCINATION #7 TYPE CODE			Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Varicella vaccination types were added to the IHQ starting 2006.
XVRCTY8	VARICELLA-CONTAINING VACCINATION #8 TYPE CODE			Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Varicella vaccination types were added to the IHQ starting 2006.
XVRCTY9	VARICELLA-CONTAINING VACCINATION #9 TYPE CODE			Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Varicella vaccination types were added to the IHQ starting 2006.
YEAR	YEAR OF INTERVIEW	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	

* For a list of variables that appeared in one or more (but not all) NIS-Child public-use data files from 1995-2004, see "Alphabetical Listing of Variables that are Not Available in All Public-Use Data Files, National Immunization Survey, 1995-2004": http://www.cdc.gov/nchs/data/nis/pufvariables1995to2004.pdf

† If the variable appeared in the 2018 NIS-Child public-use data file, then the 2018 label is given; otherwise the label from the most recent NIS-Child public-use data file in which the variable appeared is given.

§ Starting in 2005, a code of 77 is used for "Don't Know" responses and a code of 99 is used for "Refused" responses.

Appendix F: Summary Tables

Table F.1: Estimated Population Totals and Sample Sizes of Children 19-35 Months of Age by State and Estimation Area, National Immunization Survey - Child, 2018

State/Estimation Area	ESTIAP	Estimated Population Total of Children	Number of Children with Complete Household Interviews	Number of Children with Adequate Provider Data	Percent of Children with Adequate Provider Data
U.S. National*		5,747,343	28,971	15,657	54.0%
Alabama	20	85,380	566	303	53.5%
Alaska	74	15,505	396	228	57.6%
Arizona	66	124,240	488	255	52.3%
Arkansas	46	54,646	452	244	54.0%
California	68	712,397	626	296	47.3%
Colorado	60	96,713	446	245	54.9%
Connecticut	1	52,334	319	166	52.0%
Delaware	13	16,320	481	247	51.4%
District of Columbia	12	12,396	589	312	53.0%
Florida	22	338,704	601	306	50.9%
Georgia	25	191,697	632	324	51.3%
Hawaii	72	25,824	448	230	51.3%
Idaho	75	32,655	363	202	55.6%
Illinois		218,288	924	474	51.3%
IL-City of Chicago	35	54,337	292	158	54.1%
IL-Rest of State	34	163,951	632	316	50.0%
Indiana	36	121,150	517	279	54.0%
Iowa	56	56,468	346	207	59.8%
Kansas	57	56,384	318	193	60.7%
Kentucky	27	78,768	343	175	51.0%
Louisiana	47	88,895	457	235	51.4%
Maine	4	18,079	464	263	56.7%
Maryland	14	105,973	722	367	50.8%
Massachusetts	2	104,138	466	282	60.5%
Michigan	38	163,286	499	294	58.9%
Minnesota	40	101,670	397	217	54.7%
Mississippi	28	54,223	662	299	45.2%
Missouri	58	107,821	440	243	55.2%
Montana	61	17,870	477	280	58.7%
Nebraska	59	38,626	393	230	58.5%
Nevada	73	54,665	499	260	52.1%
New Hampshire	5	19,280	427	220	51.5%
New Jersey	8	151,338	653	313	47.9%
New Mexico	49	35,485	537	313	58.3%

State/Estimation Area	ESTIAP	Estimated Population Total of Children	Number of Children with Complete Household Interviews	Number of Children with Adequate Provider Data	Percent of Children with Adequate Provider Data
New York		332,891	995	504	50.7%
NY-City of New York	11	166,528	576	291	50.5%
NY-Rest of State	10	166,363	419	213	50.8%
North Carolina	29	178,990	647	351	54.3%
North Dakota	62	17,360	424	241	56.8%
Ohio	41	197,266	540	282	52.2%
Oklahoma	50	75,779	601	329	54.7%
Oregon	76	66,739	319	192	60.2%
Pennsylvania		201,717	1,011	548	54.2%
PA-Philadelphia County	17	31,448	443	235	53.0%
PA-Rest of State	16	170,269	568	313	55.1%
Rhode Island	6	16,017	420	249	59.3%
South Carolina	30	82,845	580	296	51.0%
South Dakota	63	18,166	407	209	51.4%
Tennessee	31	119,715	381	228	59.8%
Texas		594,186	3,236	1,747	54.0%
TX-Bexar County	55	41,296	441	243	55.1%
TX-City of Houston	54	81,828	369	169	45.8%
TX-Hidalgo County	107	22,763	444	251	56.5%
TX-Tarrant County	109	42,164	461	240	52.1%
TX-Rest of State	51	406,135	1,521	844	55.5%
Utah	64	73,917	453	277	61.1%
Vermont	7	8,010	392	232	59.2%
Virginia	18	147,174	687	384	55.9%
Washington	77	132,489	431	240	55.7%
West Virginia	19	28,462	567	298	52.6%
Wisconsin	44	94,874	505	307	60.8%
Wyoming	65	9,527	427	241	56.4%

*Excludes U.S. territories.

Table F.2: Estimated Population Totals and Sample Sizes for Age Group by Maternal Education, National Immunization Survey - Child, 2018

Age Group in Months	Maternal Education	Children with Completed Household Interviews* Unweighted Completes	Children with Completed Household Interviews* Weighted Completes†	Children with Adequate Provider Data* Unweighted Completes	Children with Adequate Provider Data* Weighted Completes§
19-23	<12 Years	870	264,098	465	253,272
19-23	12 Years	1,536	452,082	767	449,144
19-23	>12, Non College Graduate	2,082	369,224	1,119	363,039
19-23	College Graduate	3,838	635,587	2,176	655,535
24-29	<12 Years	840	271,928	466	285,019
24-29	12 Years	1,602	465,244	830	450,616
24-29	>12, Non College Graduate	2,226	464,353	1,208	479,347
24-29	College Graduate	4,059	750,197	2,274	736,740
30-35	<12 Years	1,231	301,315	650	304,713
30-35	12 Years	2,096	501,717	1,054	513,619
30-35	>12, Non College Graduate	2,993	475,388	1,522	446,839
30-35	College Graduate	5,598	796,211	3,126	809,460
Total		28,971	5,747,343	15,657	5,747,343

* Excludes U.S. territories.

† Weighted by RDDWT_C.

§ Weighted by PROVWT_C.

Table F.3: Estimated Population Totals and Sample Sizes for Age Group by Poverty Status, National Immunization Survey - Child, 2018

Age Group in Months	Poverty Status	Children with Completed Household Interviews* Unweighted Completes	Children with Completed Household Interviews* Weighted Completes†	Children with Adequate Provider Data* Unweighted Completes	Children with Adequate Provider Data* Weighted Completes§
19-23 Months	Above poverty, > $75K	3,345	577,849	1,897	605,435
19-23 Months	Above poverty, <= $75K	2,730	549,295	1,479	534,924
19-23 Months	Below poverty	1,728	466,848	959	466,369
19-23 Months	Unknown	523	126,999	192	114,263
24-29 Months	Above poverty, > $75K	3,651	699,431	2,012	685,353
24-29 Months	Above poverty, <= $75K	2,796	629,484	1,537	625,795
24-29 Months	Below poverty	1,819	513,315	1,039	519,565
24-29 Months	Unknown	461	109,492	190	121,010
30-35 Months	Above poverty, > $75K	4,994	732,327	2,779	758,634
30-35 Months	Above poverty, <= $75K	3,865	638,696	2,031	631,749
30-35 Months	Below poverty	2,370	548,494	1,301	543,328
30-35 Months	Unknown	689	155,114	241	140,920
Total		28,971	5,747,343	15,657	5,747,343

* Excludes U.S. territories.

† Weighted by RDDWT_C.

§ Weighted by PROVWT_C.

Table F.4: Estimated Population Totals and Sample Sizes for Race/Ethnicity by Poverty Status, National Immunization Survey - Child, 2018

Race/Ethnicity†	Poverty Status	Children with Completed Household Interviews* Unweighted Completes	Children with Completed Household Interviews* Weighted Completes§	Children with Adequate Provider Data* Unweighted Completes	Children with Adequate Provider Data* Weighted Completes¶
Hispanic	Above poverty, > $75K	1,411	274,060	698	261,527
Hispanic	Above poverty, <= $75K	2,021	452,436	1,096	471,868
Hispanic	Below poverty	2,600	687,286	1,475	664,527
Hispanic	Unknown	680	156,098	295	173,389
Non-Hispanic White Only	Above poverty, > $75K	8,235	1,279,730	4,774	1,300,104
Non-Hispanic White Only	Above poverty, <= $75K	5,208	879,517	2,948	873,425
Non-Hispanic White Only	Below poverty	1,711	381,290	998	400,264
Non-Hispanic White Only	Unknown	585	125,876	191	108,529
Non-Hispanic Black Only	Above poverty, > $75K	622	153,181	250	130,969
Non-Hispanic Black Only	Above poverty, <= $75K	955	254,136	390	233,167
Non-Hispanic Black Only	Below poverty	836	272,326	409	300,016
Non-Hispanic Black Only	Unknown	186	56,418	57	44,739
Non-Hispanic Other & Multiple Races	Above poverty, > $75K	1,722	302,635	966	356,822
Non-Hispanic Other & Multiple Races	Above poverty, <= $75K	1,207	231,386	613	214,006
Non-Hispanic Other & Multiple Races	Below poverty	770	187,755	417	164,455
Non-Hispanic Other & Multiple Races	Unknown	222	53,213	80	49,535
Total		28,971	5,747,343	15,657	5,747,343

* Excludes U.S. territories.

† Race/Ethnicity is self-reported and mutually exclusive.

§ Weighted by RDDWT_C.

¶ Weighted by PROVWT_C.

Table F.5: Estimated Population Totals and Sample Sizes for Age Group by Race/Ethnicity, National Immunization Survey - Child, 2018

Age Group in Months	Race/Ethnicity of Child[†]	Children with Completed Household Interviews* Unweighted Completes	Children with Completed Household Interviews* Weighted Completes[§]	Children with Adequate Provider Data* Unweighted Completes	Children with Adequate Provider Data* Weighted Completes[¶]
19-23 Months	Hispanic	1,996	491,149	1,065	495,936
19-23 Months	Non-Hispanic White Only	4,444	775,700	2,530	792,026
19-23 Months	Non-Hispanic Black Only	765	219,454	328	193,391
19-23 Months	Non-Hispanic Other & Multiple Races	1,121	234,688	604	239,637
24-29 Months	Hispanic	1,971	522,856	1,060	534,932
24-29 Months	Non-Hispanic White Only	4,799	932,255	2,739	904,055
24-29 Months	Non-Hispanic Black Only	777	243,179	350	266,575
24-29 Months	Non-Hispanic Other & Multiple Races	1,180	253,432	629	246,159
30-35 Months	Hispanic	2,745	555,875	1,439	540,444
30-35 Months	Non-Hispanic White Only	6,496	958,459	3,642	986,241
30-35 Months	Non-Hispanic Black Only	1,057	273,428	428	248,924
30-35 Months	Non-Hispanic Other & Multiple Races	1,620	286,869	843	299,022
Total		28,971	5,747,343	15,657	5,747,343

* Excludes U.S. territories.

† Race/Ethnicity is self-reported and mutually exclusive.

§ Weighted by RDDWT_C.

¶ Weighted by PROVWT_C.

Table F.6: Estimated Population Totals and Sample Sizes for Age Group by Sex, National Immunization Survey - Child, 2018

Age Group in Months	Sex	Children with Completed Household Interviews* Unweighted Completes	Children with Completed Household Interviews* Weighted Completes†	Children with Adequate Provider Data* Unweighted Completes	Children with Adequate Provider Data* Weighted Completes§
19-23 Months	Male	4,245	865,628	2,277	869,566
19-23 Months	Female	4,081	855,362	2,250	851,424
24-29 Months	Male	4,551	989,277	2,470	1,007,633
24-29 Months	Female	4,176	962,445	2,308	944,089
30-35 Months	Male	6,196	1,083,885	3,247	1,061,591
30-35 Months	Female	5,722	990,746	3,105	1,013,040
Total		28,971	5,747,343	15,657	5,747,343

* Excludes U.S. territories.

† Weighted by RDDWT_C.

§ Weighted by PROVWT_C.

Table F.7: Estimated Vaccination Coverage* with Individual Vaccines and Selected Vaccination Series Among Children 19-35 Months of Age by State and Estimation Area, National Immunization Survey - Child, Q1/2018-Q4/2018†

	≥4 DTaP§	≥3 Polio¶	≥1 MMR**	Hib-FS††	≥3 HepB¶¶	HepB Birth Dose	≥1 HepA	≥1 Var***	≥4 PCV†††	Rotavirus	4:3:1:3*:3:1:4§§§
U.S. National¶¶¶	83.8 ± 1.4	93.6 ± 0.7	92.1 ± 0.9	82.3 ± 1.4	92.1 ± 0.9	75.2 ± 1.5	88.1 ± 1.1	92.0 ± 0.8	83.3 ± 1.4	74.7 ± 1.6	72.8 ± 1.6
Alabama	89.3 ± 4.3	95.5 ± 2.4	94.4 ± 2.5	84.6 ± 5.1	95.3 ± 2.4	79.6 ± 6.2	91.5 ± 3.5	95.2 ± 2.2	88.1 ± 4.5	76.6 ± 6.3	79.3 ± 5.7
Alaska	78.1 ± 6.9	87.7 ± 5.8	85.1 ± 6.1	80.3 ± 6.7	88.9 ± 5.9	69.5 ± 7.0	84.4 ± 6.3	80.3 ± 6.6	79.3 ± 6.7	70.8 ± 7.4	68.2 ± 7.5
Arizona	80.0 ± 6.3	88.4 ± 5.1	87.5 ± 5.3	77.4 ± 6.5	85.4 ± 5.3	80.4 ± 5.3	84.9 ± 6.0	88.0 ± 5.2	74.2 ± 6.6	69.4 ± 7.1	69.6 ± 6.8
Arkansas	81.9 ± 5.9	90.7 ± 4.7	93.4 ± 3.8	83.3 ± 5.9	94.2 ± 3.1	78.7 ± 6.2	87.3 ± 5.2	93.4 ± 3.7	78.3 ± 6.6	73.4 ± 7.0	71.0 ± 7.2
California	83.2 ± 9.0	94.6 ± 3.8	92.0 ± 5.3	83.5 ± 8.9	91.8 ± 5.4	68.2 ± 9.6	90.3 ± 6.0	93.5 ± 4.2	81.6 ± 9.2	70.2 ± 10.3	72.2 ± 10.1
Colorado	85.6 ± 6.3	92.3 ± 4.5	93.8 ± 4.1	88.3 ± 5.3	92.3 ± 4.4	76.8 ± 7.1	88.7 ± 5.4	93.3 ± 4.1	85.3 ± 6.6	79.6 ± 7.4	75.5 ± 7.8
Connecticut	88.6 ± 5.4	98.0 ± 2.5	94.7 ± 3.9	89.8 ± 5.0	97.1 ± 2.6	77.5 ± 8.9	94.1 ± 4.5	96.3 ± 3.3	91.0 ± 4.8	85.9 ± 6.1	83.7 ± 6.1
Delaware	82.7 ± 6.0	94.3 ± 3.6	91.7 ± 4.3	78.7 ± 6.3	89.0 ± 4.7	80.3 ± 5.7	86.5 ± 5.4	91.3 ± 4.4	84.3 ± 5.7	74.3 ± 6.9	73.7 ± 6.6
Dist. of Columbia	89.2 ± 4.9	92.8 ± 4.2	89.6 ± 4.8	84.5 ± 5.4	93.6 ± 3.6	76.3 ± 6.5	89.3 ± 5.0	91.6 ± 4.2	85.5 ± 5.6	80.0 ± 6.0	72.5 ± 6.9
Florida	83.7 ± 5.8	92.3 ± 4.2	91.0 ± 4.5	78.5 ± 6.8	90.4 ± 4.8	66.5 ± 7.3	79.8 ± 6.6	91.6 ± 4.4	76.3 ± 6.9	69.4 ± 7.4	70.1 ± 7.3
Georgia	83.7 ± 5.7	95.3 ± 2.7	93.2 ± 3.7	84.3 ± 5.4	96.3 ± 2.2	78.6 ± 6.0	93.2 ± 3.9	93.0 ± 3.8	85.5 ± 5.4	78.3 ± 6.3	76.7 ± 6.4
Hawaii	82.2 ± 5.9	89.8 ± 4.6	88.5 ± 5.1	79.0 ± 6.4	88.3 ± 4.9	77.7 ± 6.3	85.8 ± 5.5	85.6 ± 5.6	79.9 ± 6.3	67.6 ± 7.2	71.0 ± 7.0
Idaho	82.4 ± 6.5	91.9 ± 4.8	93.4 ± 4.1	78.6 ± 7.1	91.8 ± 4.6	75.5 ± 7.5	91.8 ± 4.5	93.5 ± 4.0	83.0 ± 6.6	75.9 ± 7.6	70.5 ± 7.8
Illinois	86.9 ± 3.8	95.0 ± 2.8	93.5 ± 2.8	84.9 ± 4.1	94.0 ± 2.8	72.3 ± 5.0	90.9 ± 3.3	94.7 ± 2.5	88.3 ± 3.9	75.4 ± 5.2	76.0 ± 4.9
IL-City of Chicago	90.3 ± 5.2	99.3 ± 1.1	97.5 ± 2.2	88.7 ± 5.5	97.8 ± 1.9	82.3 ± 8.3	96.8 ± 2.5	96.2 ± 2.8	90.1 ± 4.9	76.8 ± 9.4	81.1 ± 6.8
IL-Rest of State	85.8 ± 4.7	93.7 ± 3.6	92.2 ± 3.7	83.7 ± 5.1	92.7 ± 3.6	69.0 ± 6.1	89.0 ± 4.2	94.3 ± 3.2	87.7 ± 4.9	74.9 ± 6.2	74.3 ± 6.0
Indiana	75.3 ± 6.8	92.7 ± 3.8	86.5 ± 5.5	73.5 ± 7.1	90.5 ± 4.5	79.0 ± 6.0	85.6 ± 5.5	84.3 ± 6.0	76.3 ± 6.8	68.3 ± 7.1	63.8 ± 7.4
Iowa	84.8 ± 6.4	94.1 ± 3.8	90.7 ± 4.9	84.4 ± 6.1	95.9 ± 2.9	83.9 ± 5.8	85.5 ± 6.0	89.2 ± 5.2	88.3 ± 5.7	77.7 ± 7.3	74.4 ± 7.3
Kansas	80.8 ± 6.9	92.2 ± 4.8	88.9 ± 5.2	80.0 ± 7.3	93.3 ± 4.0	71.2 ± 8.3	89.2 ± 5.2	89.8 ± 4.8	83.2 ± 6.9	75.4 ± 7.6	74.7 ± 7.7
Kentucky	86.8 ± 6.9	97.4 ± 3.0	93.8 ± 3.8	88.2 ± 6.5	93.7 ± 4.9	84.1 ± 6.7	87.7 ± 6.7	94.3 ± 4.0	89.3 ± 5.9	77.7 ± 8.4	80.6 ± 7.6
Louisiana	80.0 ± 7.6	91.5 ± 4.9	92.1 ± 4.7	82.3 ± 6.9	92.2 ± 4.6	79.1 ± 7.3	91.5 ± 3.7	93.7 ± 3.9	79.4 ± 7.5	77.3 ± 7.3	72.1 ± 8.3
Maine	87.1 ± 5.4	92.6 ± 4.4	93.3 ± 3.9	81.7 ± 6.1	90.9 ± 4.4	73.9 ± 6.5	88.1 ± 4.8	92.6 ± 4.1	84.1 ± 5.9	78.5 ± 6.0	75.6 ± 6.5
Maryland	84.0 ± 5.7	95.0 ± 3.7	92.8 ± 4.2	84.2 ± 5.4	92.3 ± 4.1	77.6 ± 5.9	86.7 ± 5.3	92.7 ± 4.1	84.9 ± 5.4	78.8 ± 6.3	74.0 ± 6.7
Massachusetts	88.1 ± 5.1	97.0 ± 3.3	95.4 ± 3.8	89.9 ± 4.9	95.9 ± 3.5	77.0 ± 7.4	93.8 ± 4.1	94.8 ± 3.9	92.2 ± 4.5	85.5 ± 6.3	81.8 ± 6.1
Michigan	83.9 ± 5.8	92.7 ± 3.7	91.9 ± 3.7	84.0 ± 5.4	90.7 ± 4.6	73.7 ± 6.6	88.8 ± 4.8	91.9 ± 3.8	83.3 ± 5.5	76.9 ± 6.3	70.5 ± 6.8
Minnesota	83.0 ± 8.0	91.5 ± 5.2	91.9 ± 5.6	81.9 ± 7.2	88.8 ± 6.3	64.8 ± 9.8	90.6 ± 5.6	89.1 ± 6.2	85.1 ± 6.7	80.3 ± 7.8	67.0 ± 9.4
Mississippi	77.3 ± 6.6	91.7 ± 3.4	90.3 ± 3.9	78.0 ± 6.3	92.2 ± 3.5	77.8 ± 5.9	75.8 ± 5.9	90.0 ± 4.0	76.8 ± 6.7	65.2 ± 7.0	70.6 ± 6.9
Missouri	77.0 ± 7.0	90.7 ± 4.3	87.9 ± 5.1	74.5 ± 7.1	89.5 ± 4.7	83.6 ± 5.2	80.7 ± 6.4	89.0 ± 4.9	78.5 ± 6.8	70.9 ± 7.1	66.9 ± 7.4
Montana	76.3 ± 6.0	92.7 ± 3.5	88.5 ± 4.6	74.8 ± 6.2	92.5 ± 3.5	73.4 ± 6.1	77.6 ± 6.0	87.2 ± 4.5	78.1 ± 5.9	68.9 ± 6.6	61.6 ± 6.9
Nebraska	88.5 ± 5.2	92.9 ± 4.5	92.1 ± 4.8	86.2 ± 5.9	92.1 ± 5.0	84.9 ± 5.9	87.0 ± 5.9	91.6 ± 4.9	84.6 ± 6.2	81.3 ± 6.3	77.8 ± 6.8
Nevada	76.2 ± 6.2	87.0 ± 4.9	87.0 ± 4.9	71.5 ± 6.6	86.9 ± 4.8	75.8 ± 6.2	84.4 ± 5.4	86.3 ± 5.0	72.6 ± 6.5	70.9 ± 6.5	64.0 ± 6.9
New Hampshire	91.9 ± 4.1	96.3 ± 2.9	93.6 ± 3.5	88.4 ± 4.8	95.3 ± 3.2	77.4 ± 6.3	87.4 ± 5.0	90.4 ± 4.2	88.0 ± 4.8	81.2 ± 6.1	80.6 ± 5.9
New Jersey	85.2 ± 5.5	96.3 ± 2.2	94.9 ± 2.7	82.2 ± 5.7	94.0 ± 3.1	67.2 ± 6.9	86.3 ± 4.9	92.5 ± 3.5	83.8 ± 5.4	71.5 ± 6.8	70.1 ± 6.8
New Mexico	85.1 ± 5.0	94.9 ± 3.0	93.7 ± 3.1	85.9 ± 4.8	94.5 ± 3.0	67.1 ± 6.6	91.9 ± 3.6	94.4 ± 2.9	84.8 ± 4.9	77.9 ± 6.7	76.7 ± 5.7
New York	82.4 ± 4.6	93.9 ± 2.6	92.0 ± 2.9	83.4 ± 4.3	91.4 ± 3.1	69.1 ± 5.4	82.5 ± 4.5	90.6 ± 3.2	84.8 ± 3.8	74.4 ± 5.2	68.8 ± 5.4
NY-City of New York	84.7 ± 5.6	94.7 ± 3.0	92.4 ± 3.9	85.7 ± 5.0	90.5 ± 4.6	67.0 ± 7.1	81.5 ± 6.0	90.3 ± 4.6	81.1 ± 5.8	72.3 ± 6.7	71.8 ± 6.8
NY-Rest of State	80.2 ± 7.4	93.0 ± 4.2	91.7 ± 4.5	81.1 ± 6.9	92.4 ± 4.3	71.2 ± 8.1	83.6 ± 6.6	90.9 ± 4.5	88.5 ± 4.9	76.5 ± 7.8	65.7 ± 8.4

	≥4 DTaP[§]	≥3 Polio[¶]	≥1 MMR**	Hib-FS[††]	≥3 HepB[¶¶]	HepB Birth Dose	≥1 HepA	≥1 Var***	≥4 PCV[†††]	Rotavirus	4:3:1:3*:3:1:4[§§§]
North Carolina	84.4 ± 5.7	95.1 ± 3.9	93.4 ± 4.3	87.0 ± 5.2	94.6 ± 4.2	74.8 ± 6.6	85.2 ± 5.5	92.5 ± 4.6	87.1 ± 5.3	79.2 ± 6.2	78.0 ± 6.2
North Dakota	87.3 ± 4.8	95.1 ± 2.9	93.5 ± 3.4	85.8 ± 5.1	94.7 ± 3.1	88.4 ± 4.2	90.2 ± 4.1	92.5 ± 3.6	88.9 ± 4.6	79.2 ± 6.0	81.8 ± 5.5
Ohio	88.0 ± 4.4	95.0 ± 2.9	93.8 ± 3.3	83.3 ± 5.4	94.6 ± 3.2	78.5 ± 6.1	89.7 ± 4.6	91.8 ± 3.8	85.7 ± 5.1	76.0 ± 6.2	74.7 ± 6.3
Oklahoma	84.2 ± 4.4	93.4 ± 2.7	92.2 ± 3.0	81.6 ± 4.6	90.8 ± 3.2	76.9 ± 5.5	90.7 ± 4.1	91.4 ± 3.3	81.6 ± 4.9	71.3 ± 5.6	68.7 ± 5.8
Oregon	79.8 ± 7.9	94.8 ± 4.1	94.5 ± 3.7	80.4 ± 7.5	89.7 ± 5.7	76.4 ± 7.8	93.2 ± 4.7	93.1 ± 4.2	83.9 ± 6.6	72.6 ± 8.7	65.5 ± 9.1
Pennsylvania	86.1 ± 5.6	95.4 ± 3.1	94.9 ± 3.2	84.8 ± 5.4	94.2 ± 3.2	86.8 ± 4.4	93.7 ± 3.6	94.9 ± 3.2	87.5 ± 5.2	76.2 ± 6.7	79.6 ± 6.1
PA-Philadelphia County	92.2 ± 3.8	96.5 ± 2.5	94.2 ± 2.9	87.5 ± 4.6	95.9 ± 2.3	84.2 ± 5.7	93.8 ± 3.0	94.8 ± 2.8	89.1 ± 4.3	75.3 ± 6.9	81.7 ± 5.4
PA-Rest of State	85.0 ± 6.6	95.2 ± 3.7	95.1 ± 3.8	84.3 ± 6.4	93.9 ± 3.8	87.2 ± 5.1	93.7 ± 4.2	95.0 ± 3.8	87.3 ± 6.1	76.4 ± 7.8	79.2 ± 7.2
Rhode Island	87.8 ± 4.7	97.9 ± 1.6	97.1 ± 2.0	87.3 ± 4.8	97.7 ± 2.0	79.6 ± 5.5	97.0 ± 2.0	95.7 ± 2.7	91.9 ± 3.7	90.8 ± 3.9	75.1 ± 6.2
South Carolina	88.4 ± 4.3	95.5 ± 2.8	91.1 ± 4.1	84.2 ± 5.6	95.6 ± 2.7	72.9 ± 7.0	90.6 ± 4.1	91.6 ± 3.8	87.8 ± 4.7	83.1 ± 5.8	75.2 ± 6.6
South Dakota	77.1 ± 7.0	89.4 ± 5.3	90.1 ± 5.0	78.6 ± 6.8	90.1 ± 5.0	80.8 ± 5.9	88.8 ± 5.1	88.4 ± 5.2	80.1 ± 6.7	71.3 ± 7.5	69.1 ± 7.7
Tennessee	82.9 ± 6.2	93.0 ± 4.0	91.0 ± 4.6	77.2 ± 7.1	91.2 ± 5.0	70.0 ± 7.6	87.2 ± 5.5	91.7 ± 4.3	78.7 ± 7.1	72.9 ± 7.6	70.8 ± 7.7
Texas	83.0 ± 2.8	91.9 ± 2.1	90.8 ± 2.2	80.2 ± 3.0	90.3 ± 2.3	81.4 ± 2.9	89.9 ± 2.3	91.2 ± 2.2	82.6 ± 2.9	75.4 ± 3.2	72.3 ± 3.3
TX-Bexar County	85.2 ± 4.9	95.0 ± 3.0	94.2 ± 3.7	85.2 ± 5.2	94.0 ± 3.5	74.8 ± 6.2	94.2 ± 3.3	94.2 ± 3.6	83.4 ± 5.6	73.2 ± 6.9	75.2 ± 6.3
TX-City of Houston	85.5 ± 6.4	96.5 ± 3.0	94.5 ± 4.4	82.3 ± 7.5	94.3 ± 3.9	81.5 ± 7.7	92.2 ± 5.3	95.8 ± 3.8	84.5 ± 6.8	78.8 ± 7.2	76.3 ± 7.9
TX-Hidalgo County	81.1 ± 5.8	94.7 ± 3.5	89.2 ± 4.3	84.7 ± 5.2	93.6 ± 3.6	93.2 ± 3.7	92.4 ± 3.6	93.0 ± 3.7	86.5 ± 5.0	72.5 ± 6.9	74.1 ± 6.4
TX-Tarrant County	79.3 ± 6.4	91.1 ± 4.5	92.9 ± 3.7	76.5 ± 6.8	90.1 ± 4.4	80.8 ± 6.5	91.1 ± 4.2	91.4 ± 4.1	80.3 ± 6.3	72.3 ± 7.5	69.9 ± 7.2
TX-Rest of State	82.8 ± 3.8	90.6 ± 2.9	89.6 ± 3.1	79.3 ± 4.1	89.0 ± 3.2	81.5 ± 3.8	88.8 ± 3.1	89.9 ± 3.0	82.1 ± 3.9	75.4 ± 4.3	71.4 ± 4.5
Utah	84.7 ± 5.2	94.6 ± 2.8	91.7 ± 3.6	81.6 ± 5.4	93.0 ± 3.1	83.9 ± 4.9	89.7 ± 4.5	91.1 ± 3.7	85.5 ± 4.8	79.4 ± 5.3	74.2 ± 6.1
Vermont	86.6 ± 5.4	93.1 ± 3.4	92.0 ± 4.1	87.4 ± 5.2	93.2 ± 3.4	62.6 ± 7.7	87.4 ± 5.1	90.9 ± 4.2	87.7 ± 5.2	78.5 ± 6.7	78.5 ± 6.3
Virginia	89.8 ± 5.7	94.8 ± 4.4	93.7 ± 4.3	86.8 ± 6.4	94.8 ± 3.8	76.3 ± 7.2	89.9 ± 5.5	94.9 ± 3.9	92.4 ± 5.0	79.8 ± 7.2	77.8 ± 7.7
Washington	79.1 ± 7.4	87.5 ± 6.6	92.3 ± 3.9	73.9 ± 7.9	84.0 ± 7.3	73.2 ± 8.1	82.1 ± 7.3	88.8 ± 5.7	75.1 ± 8.1	69.8 ± 8.5	64.6 ± 8.6
West Virginia	82.8 ± 4.9	94.4 ± 2.8	89.8 ± 4.0	82.5 ± 5.0	93.1 ± 3.4	75.6 ± 5.6	86.4 ± 4.5	90.1 ± 4.0	82.8 ± 5.0	73.0 ± 5.8	72.4 ± 5.8
Wisconsin	90.1 ± 3.6	96.4 ± 2.2	96.5 ± 2.0	85.1 ± 4.9	95.5 ± 2.5	82.2 ± 4.9	92.7 ± 3.4	94.1 ± 2.7	86.7 ± 4.5	77.0 ± 5.9	78.7 ± 5.4
Wyoming	76.0 ± 6.4	91.1 ± 4.2	88.1 ± 4.9	78.4 ± 6.1	90.9 ± 4.2	60.9 ± 7.2	77.1 ± 6.0	88.0 ± 4.7	77.8 ± 6.2	73.5 ± 6.7	68.2 ± 6.9

[*] Estimates presented as point estimate (%) ± 95% Confidence Interval half width. Estimate=NA (Not Available) if the unweighted sample size for the denominator was < 30, or (CI half width)/Estimate > 0.588, or (CI half width) >10.

[†] Children in the Q1/2018-Q4/2018 National Immunization Survey - Child were born from January 2015 through May 2017.

[§] 4 or more doses of diphtheria and tetanus toxoids and acellular pertussis vaccine adsorbed, diphtheria and tetanus toxoids and pertussis vaccine, or diphtheria and tetanus toxoids vaccine adsorbed (DTaP/DTP/DT).

[¶] 3 or more doses of any poliovirus vaccine.

** 1 or more doses of measles-mumps-rubella vaccine

[††] 4 or more doses of Haemophilus influenzae type b (Hib) vaccine of any type or 2 doses of Hib of Merck types followed by 1+ dose of Hib of any type.

[¶¶] 3 or more doses of hepatitis B vaccine.

*** 1 or more doses of varicella at or after child's first birthday, unadjusted for history of varicella illness.

[†††] 4 or more doses of pneumococcal conjugate vaccine (PCV).

[§§§] 4+ diphtheria and tetanus toxoids and acellular pertussis vaccine adsorbed, diphtheria and tetanus toxoids and pertussis vaccine, or diphtheria and tetanus toxoids vaccine adsorbed (DTaP/DTP/DT); 3+ poliovirus vaccine; 1+ measles-containing vaccine (MCV); full series Haemophilus influenzae type b conjugate vaccine (Hib), i.e., 3 or 4 doses depending on type of vaccine received; 3+ hepatitis B vaccine (Hep B); 1+ varicella at or after 12 months of age; and 4+ pneumococcal conjugate vaccine (PCV).

[¶¶¶] U.S. national estimates exclude U.S. territories.

Appendix G: Trends in NIS-Child Response Rates and Vaccination Coverage Rates, 1995-2018

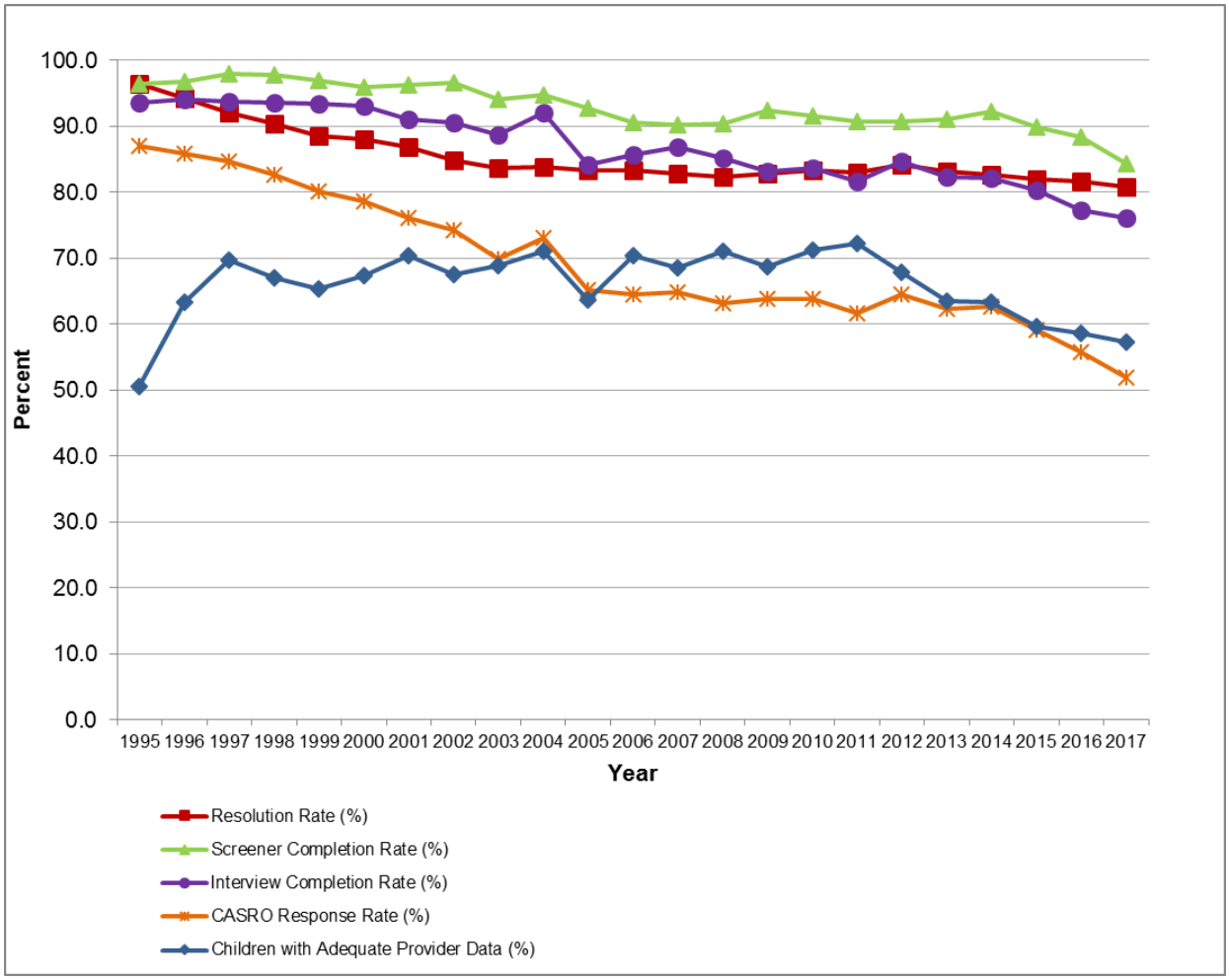
Table G.1: Key Indicators* from Landline Sample Household and Provider Data Collection by Survey Year, National Immunization Survey - Child, 1995-2017†

Survey Year	Resolution Rate (%)	Screener Completion Rate (%)	Interview Completion Rate (%)	CASRO Response Rate (%)	Children with Adequate Provider Data (%)
1995	96.5	96.4	93.5	87.1	50.6
1996	94.3	96.8	94.0	85.8	63.4
1997	92.1	97.9	93.8	84.6	69.7
1998	90.4	97.8	93.6	82.7	67.1
1999	88.6	97.0	93.4	80.2	65.4
2000	88.1	96.0	93.1	78.7	67.4
2001	86.8	96.2	91.1	76.1	70.4
2002	84.8	96.6	90.6	74.2	67.6
2003	83.6	94.0	88.7	69.8	68.9
2004	83.8	94.8	92.0	73.1	71.0
2005	83.3	92.8	84.2	65.1	63.6
2006	83.3	90.5	85.6	64.5	70.4
2007	82.9	90.2	86.8	64.9	68.6
2008	82.3	90.3	85.1	63.2	71.0
2009	82.9	92.4	83.2	63.8	68.7
2010	83.3	91.5	83.6	63.8	71.2
2011	83.0	90.7	81.7	61.6	72.3
2012	84.1	90.7	84.6	64.5	67.9
2013	83.2	91.0	82.3	62.3	63.5
2014	82.7	92.2	82.1	62.6	63.3
2015	81.9	89.9	80.3	59.1	59.7
2016	81.6	88.4	77.2	55.7	58.6
2017	80.8	84.4	76.1	51.9	57.2

* For the definition of the key indicators see Table 1 of NIS-Child Data User's Guide for the survey year of interest.

† Excludes U.S. territories.

Figure G.1: Trends in Landline Sample Key Indicators from Household and Provider Data Collection by Survey Year, National Immunization Survey - Child, 1995-2017*



* Excludes U.S. territories.

Figure G.1 provides a graphical representation of the data contained in Table G.1. It shows how selected landline sample key indicators from the household and provider data collection performed throughout the years, from 1995 to present. We observe that the trend in the data collection rates is downward, with the exception of the percentage of children with adequate provider data, which had been essentially flat from 1997-2012, but also trending downward since 2013. Note that this chart reflects the landline sample only.

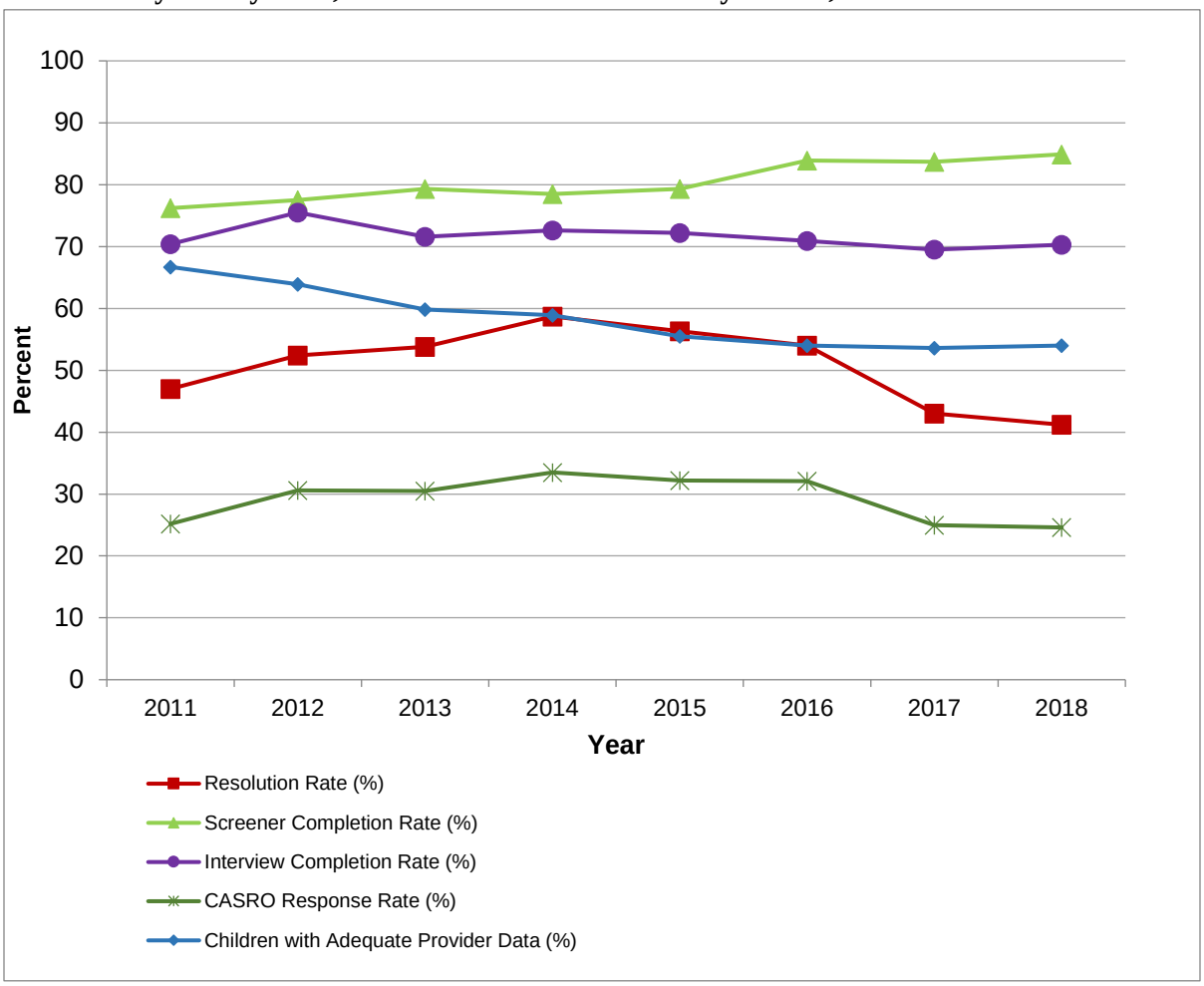
Table G.2: Key Indicators* from Cell-Phone Sample Household and Provider Data Collection by Survey Year, National Immunization Survey - Child, 2011-2018†

Survey Year	Resolution Rate (%)	Screener Completion Rate (%)	Interview Completion Rate (%)	CASRO Response Rate (%)	Children with Adequate Provider Data (%)
2011	47.0	76.2	70.4	25.2	66.7
2012	52.4	77.5	75.5	30.6	63.9
2013	53.8	79.3	71.6	30.5	59.8
2014	58.7	78.5	72.6	33.5	58.9
2015	56.3	79.3	72.2	32.2	55.5
2016	54.0	83.9	70.9	32.1	54.0
2017	43.0	83.7	69.5	25.0	53.6
2018	41.2	84.9	70.3	24.6	54.0

*For the definition of the key indicators see Table 1 of NIS-Child Data User's Guide for the survey year of interest.

† Excludes U.S. territories.

Figure G.2: Trends in Cell-Phone Sample Key Indicators from Household and Provider Data Collection by Survey Year, National Immunization Survey - Child, 2011-2018*



* Excludes U.S. territories.

Figure G.2 provides a graphical representation of the data contained in Table G.2. It shows how selected cell-phone sample key indicators from the household and provider data collection performed from 2011 to present. We observe that the rates since the inception of the cell-phone sample have been essentially flat, aside from a declining percentage of children with adequate provider data, a moderate increase in the resolution rate in 2014 that is likely due to the introduction of a process for removing and classifying as non-working cell-phone numbers flagged as having no recent activity, and a decline in the resolution rate in 2017 when this process was discontinued.

The response rate is the number of households with a completed household interview divided by the estimated number of eligible households in the sample. Within each sample type (landline or cell phone), the number of eligible households was estimated using the CASRO assumptions; these assumptions are that the rate of households among the unresolved telephone numbers is the same as the observed rate of households among the resolved telephone numbers, and the rate of eligible households among unscreened households is the same as the observed rate of eligible households among screened households. Under these assumptions, within each sample type the CASRO response rate is equal to the product of the resolution rate, the screener completion rate, and the interview completion rate. For the combined samples, we have defined the CASRO response rate as the total number of households with a completed interview divided by the estimated total number of eligible households across both sample types, where the estimated total number of eligible households is equal to the sum of the estimated number of eligible households in the landline sample (using CASRO assumptions) and the estimated number of eligible households in the cell-phone sample (using CASRO assumptions). Table G.3 presents the CASRO response rate calculated in this way for the combined landline and cell-phone samples, by survey year, and Figure G.3 presents a graphical representation. Because the CASRO response rate is lower for the cell-phone sample than for the landline sample, the CASRO response rate for the combined landline and cell-phone samples was lower in years with a larger cell-phone sample and higher in years with a smaller cell-phone sample.

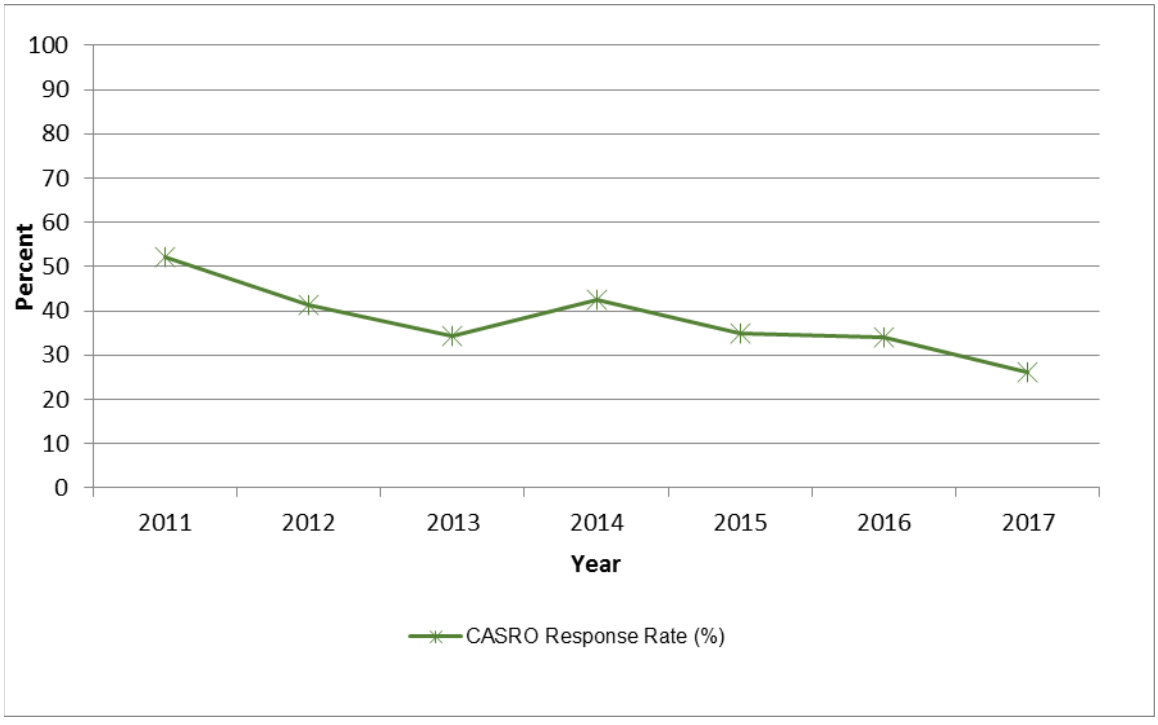
Table G.3: CASRO Response Rate for the Combined Landline and Cell-Phone Samples by Survey Year, National Immunization Survey - Child, 2011-2017*

Survey Year†	CASRO Response Rate (%)
2011	52.2
2012	41.2
2013	34.4
2014	42.5
2015	34.9
2016	33.9
2017	26.1

* Excludes U.S. territories.

† Cell-phone sample was added to the NIS-Child in 2011. The NIS-Child transitioned from a dual-frame landline and cell-phone RDD sample design to a single-frame cell phone RDD sample design beginning in 2018.

Figure G.3: Trend in CASRO Response Rate for the Combined Landline and Cell-Phone Samples by Survey Year, National Immunization Survey - Child, 2011-2017*



* Excludes U.S. territories.

Table G.4: Vaccine-Specific Coverage Levels Among Children Age 19-35 Months in the United States by Survey Year, National Immunization Survey - Child, 1995-2018*

Survey Year[†]	4+ DTaP	3+ Polio	1+ MMR	3+ Hib[§]	3+ Hep B	1+ Varicella[¶]	4+ PCV	4:3:1**	4:3:1:3[††]
1995	78.4	87.8	89.8	91.2	67.9	N.A.	N.A.	76.0	73.7
1996	81.1	91.0	90.6	91.4	81.8	12.0	N.A.	78.4	76.4
1997	81.5	90.7	90.4	92.5	83.6	25.8	N.A.	77.9	76.2
1998	83.9	90.8	92.0	93.4	87.0	43.2	N.A.	80.6	79.2
1999	83.3	89.6	91.5	93.5	88.1	57.5	N.A.	79.9	78.4
2000	81.7	89.5	90.5	93.4	90.3	67.8	N.A.	77.6	76.2
2001	82.1	89.4	91.4	93.0	88.9	76.3	N.A.	78.6	77.2
2002	81.6	90.2	91.6	93.1	89.9	80.6	N.A.	78.5	77.5
2003	84.8	91.6	93.0	93.9	92.4	84.8	N.A.	82.2	81.3
2004	85.5	91.6	93.0	93.5	92.4	87.5	N.A.	83.5	82.5
2005	85.7	91.7	91.5	93.9	92.9	87.9	53.7	83.1	82.4
2006	85.2	92.8	92.3	93.4	93.3	89.2	68.4	83.1	82.2
2007	84.5	92.6	93.2	92.6	92.7	90.0	75.3	82.8	80.1
2008	84.6	93.6	92.1	90.9	93.5	90.7	80.1	82.5	79.6
2009	83.9	92.8	90.0	83.6	92.4	89.6	80.4	81.5	73.4
2010	84.4	93.3	91.5	90.4	91.8	90.4	83.3	82.0	78.8
2011	84.6	93.9	91.6	94.0	91.1	90.8	84.4	82.6	81.9
2012[§§]	82.5	92.8	90.8	93.0	89.7	90.2	81.9	80.5	80.0
2013	83.1	92.7	91.9	92.8	90.8	91.2	82.0	81.5	81.1
2014	84.2	93.3	91.5	92.6	91.6	91.0	82.9	82.6	82.0
2015	84.6	93.7	91.9	93.2	92.6	91.8	84.1	83.2	82.6
2016	83.4	91.9	91.1	91.6	90.5	90.6	81.8	81.9	81.2
2017	83.2	92.7	91.5	91.8	91.4	91.0	82.4	81.7	80.9
2018	83.8	93.6	92.1	91.6	92.1	92.0	83.3	82.5	81.7

* Excludes U.S. territories.

[†] Prior to 2011, estimates are single-frame, landline-sample estimates. From 2011-2017, estimates are dual-frame (landline plus cell-phone) estimates. From 2018 onward, estimates are single-frame, cell-phone estimates.

[§] Beginning in 2009, the number of doses required to be up-to-date on Hib depends on the manufacturer of the vaccine. However, the figures shown here refer to 3 or more doses of Hib vaccine regardless of manufacturer.

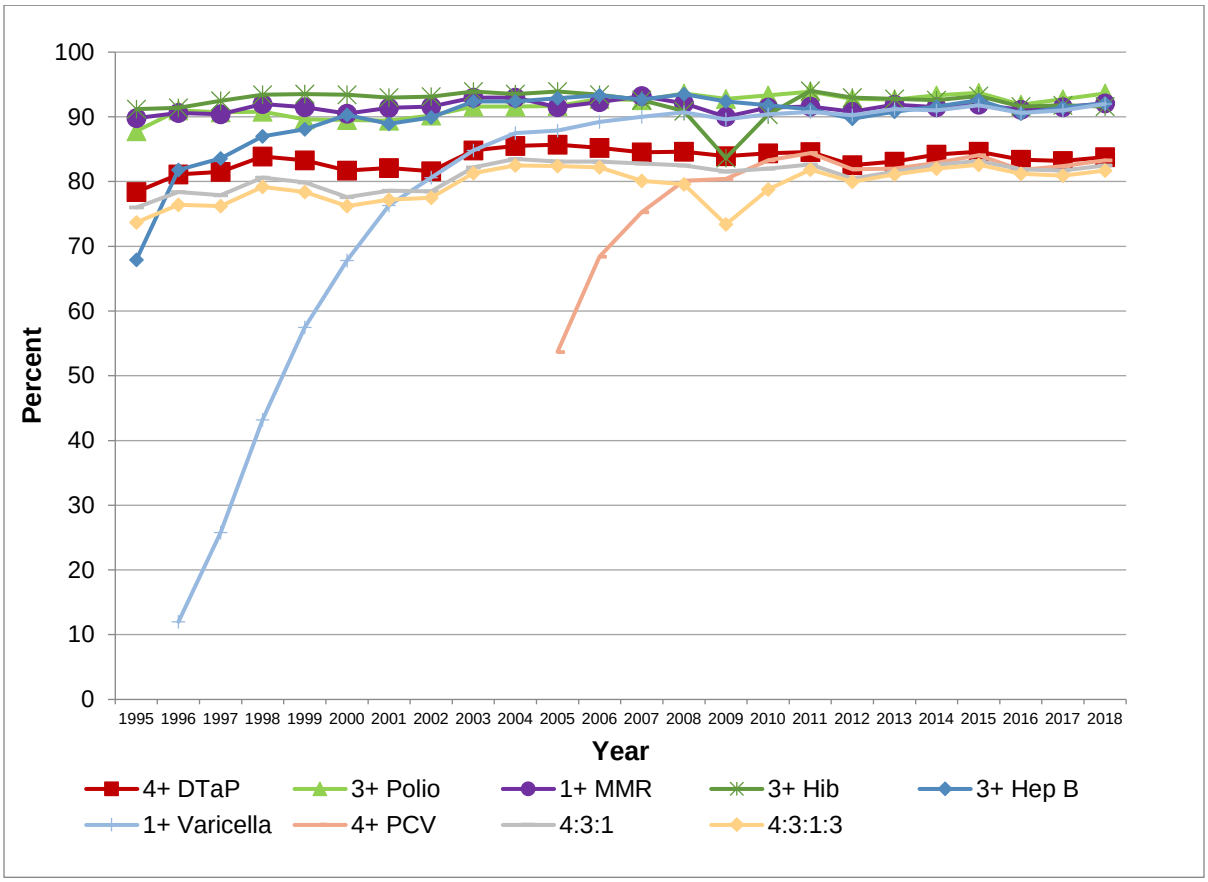
[¶] Varicella was added to the NIS-Child in 1996.

** Four or more doses of DTaP, three or more doses of poliovirus vaccine, and one or more doses of MCV.

[††] Four or more doses of DTaP, three or more does of poliovirus vaccine, one or more doses of MCV, and three or more doses of Hib.

[§§] Revised definition of adequate provider data (APD) implemented.

Figure G.4: Trends in Vaccine-Specific Coverage Levels among Children 19-35 Months of Age in the United States by Survey Year, National Immunization Survey - Child, 1995-2018*†¶



* Excludes U.S. territories.

† Prior to 2011, estimates are single-frame, landline-sample estimates. From 2011-2017, estimates are dual-frame (landline plus cell-phone) estimates. From 2018 onward, estimates are single-frame, cell-phone estimates.

¶ Revised definition of adequate provider data (APD) implemented in 2012.

Figure G.4 provides a graphical representation of the data contained in Table G.4. It displays the trend in vaccine-specific coverage levels among children aged 19 through 35 months from 1995 to present. We observe that the trend in the vaccination coverage levels is stable or slightly upward for the longer-established vaccines, while the early trends for new vaccines are strongly upward. Note that this chart reflects the landline sample prior to 2011, the dual-frame sample in 2011-2017, and the single-frame cell-phone sample thereafter. For more information on interpreting trends in vaccination coverage, see online reports at https://www.cdc.gov/vaccines/imz-managers/coverage/childvaxview/pubs-presentations/NIS-vax-trends-2012-2016.html.

Appendix H: Vaccine Type Codes

Table H.1: 2018 NIS-Child Vaccine Type Codes

Vaccine Code	Description
03	DTaP/DTP/DT-containing, unknown type
04	DTaP/DTP/DT
07	DTaP-Hib
08	DTaP-HepB-IPV
20	OPV
21	IPV
22	Polio-containing, unknown type
30	Measles-mumps-rubella
31	Measles only
32	Measles-mumps
33	Measles-rubella
43	HepB-Hib
44	Hib-only, unknown type
60	HepB-only
70	Pneumococcal conjugate, unknown type
71	Pneumococcal polysaccharide
72	Pneumococcal-containing, unknown type
73	Pneumococcal conjugate-7
74	Pneumococcal conjugate-13
D3	DTaP-IPV-Hib
FL	Seasonal influenza, unknown type
FM	Seasonal influenza spray
FN	Injected seasonal influenza
HB	HepB-containing, unknown type
HG	Hib-only (GSK)
HI	Hib-containing, unknown type
HM	Hib-only (Merck)
HS	Hib-only (Sanofi)
HY	Hib-MenCY
MM	Measles-containing, unknown type
RG	Rotarix (GSK)
RM	Rotateq (Merck)
RO	Rotavirus-containing, unknown type
VA	Varicella-containing, unknown type
VM	MMR-varicella
VO	Varicella-only

Appendix I: Key NIS-Child Response Rates by Area

Table I.1: Key Indicators* for the Cell-Phone Sample by Estimation Area, National Immunization Survey - Child, 2018

Area	Resolution Rate (%)	Screener Completion Rate (%)	Interview Completion Rate (%)	CASRO Response Rate (%)	Children with Adequate Provider Data (%)
U.S. National†	41.2	84.9	70.3	24.6	54.0
Alabama	47.7	86.9	65.7	27.2	53.5
Alaska	61.2	86.6	78.1	41.4	57.6
Arizona	36.3	88.2	70.3	22.5	52.3
Arkansas	52.2	87.4	69.6	31.7	54.0
California	37.9	87.0	64.5	21.3	47.3
Colorado	33.2	89.4	73.8	21.9	54.9
Connecticut	30.7	85.7	72.9	19.2	52.0
Delaware	35.4	77.3	67.2	18.4	51.4
District of Columbia	34.0	78.6	73.6	19.7	53.0
Florida	37.2	88.9	63.0	20.8	50.9
Georgia	40.2	87.9	67.6	23.9	51.3
Hawaii	35.9	80.3	67.2	19.3	51.3
Idaho	35.7	88.2	76.4	24.1	55.6
Illinois	47.3	87.7	71.2	29.5	51.3
IL-City of Chicago	52.0	85.7	69.2	30.8	54.1
IL-Rest of State	45.4	88.6	72.3	29.1	50.0
Indiana	39.9	89.9	72.6	26.0	54.0
Iowa	48.3	90.4	76.4	33.4	59.8
Kansas	36.9	89.0	72.1	23.7	60.7
Kentucky	47.6	87.8	69.6	29.1	51.0
Louisiana	50.1	87.1	68.0	29.7	51.4
Maine	38.3	82.3	73.6	23.2	56.7
Maryland	31.2	88.5	73.2	20.2	50.8
Massachusetts	35.9	87.6	69.2	21.8	60.5
Michigan	40.5	90.0	73.3	26.7	58.9
Minnesota	36.3	89.5	73.3	23.8	54.7
Mississippi	45.2	84.1	61.5	23.4	45.2
Missouri	39.1	89.3	75.1	26.3	55.2
Montana	45.4	86.9	77.4	30.5	58.7
Nebraska	52.7	87.5	75.8	34.9	58.5
Nevada	39.0	85.6	69.3	23.2	52.1
New Hampshire	37.5	79.3	72.5	21.6	51.5

Area	Resolution Rate (%)	Screener Completion Rate (%)	Interview Completion Rate (%)	CASRO Response Rate (%)	Children with Adequate Provider Data (%)
New Jersey	35.1	86.6	65.9	20.0	47.9
New Mexico	44.1	87.1	71.0	27.3	58.3
New York	36.1	85.7	63.4	19.6	50.7
NY-City of New York	36.0	84.8	62.2	19.0	50.5
NY-Rest of State	36.1	88.2	66.9	21.3	50.8
North Carolina	37.0	88.4	68.1	22.3	54.3
North Dakota	50.4	83.2	77.3	32.4	56.8
Ohio	37.0	89.5	71.3	23.7	52.2
Oklahoma	50.9	88.2	73.6	33.1	54.7
Oregon	33.4	90.5	77.1	23.3	60.2
Pennsylvania	33.9	83.4	68.0	19.3	54.2
PA-Philadelphia County	34.0	82.8	67.4	19.0	53.0
PA-Rest of State	33.5	90.2	74.4	22.5	55.1
Rhode Island	38.2	75.4	67.3	19.4	59.3
South Carolina	41.1	87.3	66.1	23.7	51.0
South Dakota	46.2	84.2	75.9	29.6	51.4
Tennessee	40.3	88.8	68.2	24.4	59.8
Texas	42.9	86.5	67.1	24.9	54.0
TX-Bexar County	44.1	85.7	70.4	26.6	55.1
TX-City of Houston	37.7	86.7	67.6	22.1	45.8
TX-Hidalgo County	49.2	85.7	63.5	26.7	56.5
TX-Tarrant County	35.7	88.1	68.1	21.4	52.1
TX-Rest of State	43.1	86.3	85.1	31.7	55.5
Utah	37.2	88.9	78.5	26.0	61.1
Vermont	39.4	73.4	73.2	21.2	59.2
Virginia	36.0	89.0	69.8	22.4	55.9
Washington	33.2	88.3	76.8	22.5	55.7
West Virginia	43.6	81.7	69.8	24.9	52.6
Wisconsin	41.8	90.0	74.8	28.1	60.8
Wyoming	66.4	77.6	78.6	40.5	56.4

* For the definition of the key indicators see Table 1 of NIS-Child Data User's Guide.

† Excludes U.S. territories.