National Health Interview Survey/ National Immunization Provider Record Check Study

User=s Guide for the 1999 Public-Use Data File

Prepared for
U.S. Department of Health and Human Services
Centers for Disease Control and Prevention
National Center for Health Statistics
and
National Immunization Program

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October 2002

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Appendices

Glossary of Commonly Used Terms and Abbreviations

4:3:1	Child has received 4 or more DTP, 3 or more polio, and 1 or more MCV vaccinations.
4:3:1:3	Child has received 4 or more DTP, 3 or more polio, 1 or more MCV, and 3 or more Hib vaccinations.
4:3:1:3:3	Child has received 4 or more DTP, 3 or more polio, 1 or more MCV, 3 or more Hib, and 3 or more hepatitis B vaccinations.
CAPI	Computer-assisted personal interviewing
CDC	Centers for Disease Control and Prevention
DOB	Date of birth
DTaP	Diphtheria, tetanus, acellular pertussis
DTP	Diphtheria, tetanus, pertussis
Hep B	Hepatitis B
Hib	*Haemophilus influenzae* type b
IHQ	Immunization History Questionnaire
IPV	Inactivated poliovirus vaccine
MCV	Measles-containing vaccine
MMR	Measles, mumps, rubella
NCHS	National Center for Health Statistics
NHIS	National Health Interview Survey
NIP	National Immunization Program
NIPRCS	National Immunization Provider Record Check Study
OPV	Oral poliovirus vaccine

Chapter 1.   Introduction

Since 1991, national estimates of vaccination coverage have been available through the National Health Interview Survey - Immunization Supplement (NHIS/IM), sponsored by the National Center for Health Statistics (NCHS) of the Centers for Disease Control and Prevention (CDC) and conducted by the Census Bureau. The NHIS questionnaire includes a core module that collects demographic information on all household members, a module of health questions about one sampled adult, and a module of health questions about one sampled child.[1] At the end of the core interview, the NHIS/IM is administered for the sampled child and all other children in the household between the ages of 12-35 months. The NHIS/IM asks for a vaccination history of the child. Respondents can either report vaccination dates from a written shot record, if one is available for the child, or they can report the total number of doses for each vaccine from memory recall if no shot record is available.

Reliance on household reports of childhood immunizations has two potential inaccuracies that influence the estimation of vaccination coverage (Zell et al. 1996). First, a large proportion (63%) of respondents rely only on memory recall to report their child's immunization history, which is subject to the potential bias inherent in recall data. In 1999, only 37% of respondents used a shot card to report all or some of their child's vaccinations. Second, even when shot records are used, dates of vaccinations may be missing if the respondent did not have the shot record at the time of the immunization or the original shot record has been lost. Thus, the validity of the vaccination coverage estimates produced from the NHIS has been a major concern. Therefore, to determine the accuracy of the household responses in the NHIS, the NCHS and the National Immunization Program (NIP) of the CDC implemented the National Immunization Provider Record Check Study (NHIS/NIPRCS) in 1994. Its purpose is to evaluate the accuracy of household reports of children's immunization histories by comparing the household reports with the reports from the children's immunization providers, and to produce national estimates of vaccination coverage using both the household and provider reports (Ezzati-Rice et al. 1996; Peak and Cadell 1996). The estimates of vaccination coverage from the NHIS/NIPRCS are also used to adjust for non-telephone coverage bias in the National Immunization Survey (NIS), a telephone survey of households with children aged 19-35 months.

The NHIS/NIPRCS produces estimates of coverage for nine vaccines and series of vaccines. Table 1.1 lists these vaccines and the number of doses required to be up-to-date for each vaccine and series.

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[1] For details on the NHIS sample design and data collection procedures, see the documentation on the NHIS Web site: http://www.cdc.gov/nchs/nhis.htm

Table 1.1: Vaccines and Combinations of Vaccines Monitored in the 1999 NHIS/NIPRCS	
DTP	4 or more doses of diphtheria-tetanus-pertussis vaccine
DTP3	3 or more doses of diphtheria-tetanus-pertussis vaccine
Polio	3 or more doses of polio vaccine
MCV	1 or more doses of measles-containing vaccine
Hib	3 or more doses of *Haemophilus influenzae* type b vaccine
Hep B	3 or more doses of hepatitis B vaccine
4:3:1	4 or more doses of DTP, 3 or more doses of polio, and 1 or more doses of measles-containing vaccine
4:3:1:3	4 or more doses of DTP, 3 or more doses of polio, 1 or more doses of measles-containing vaccine, and 3 or more doses of Hib vaccine
4:3:1:3:3	4 or more doses of DTP, 3 or more doses of polio, 1 or more doses of measles-containing vaccine, 3 or more doses of Hib, and 3 or more doses of hepatitis B vaccine

General Information about the 1999 NHIS/NIPRCS

The NHIS/NIPRCS begins with households that completed an NHIS/IM for a child or children aged 12-35 months. As part of completing the Immunization Supplement, the parent or legal guardian is asked to sign a permission form allowing the survey staff to contact the child's medical providers. Only households that signed permission forms are eligible for the NHIS/NIPRCS. The permission form has space for the names and addresses of up to three providers. It also contains identifying information and the signature of the parent or guardian. Permission forms are valid for one year from the date of the interview. The permission forms are sent to the NHIS/NIPRCS contractor for data collection, Abt Associates Inc.

All providers for whom households gave adequate locating information are mailed an Immunization History Questionnaire (IHQ). (See Appendix B for a copy of the 1999 IHQ.) A label on the IHQ gives the child's name, date of birth, and gender, so the provider can locate the child's records. The form includes a grid for the provider to record the date of each vaccination the child has received. The provider is asked to enter all known vaccinations, whether they were given at that practice or elsewhere. In addition to the child's immunization history, the form collects the characteristics of the provider's practice, such as whether the practice is a public or private facility and the types of care provided.

The returned IHQs are reviewed for legibility and consistency, and edited as appropriate before being sent to a vendor for data entry. The data from the IHQ are entered in a database, with 100% double-keying, and the raw data file is returned to the contractor for cleaning and further editing.

The immunization information reported by the households and providers is compared for each child. If discrepancies are discovered, the case is eligible for reconciliation. That process contacts the providers, the household, or both to resolve the inconsistencies between the reports. The household is asked to verify some information and whether any additional providers should be contacted, and the providers are asked about specific vaccination dates or whether another provider could have immunization records for the child. If discrepancies remain in the data after these contacts, either the provider information or a combination of the household and provider information is considered to be the most accurate or the "best values" for immunization information.

The NHIS interviews were conducted between January and December of 1999. Data collection for the 1999 NHIS/NIPRCS began in June 1999 and continued through September 2000. The reconciliation was conducted between May and September of 2001.

The 1999 NHIS/NIPRCS public-use data file includes data for 2,565 children with completed NHIS/IM interviews. The variables included in the data file come from the 1999 NHIS and the 1999 NHIS/NIPRCS IHQ. The NHIS variables were selected from the following NHIS data files: Household, Family, Person, Sample Adult, Sample Child, and Immunization Supplement.

For further information on the NHIS data products, please contact the NCHS Data Dissemination Branch:

    Phone: 301-458-4901
    FAX: 301-458-4035
    E-mail: nhislist@cdc.gov
    Internet: http://www.cdc.gov/nchs/nhis.htm

Chapter 2.   Sample and Data Collection

2.1 Summary of 1999 Sample

The 1999 NHIS/NIPRCS sample contains 2,565 children aged 12-35 months with a completed NHIS/IM. Of these children, 772 (30.1%) were aged 12-18 months at the time of the NHIS interview, and 1,793 (69.9%) were 19-35 months.   IHQs were mailed to the providers for the 1,793 children (69.9%) who had valid permission forms. Providers returned IHQs with vaccination data for 1,394 children in the original data collection, and an additional 33 children in reconciliation, for a total of 1,427 (79.6%) of the children. In total, 1,427 (55.6%) of the children with a completed NHIS/IM had provider data.   (See Figure 2.1.)

Of the 2,565 children, best values for vaccination dates could be determined for 1,533 (59.8%). The number of children with best values for vaccination dates is greater than the number of children with provider vaccination data.   Some children without provider vaccination data have best vaccination values because they are 4:3:1:3 up-to-date from a household shot card.   For the children without best values, up-to-date status was imputed. (The imputation procedures are described in Section 3.6.) Table 2.1 shows the results of the provider data collection and best value construction for the two age groups. See Appendices F and G for tables summarizing the distribution of the sample by various demographic characteristics.

Table 2.1 Distribution of Children with Provider and Best Value Data by Age Group, 1999 NHIS/NIPRCS			
	Children aged 12-18 months	Children aged 19-35 months	Total
Total number of children	772	1,793	2,565
Number of children with requests mailed to providers	N/A	N/A	1,793
Number of children with provider data	431	996	1,427
Number of children with best values	464	1,069	1,533
Number of children with imputed best values	308	724	1,032

FIGURE 2.1: 1999 NHIS/ NIPRCS SAMPLE

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                                                    ┌─────────────────────┐
                                                    │   TOTAL CHILDREN     │
                                                    │    W/ NHIS/IM        │
                                                    │      2,565           │
                                                    └─────────────────────┘

┌────────────────────────────────────┐
│     MATCHED PERMISSION FORMS        │
│              2,287                  │
└────────────────────────────────────┘

┌─────────────────────┐                    ┌─────────────────────┐   ┌─────────────────────┐
│  VALID PERMISSION   │                    │   UNUSABLE FORMS    │   │   NO PERMISSION     │
│  FORMS MAILED TO     │                    │        494          │   │       FORM          │
│    PROVIDERS         │                    └─────────────────────┘   │       278           │
│      1,793           │                                              └─────────────────────┘
└─────────────────────┘

┌─────────────────┐        ┌─────────────────┐
│  RECEIVED IHQ   │        │     NO IHQ      │
│     1,394       │        │      399        │
└─────────────────┘        └─────────────────┘

                    ┌─────────────────────┐   ┌─────────────────────┐
                    │  IHQ RECEIVED IN    │   │        NO           │
                    │   RECONCILIATION    │   │   RECONCLIATION     │
                    │        33           │   │       366           │
                    └─────────────────────┘   └─────────────────────┘

            ╭─────────────────────────╮
            │   WITH PROVIDER DATA    │
            │        1,427            │
            ╰─────────────────────────╯
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10
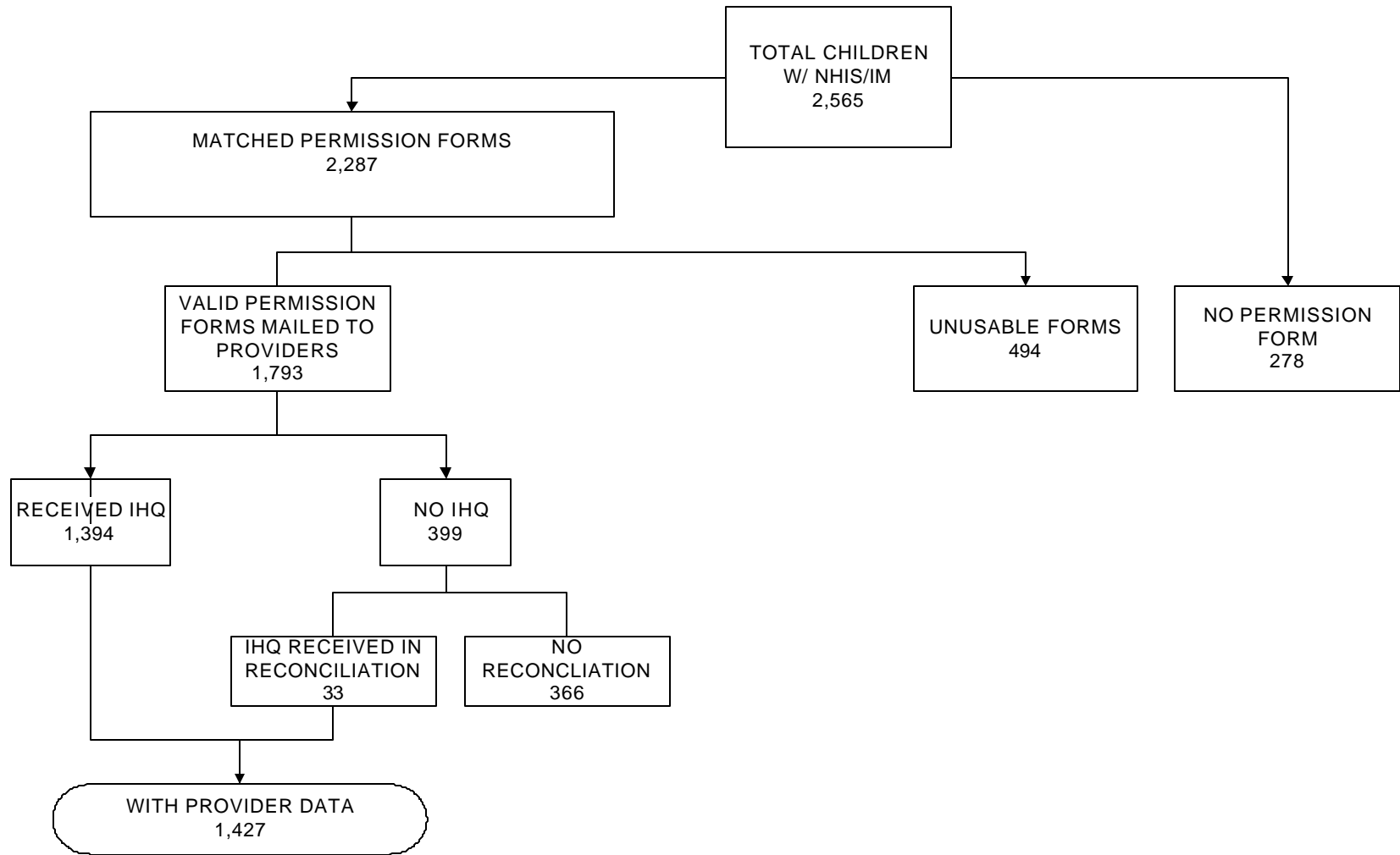
2.2 NHIS Immunization Supplement

The U.S. Bureau of the Census collects data for the NHIS under a contract with the NCHS. Census Bureau interviewers conduct personal, in-home interviews with individuals in sampled households. For the Family Core component of the NHIS Basic Module, all members of an eligible household who are at home at the time of the interview and 17 years of age and over are asked to participate and to respond for themselves. For children and those adults not at home during the interview, information is provided by a knowledgeable adult family member (18 years of age or over) residing in the household. For the Sample Adult questionnaire, one adult per family is randomly selected; this individual responds for him/herself to the questions in this interview. Information for the Sample Child questionnaire is obtained from a knowledgeable adult in the household.

The 1999 NHIS interview was conducted using a computer-assisted personal interviewing (CAPI) version of the NHIS questionnaire. Interviewers administered the instrument using laptop computers, entering responses directly into the computer during the household interview. This computerized mode of administration offers distinct advantages in timeliness of the data and improved data quality.

The data for the NHIS/IM are collected for children selected for the Sample Child questionnaire, and all other children in the household between the ages of 12 and 35 months.

2.3 National Immunization Provider Record Check Study

The data in the provider record check study are collected in two phases: original data collection and reconciliation. In the original data collection, immunization records are collected from the providers. In reconciliation, the data collected from the providers are compared and reconciled with the data collected from the household. During reconciliation, some new IHQs are received for children for whom provider data were not obtained in the original data collection.

2.3.1 Original Data Collection

Once the NHIS/IM is completed, the names and addresses of immunization providers identified by household respondents are written on permission forms. The NHIS CAPI questionnaire captures whether a permission form was completed (or Agenerated@), and whether the permission form was signed by the child=s parent or legal guardian. An electronic file of eligible household ID numbers with child and household data is forwarded to the NIPRCS contractor, Abt Associates, where it is entered into a case management and tracking system. The Regional Offices of the Census Bureau send the signed permission forms to the contractor.

The first step in data collection matches the permission forms with the file of eligible households. The file is loaded into a case management system. After the forms have been matched, provider names, addresses and telephone numbers are entered from the hard-copy permission forms. After data entry and editing are completed, a scannable label with an ISBN

bar code is printed for each case ID and attached to the appropriate permission form in order to facilitate tracking and reporting.

After the provider address information has been entered, the next step is to check its completeness. (Complete addresses are necessary to mail questionnaires to immunization providers.) When the household did not supply a complete address for a provider, locating clerks use multiple methods to find additional information, including searching a database of providers from the NIS and calling Directory Assistance.

Once the provider addresses have been reviewed and updated, the initial requests are mailed. The initial mailing packet includes the following documents:

$ A cover letter from the Director of the NCHS describing the purpose of the NHIS/NIPRCS, the importance of provider participation, and how the parent=s consent was obtained. Separate letters are used for cases with a parent=s signature and cases with an interviewer=s signature verifying a parent=s verbal consent during a telephone contact.

$ An excerpt from the permission form signed by the parent or guardian, or signed by the interviewer for cases with verbal consent.

$ An Immunization History Questionnaire labeled with sufficient information to identify the child whose immunization records are requested.

$ An excerpt from an article in the *Morbidity and Mortality Weekly Report (MMWR)* containing information on national vaccination rates.

$ A pre-addressed, postage-paid return envelope.

Providers are asked to complete the IHQ, or to attach a copy of the child=s immunization records. Providers are also given the option to return the forms by mail, or to a toll-free fax number. Reminder/thank you postcards are mailed two weeks after the initial mailing. The postcards contain the CDC logo to identify study sponsorship, a Athank-you@ to those who have already returned the original IHQ, and a brief message about the need for and importance of collecting these data to measure vaccination coverage among children in the U.S.

The IHQ used in 1999 was changed from the questionnaire used in previous years. The format of the first page was changed from a vertical to a landscape orientation, and the combination vaccine hepatitis B-Hib was added to the shot grid. Two new questions were added on the second page. One item asks if the child's shots were reported to a state or local immunization registry, and the second asks for the medical specialty of the person who ordered the child's immunizations. Two questions were dropped from the previous versions of the IHQ. (See Appendix B for the 1999 IHQ and Section 5.5 for detailed descriptions of the changes to the data file resulting from the changes to the questionnaire.)

Reminder packets containing a second copy of the IHQ are mailed three weeks after the postcard mailing (five weeks from the initial mailing) to providers who have not yet returned the IHQ from the first mailing. A one-page letter reiterates the importance of provider participation and requests return of the completed questionnaire. Seven weeks after the initial mailing, provider offices that still have not responded to the initial request or subsequent mailed reminders receive a telephone prompt from an experienced interviewer trained to elicit cooperation and record medical information. The prompting call is a final attempt to complete and return the provider questionnaires. Generally, these prompting calls serve to remind providers to return the completed questionnaires, and they provide an opportunity to mail or fax new materials to those providers who request them. In some cases, the questionnaire is completed with the interviewer over the telephone.

The IHQ is then manually edited. If a provider returned a copy of the child's medical records, the information is transcribed onto a new IHQ. Every IHQ is reviewed by a quality control clerk. The cases are then sent to a vendor for data entry. The forms are keyed twice for verification. The data from the IHQs are then merged with the NHIS data to create the initial dataset.

2.3.2 Matching and Reconciliation

In matching and reconciliation, every case with provider data is reviewed and compared with the corresponding data from the NHIS/IM interview. For cases in which the household and provider data are discrepant, or where provider data are missing, either the household, the provider, or both are recontacted by telephone or mail to clarify the discrepant data.

The first step in the matching process is to divide the cases into ten adjudication groups. First, the cases are separated by whether a shot card was used in the initial household interview. Cases with shot cards are further divided into five groups, depending on whether there is a discrepancy between the dates and/or doses of the household and provider reports. Cases in which the household reported only the number of doses of each vaccine from recall are divided into four groups. Finally, cases in which multiple providers responded for a child but the provider reports disagreed form the final adjudication group. Table 2.2 defines the adjudication groups and gives the number of children in each in 1999.

Category	Category Description	Total Number of Cases	Cases Requiring Reconciliation
Table 2.2 Distribution of Cases with Provider Data by Adjudication Group before Reconciliation, 1999 NHIS/NIPRCS[1]			
Household reports from shot record			
R1	All dates and numbers of doses matched provider reports	55	5
R2	All numbers of doses matched provider reports, but at least one date was discrepant	56	46
R3	At least one discrepancy in number of doses; all discrepancies involved a household over-report	78	76
R4	At least one discrepancy in number of doses; all discrepancies were involved a household under-report	225	109
R5	At least two discrepancies in number of doses; at least one over-report and one under-report	72	69
Household reports from memory (recall)			
H1	No discrepancies in number of doses (including cases where the household responded "Don=t Know@)	96	11
H2	At least one discrepancy in number of doses; all discrepancies involved a household over-report	155	118
H3	At least one discrepancy in number of doses; all discrepancies involved a household under-report	311	52
H4	At least two discrepancies in number of doses; at least one over-report and one under-report	166	128
Multiple providers			
M	Non-identical reports from two or more providers	180	66
Total number of children with provider data		1,394	680

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[1]The distribution of adjudication groups in this table is different than the values of the variable ADJ_GRP in the final data file. This table shows the number of cases in each group before reconciliation. A case may have a different adjudication group after reconciliation is completed. For example, the final data file contains 59 cases with ADJ_GRP = R1, as some cases had their discrepancies resolved.

A matching sheet is printed for every case. The matching sheet displays key data items for the child, and all of the household and provider-reported vaccination data. The matching sheets from each adjudication group are reviewed for discrepancies. Cases that need reconciliation because of differences between household and provider reports of the number or dates of specific vaccinations are assigned problem codes that describe the type of discrepancy. These cases are sent to a specially trained team of telephone interviewers and supervisors for reconciliation. Additionally, sample children for whom no providers responded in the original data collection are sent to reconciliation. (See Figure 2.2 for an illustration of the reconciliation process.)

In reconciliation, the provider is called, and interviewers attempt to resolve the discrepancy. The providers are asked to check their medical records to verify the information returned on the IHQ or reported by the household. Providers are also asked whether they know of any other vaccination providers for the child.

If the provider is unable to reconcile the discrepancy or cannot be reached, or if the problem appears to be in the household data, telephone interviewers attempt to contact the household to resolve the discrepancy. When contacted, the original household respondent or another knowledgeable adult is asked whether a shot card is available for the child. If the household has a shot card, specific dates are verified. If no shot card is available, the household respondent is asked to verify that the child had received vaccinations.

For those cases in which none of the providers for a child responded with vaccination data, a telephone interviewer contacts the household, verifies the names and addresses of providers previously reported, and asks for any other providers who may have immunization information for the child. This group includes cases in which:

- $ The provider reported never treating the child.

- $ The provider reported treating the child but not having immunization records, or indicated that the immunization records had been forwarded to another provider.

- $ No provider responded for the child.

- $ The provider contact information originally reported by the household was inadequate.

- $ An original provider responded with some vaccination information, but it appeared that the child may have had another vaccination provider.

Figure 2.2: Flow Diagram of 1999 NHIS/NIPRCS Reconciliation Process
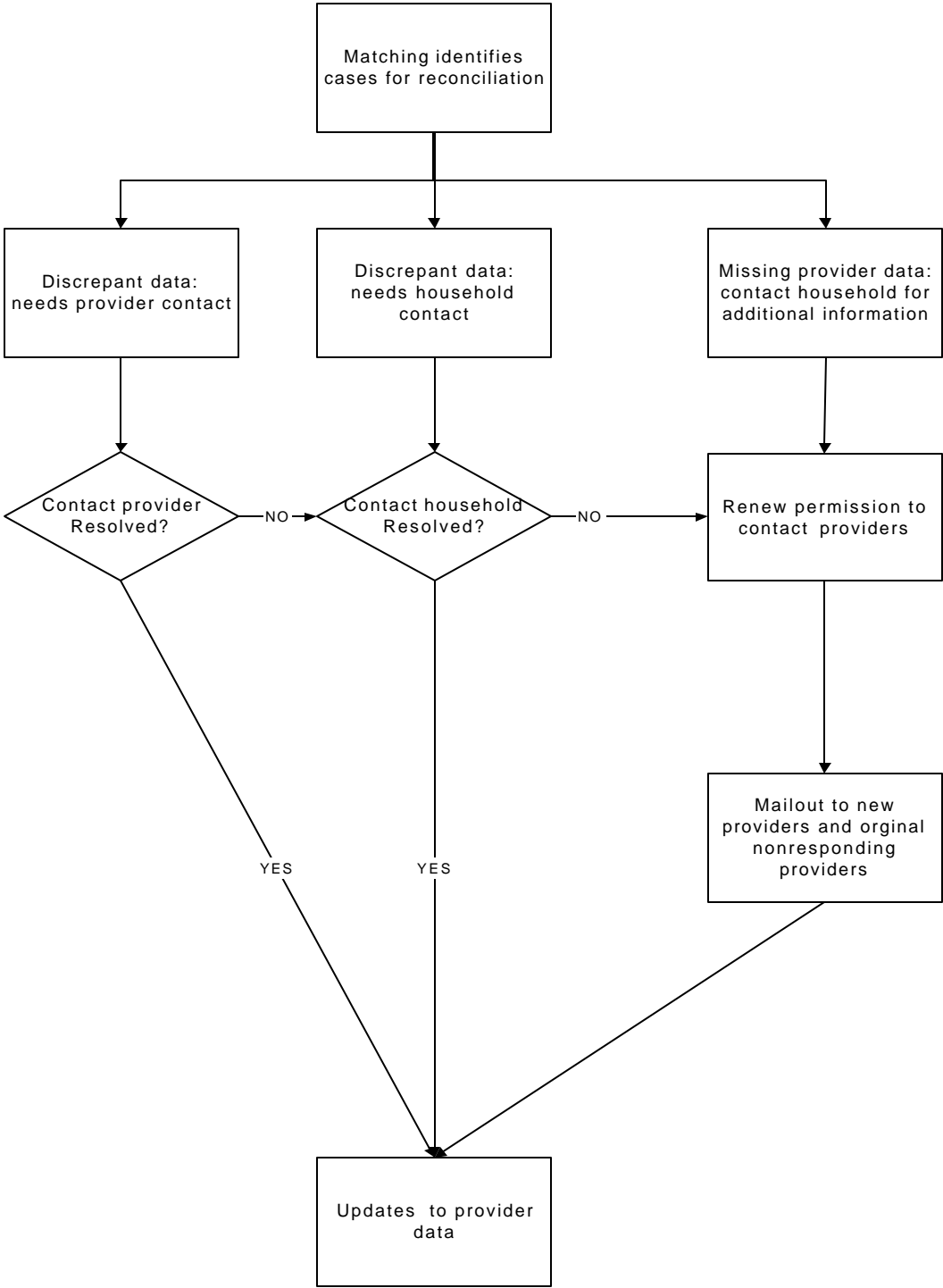
These households are mailed an advance letter that includes a provider information form and a consent form that the respondent can return by mail. Ten days after the advance letter is mailed, telephone interviewers attempt to contact the household by phone. The interviewer confirms the provider information originally reported by the respondent, and probes the respondent for additional providers. The interviewer obtains verbal consent to recontact the original providers and to contact any additional providers. In 1999, 399 cases in which the original provider never responded were eligible for reconciliation.

Of the 1,079 total cases eligible for reconciliation, the provider gave new information to reconcile a discrepancy in 113 cases. In 87 cases, the household reconciled a discrepancy. Additionally, providers returned data for 33 children for whom provider data were not returned in the original data collection. These additional data were added to the original provider data for estimation. Table 2.3 summarizes the impact reconciliation had on the numbers of vaccinations reported.

Table 2.3 Reconciliation for 1999 NHIS/NIPRCS	
Total number of children in reconciliation	1,079
Number of children with changes to provider-reported number of doses	
DTP	44
Polio	19
MCV	10
Hib	67
Hep B	71
Varicella	31
Number of children aged 19-35 months who were **not** 4:3:1:3 up-to-date	
Before reconciliation	227
After reconciliation	216
Change in 4:3:1:3 up-to-date status	-11
Number of children with changes to shot dates	
Changes to household-reported shot dates	87
Changes to provider-reported shot dates	113

2.4 Data Processing

After reconciliation is completed, the new data are combined with the original data for the estimation of vaccination coverage rates. The combined data are reviewed for certain kinds of discrepancies that may remain, including:

- the date of birth name, or gender given by the provider did not match the NHIS data;
- multiple providers reported different dates of birth;

- the provider reported MCV or varicella shots before 9 months of age;
- vaccination dates before the date of birth;

- a single provider reported consecutive vaccination dates within 28 days or multiple provider reports that had vaccination dates within 14 days; and
- vaccination dates that were out of sequence.

If the discrepancy can be resolved by reviewing the dates of other vaccinations the child had received (e.g., it may be evident that part of the date was transposed or incorrectly written), the data are then edited

In filling out the IHQ, a provider may not know the date of the first dose of hepatitis B. For children with fewer than three reported hepatitis B vaccinations, a program checks to see whether the "Administered at Birth" box was checked for the first dose of hepatitis B. If it was checked, and the date of the birth dose of hepatitis B was not reported, the program assigns the date of the birth dose for this vaccine. If the household used a vaccination record to report vaccination dates, those dates are examined to see whether the date of the birth dose can be taken from that record. If it is not reported in the vaccination record, a value is imputed from the distribution of provider-reported dates for the birth dose of hepatitis B.   The birth dose is defined as being between the date of birth (i.e. 0 days) and the date of birth plus 7 days. This procedure was implemented in 1999.   Cases in which the date of the birth dose were imputed can be identified through the variable HEP_IFLG.

Once all the data have been edited, a disposition code (DISPCODE) that indicates the completeness and validity of the immunization data is assigned to every case with provider data. Cases with DISPCODE equal to 7 have provider data, but the completeness of the provider data is unknown. Therefore, cases with DISPCODE = 7 are not used in calculating the estimates of vaccination coverage.   All other cases with a nonmissing DISPCODE are considered to have usable provider data.

2.5 Informed Consent, Security, and Confidentiality of Information

The data collection procedures of the NHIS assure the respondent of the confidentiality of his/her responses and the voluntary nature of the survey.   Informed consent is obtained from the respondent (generally the parent or guardian of the child) to participate in the household interview and also (at the end of the interview) to contact the child's vaccination providers.

Information in the NHIS/NIPRCS is collected and processed under high security. To ensure privacy of the respondents and confidentiality of sensitive information, NCHS has established standards for release of data from all NCHS surveys. All CDC staff and contractor staff involved with the NHIS/NIPRCS sign the NCHS confidentiality agreement and follow procedures to prevent disclosure.

All information in the NHIS/NIPRCS is collected under strict confidentiality and can be used only for research purposes [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 the public release, the contents of the public-use data file go through an extensive review by the NCHS Disclosure Review Board to protect confidentiality of the participants as well as the data.

Chapter 3. Estimation of Vaccination Coverage

3.1 NHIS Weighting Information

The NHIS uses a multistage sample design to represent the civilian noninstitutionalized population of the U.S.; each person interviewed has a known probability of selection. The resulting sampling weights (initially equal to the reciprocal of the selection probability) are adjusted for unit nonresponse and poststratified to population control totals from the Census Bureau by sex, age, and race/ethnicity.   Thus, each respondent has a sample weight that can be used to produce national estimates.

The NHIS weight that is the foundation for the 1999 NHIS/NIPRCS sampling weight is a child-level weight that comes from the Immunization Supplment data file. This Final Annual Weight (WTFA_IM) is included in the public-use data file. It includes design, nonresponse, and poststratification adjustments for sample children under 18 years of age, and additional children aged 12-35 months in sampled households.

3.2   Provider-Adjusted Estimates

The provider-adjusted method of estimation produces estimates of percentages of children who are up-to-date for various vaccines and combinations of vaccines. The provider-adjusted estimates are calculated by first dividing the children into a set of weighting classes for each vaccine. Within each weighting class, the proportion of children with usable provider data who are up-to-date is calculated, and then applied to the total number of children within the weighting class. The estimated numbers of up-to-date children and the total numbers of children are then summed to produce an overall coverage estimate for that vaccine.   These estimates are comparable to the estimates produced in the National Immunization Survey (Stokley et al. 2000; Bartlett et al. 2001).   Section 4.1 gives detailed instructions for calculating provider-adjusted estimates.

3.3 Adjustment for Effect of Nonresponse Follow-Up Survey

The 1996 and 1998 NHIS/NIPRCS included a nonresponse follow-up survey (NRFUS) with households with children aged 12-35 months who had completed the NHIS/IM interview but who:

- had not given permission to contact the immunization providers,
- had not supplied adequate information to contact the providers, or
- had reported that their child had never been vaccinated.

The NRFUS recontacted these households and asked them again for permission to contact the immunization providers. If the household gave permission, the immunization data were collected from the providers using the same procedures as the original data collection. These

new data were combined with the original provider data to calculate estimates of vaccination coverage. (Abt Associates, Inc. 2002).

The 1999 NHIS/NIPRCS did not conduct a NRFUS. In order to make the estimates comparable to previous years, a set of adjustment factors were calculated from the results of the 1998 NRFUS. The adjustment factor for each vaccine was determined by dividing the provider-adjusted estimate of coverage including the NRFUS data by the provider-adjusted estimate calculated from only the original data collection.   For most vaccines and series, except 3+ DTP, 3+ Polio, and 1+ MCV, the addition of the NRFUS data produced a lower estimate of the number of children that were up-to-date.   Therefore, the adjustment factors (shown in Table 3.1) are less than 1 for all vaccines and series except 3+ DTP, 3+ Polio, and HMCV.

Table 3.1: 1999 NHIS/NIPRCS Adjustment Factors Based on 1998 NRFUS data	
Vaccination	**Adjustment Ratio**
DTP	0.9953
DTP3	1.0021
Polio	1.0011
MCV	1.0021
Hib	0.9979
Hep B	0.9978
4:3:1	0.9988
4:3:1:3	0.9975
4:3:1:3:3	0.9934

3.4 Best Values

The best values combine the household and provider data to produce the most accurate vaccination report for each child. Because the best value vaccination dates include data from both sources, more children have best values for vaccination dates than have provider data.   The inclusion of more children reduces the potential bias in these estimates.

For the 1999 NHIS/NIPRCS, best values for vaccination dates were developed for two main groups of children: children with no provider data who were 4:3:1:3 up-to-date according to the household report from a shot card; and all children who had usable provider-reported vaccination information (See section 2.4 for definition of useable provider data).

For the children who were 4:3:1:3 up-to-date from a shot card, the household-reported vaccination dates were evaluated to see whether they were consistent with the date of birth and the vaccination schedule. The record was also checked for the degree of agreement between vaccination dates. If the record met these criteria, then the shot card dates were inserted as best values for vaccination dates, along with any edits to the dates that seemed warranted, such as transposed dates or reports with the same month and day but in which the year was inconsistent.

For the children with usable provider data, the household and provider reports were compared. If the household used a shot card and there was no agreement between the two sources, the household-reported vaccination dates were considered unusable, and the provider vaccination dates were used as the best values for dates. (Provider reports that appeared to be inadequate or for the wrong child were previously excluded. See Section 2.4 for the definition of usable provider data.) If there was some agreement between the provider-reported and household-reported vaccination dates, the household information was deemed usable, and these shot card vaccination dates were used to supplement the provider vaccination dates to create a complete vaccination record. If the household reported from recall, the provider-reported dates were used as the best values. Children with best vaccination dates were assigned a flag (BESTVAL=1) so that they can easily be identified in the data file.

3.5 Best Value Weights

The sample weights of children with best values for vaccination dates were adjusted to account for children without best values. The method used to adjust the weights was similar to the method used in previous years of the NHIS/NIPRCS in order to maintain comparability between the years. A total of 11 weighting classes were formed using the following criteria: the vaccination status according to the household report (up-to-date, not up-to-date, missing), shot card use (shot card used, no shot card), and education of the respondent (high school or less, college or higher, missing). These three variables resulted in 18 cells; some cells were collapsed when they contained too few cases. Table 3.2 shows the 11 cells used in the weighting.

Table 3.2: Weighting Classes for Adjusting the Weights of Children with Best Values 1999 NHIS/NIPRCS					
4:3:1:3 Status According to Household	Shot Card		No Shot Card		
	High school or less, or missing	College or higher	High school or less	Education missing	College or higher
Up-to-date	1	2	3	5	4
Not up-to-date				8	9
Missing	6	7	10		11

The sample weight for the children with best values was adjusted by multiplying the NHIS/IM weight for the child (WTFA_IM) by the ratio of the sum of the weights for all children in the weighting class to the sum of the weights for children with best values. In addition to this adjustment, the weights were also adjusted through raking (Lohr 1999; Izrael et al. 2000) so that the sum of the weights agreed with the population control totals for poverty status, race/ethnicity, and telephone status in the U.S. The result of the raking is the best value weight (WT_BV2).

3.6 Imputed Best Values

For children without best values, imputation was used to calculate a total number of doses for each antigen and the up-to-date status of the child. The variables considered for forming imputation classes were the same as those used to form the weighting classes for children with best values: whether a child was up-to-date for the 4:3:1:3 series according to the household report, whether a shot card was used, and the education of the respondent. Some of the 18 cells in the cross-classification of the three variables were collapsed after looking at the distribution of children in the sample. Cells that contained few donors relative to the recipients were collapsed, resulting in a total of seven imputation classes.

Table 3.3 Imputation Classes for Imputing Missing Best Values, 1999 NHIS/NIPRCS				
4:3:1:3 Status According to Household	Shot Card		No Shot Card	
	High school or less or missing	College or higher	High school or less or missing	College or Higher
Up-to-date	1	2	3	
Not up-to-date	4	5	6	
Missing			7	

Within each imputation class, a hot-deck imputation procedure was used to impute the number of doses of each vaccine and series using data from children with non-missing best values. Cases in which best values were imputed are marked by the variable IMP_FLAG.

3.7 Children Aged 12-18 Months

In the absence of a standard definition of Aup-to-date@ for children between 12 and 18 months of age for either a specific vaccine or a series of vaccines, the best values were used to calculate weighted percentages of children receiving one or more doses of each vaccine. (See Appendix C for a table with these estimates.)

Chapter 4. Calculating Estimates of Vaccination Coverage and Standard Errors

As described in the previous chapter, the NHIS/NIPRCS uses several methods for producing estimates of vaccination coverage. This chapter provides the user of the data set with instructions for replicating these methods.

4.1 Provider-Adjusted Estimates of Vaccination Coverage

As described in Section 3.2, the provider-adjusted estimates use the children with usable provider data to estimate the proportion of children who are up-to-date in the sample as a whole. The steps required to obtain the estimates are given below:

> **Step 1:** Use the sample weight WTFA_IM in the following steps.
>
> **Step 2:** All children between the ages of 19 and 35 months for whom the NHIS/IM was completed are divided into weighting classes specific to each vaccine. The weighting classes form two main groups according to whether the household used a shot card. All children belonging to households that used shot cards to report the number and dates of vaccinations are in the first group, and children from households that reported from memory recall belong to the second group. Within each main group, children are divided into subgroups by the number of doses reported by the household. Table 4.1 shows the weighting classes for calculating the provider-adjusted estimate of DTP coverage.
>
> The weighting classes for the other vaccines appear in Appendix D in the column "Number of Doses Reported by Household."
>
> **Step 3:** Sum the weights (WTFA_IM) of children with usable provider data in each weighting class. This gives the estimated number of children with provider data. Call this Sum 1. (See Column 1 in Table 4.2.)
>
> Next, sum the sample weights of all children with usable provider data who are up-to-date on the specific vaccine. This gives the estimated number of children who are up-to-date among children with provider data. Call this Sum 2. (See Column 2 in Table 4.2.)
>
> Compute the ratio [Sum 2/Sum 1]. This gives the proportion of children with usable provider data who are up-to-date in this weighting class. (See Column 3 in Table 4.2.)

Table 4.1 Weighting Classes for DTP, 1999 NHIS/NIPRCS	
Use of Shot Card	**Number of Doses of DTP**
Shot Card Used	4+
	3
	2
	1
	0
No Shot Card	4+
	3
	2
	1
	0
	All*
	Don=t know/Missing

* AAll@ indicates that the household respondent was not
able to give the total number of shots received, but indicated
that the child was up-to-date on this vaccine.

Step 4: Apply this proportion to the total weighted number of children in the weighting class. The total weighted number of children is obtained by simply aggregating the sample weights of all children. This product gives the estimated number of children who are up-to-date in that weighting class.

Step 5: Aggregate the estimated numbers of children who are up-to-date on the specific vaccine over all weighting classes. (See the Total entry in Column 5 in Table 4.2.)

Step 6: Divide the number obtained in Step 5 by the total estimated number of children over all the weighting classes. This is simply the sum of the weights of all children who completed the NHIS/IM. (See the Total entry in Column 4 in Table 4.2.)

Step 7: The number obtained in Step 6 (when multiplied by 100) gives the percentage of children who are up-to-date on the specific vaccine. This is the provider-adjusted estimate of coverage for that vaccine.

Weighting Class	(1) Sum of the weights of all children with usable provider data	(2) Sum of the weights of children who are up-to-date among children in (1)	(3)=(2)/(1) Proportion of children who are up-to-date	(4) Sum of the weights of all children with and without provider data	(5)=(4)x(3) Estimated number of children who are up-to-date
Table 4.2: Calculation of Provider-Adjusted Estimate for DTP, 1999 NHIS/NIPRCS					
Shot Card 4+	893,242	838,915	.9392	1,226,851	1,152,258
3	221,610	148,909	.6719	363,626	244,119
2	19,629	11,292	.5753	59,246	34,084
1	36,479	28,809	.7897	70,625	55,773
0	12,533	8,179	.6526	25,662	16,747
No Shot Card 4+	68,368	63,472	.9284	95,920	89,052
3	93,577	71,784	.7671	148,859	114,190
2	67,787	51,933	.7661	106,480	81,574
1	30,784	20,441	.6640	51,091	33,924
0	35,104	26,466	.7539	161,369	121,656
All[1]	1,413,491	1,173,849	.8305	2,625,817	2,180,741
Don≠t Know/Missing	238,891	187,873	.7864	532,247	418,559
Total	3,131,495	2,631,922	.8405	**5,467,493**	**4,542,677**
Percentage of children who are up-to-date for DTP = [4,572,677/5,467,493] x 100 =					**83.09**

[1] ΑAll≅ indicates that the household respondent was not able to give the total number of shots received, but reported that the child was up-to-date on this vaccine.

See Appendix A for the provider-adjusted estimates of coverage for other vaccines and series. The provider data in the data file includes the results from reconciliation, so estimates calculated using the provider-adjusted method will correspond to the column labeled "Initial + Reconciliation" in the table in the appendix.

4.2 Including the Nonresponse Follow-Up Survey Adjustment in Coverage Estimates

Both provider-adjusted estimates and best value estimates (discussed below) for individual vaccine coverage should be multiplied by the NRFUS adjustment factor in Table 3.1.   For example, the provider-adjusted estimate of DTP coverage calculated in Table 4.2 (83.1%) should be multiplied by the adjustment factor (0.9953) to obtain a final NRFUS-adjusted coverage estimate of 82.7%.   (See Appendix A for the estimates of vaccination coverage that includes the NRFUS adjustment.)

When calculating coverage estimates for the entire sample or any subgroup, these NRFUS adjustment factors should be applied.

4.3 Best Value Estimates and Using Imputed Best Values

Best value estimates should be calculated using the best value weight (WT_BV2), which incorporates an adjustment for children without best values.   The results should then be multiplied by the NRFUS adjustment to derive the Final Best Value estimates.

When using the imputed best values, the NHIS/IM sampling weight (WTFA_IM) should be used.   Cases for which best values were imputed are flagged in the data set (IMP_FLAG = 1).

See Appendix A for the coverage estimates for each vaccine and series using the best value and imputed best value data.

4.4 Calculating Standard Errors

4.4.1 Standard Errors of NHIS Estimates

Data users should refer to the report *Design and Estimation for the 1995-2004 National Health Interview Survey* (Series 2, No. 130), available on the NCHS Web site http://www.cdc.gov/nchs/nhis.htm , for detailed instructions on how to calculate standard errors (using SUDAAN) for the 1999 NHIS estimates.

4.4.2 Standard Errors of Best Value Estimates

Vaccination coverage rates are ratio estimates, and the Taylor linearization method can be used to compute the standard errors of these estimates (Nixon et al. 1996). For computing the standard errors of best value estimates of vaccination coverage rates, the "pseudo strata" created for the NHIS with two PSUs were first considered. Because only a subset of the sample of children had best values, many of the strata were empty in the sense that the two PSUs in the stratum did not have children with best values. Therefore, the 337 NHIS strata were collapsed to 186 strata such that each stratum had two PSUs with children with best values. The standard errors of the best value estimates were computed using SUDAAN software (Shah et al. 1999).

Appendix E gives an example of a SUDAAN program that was used to calculate standard errors, including the specifications for collapsing the 1999 NHIS strata. For the 1997 NHIS/NIPRCS, strata were manually collapsed as needed to ensure a minimum of two PSUs per stratum. In later years, an algorithm (SAS program) was used to collapse the strata. Applying that program to 1997 could yield a somewhat different set of collapsed strata and therefore standard errors might differ slightly. Other software such as STATA (Stata Corporation 2001) or SAS (SAS Institute Inc. 1999) can also be used to estimate the standard errors by the Taylor linearization method.

The standard errors of the best value estimates for all vaccines and series can be found in Appendix A.

4.4.3   Standard Errors of Estimates Based on Imputed Best Values

Treating the imputed best values as if they are responses and then computing the variance estimates, using a standard method like Taylor linearization, generally results in underestimation of the variance. Alternative methods of variance estimation take into account the presence of imputed values and adjust for this underestimation. A jackknife variance estimation method suggested by Rao and Shao (1992) was used to compute the variance of the estimates based on imputed values. For details of this procedure, see the internal methodology report. (Abt Associates Inc. 2002). The standard errors can be found in Appendix A of this guide.

Chapter 5. Public-Use Data File

This chapter contains details about the 1999 NHIS/NIPRCS data file and information for users and analysts of these data. The data file is in ASCII format. A code book and a program for reading the data into SAS are available with this data file.

5.1 File Description

Data in the PUF come from two sources: the 1999 NHIS/IM and the 1999 NHIS/NIPRCS. The source of each variable is noted in the code book. Data are provided at the child level; that is, each child has one record, which includes the household and provider information. The data file contains 2,565 records for children aged 12-35 months. If more than one child was interviewed in a household, the household variables, including the ID number, are included in each child=s record.

5.2 Data Cleaning

Data from the Immunization History Questionnaire (IHQ) were checked for internal consistency, including skip-pattern logic and out-of-range or otherwise invalid values. The provider data file was checked for duplicate records from the same provider. When a child had data from more than one IHQ, decision rules were applied to produce the most complete record of the child=s immunization history. The analyst should refer to the documentation provided by the NCHS for data collected in the NHIS or the NHIS/IM.

As described in Sections 2.3.2 and 2.4, some provider data may have been edited as a result of the reconciliation and file preparation processes.

For shot date variables from the IHQ, if the day of the month was missing, it was imputed to "15" for the purpose of calculating the age in days at the time of vaccination. If this value created a vaccination date before the child=s date of birth, the value would be changed to be equal to the date of birth.

5.3 Missing Value Codes

A standard coding scheme, based on the NHIS protocol, designates Arefused@ and Adon=t know@ responses on all variables. ARefused@ responses are coded as A7@ (with leading 9s filling the width of the field), and Adon=t know@ responses are coded as A9@ (again, with leading 9s). A code of A8@ indicates Anot ascertained@ responses, which typically occur when an in-the-universe respondent had a blank field or the field contained an invalid code.

Because the appropriateness of some questions depended on the availability of shot records, not all questions were asked of all respondents. Cases that were not eligible to answer specific questions are coded as A. <BLANK: NOT IN UNIVERSE>." The notes in the code book describe the universe for each question.

5.4 Variable Naming Conventions

The provider data from the Immunization History Questionnaires are used to create numerous child-level composite variables, as described below. The names of the variables giving the number of doses received for each vaccine begin with P_NUM. For example, P_NUMHEP gives the number of doses of hepatitis B vaccine received by the child according to the provider data.

The provider data are also used to form variables for age in days and age in months at each vaccination. For age in days and age in months, either 4 or 8 variables are created, depending on the number of doses recommended for the vaccine. The variable names for age in months end with AGn, where n is the dose number. For example, HEPAG1 to HEPAG8 give age in months for 8 possible doses of hepatitis B vaccine. Similarly, for age in days at vaccination, the variable names start with D and end with AGn. DHEPAG1 to DHEPAG8 give age in days for 8 possible hepatitis B vaccination doses.

An up-to-date status indicator variable was created for each vaccine. These variables use the best values. Each of these variables begins with B_UTD. For example, the variable B_UTDHEP indicates whether the child received 3 or more doses of hepatitis B vaccine.

To accommodate the large number of types of vaccinations, a vaccination-type variable was created for each shot or dose. For example, the vaccination-type variable for DTP indicates whether the specific dose was a DTP, DTaP, DT, unknown (unmarked) type of DTP, DTP-Hib, DTaP-Hib, or an unknown (unmarked) type of DTP-Hib vaccination.

5.5 Changes from 1998 Data File

5.5.1 New Variables

Eighty-two new variables appear in the 1999 public-use data file. Three of these are the result of rewording of the race and ethnicity questions in the NHIS/IM.   The addition of the hepatitis B-Hib combination vaccine created 16 new variables to indicate the type of hepatitis B dose administered for each vaccination date. A flag was added to indicate if the first hepatitis B shot date was imputed.   The other 62 new variables come from changes made to the questions that appear on the second page of the IHQ.

HISPNR_P   Replaces HISPAN_R for the item about Hispanic ethnicity.

RACE_R   Replaces RACE.

RACERECR   Replaces RACEREC.

HEPTY1-HEPTY8   These variables indicate the type of hepatitis B vaccination administered for the 8 possible provider-reported doses.

BHEPTY1-BHEPTY8   These variables provide the type of hepatitis B vaccination for each best value vaccination date for the 8 possible best value doses.

NEWFA4A1-NEWFA4A4, NEWFA4B1-NEWFA4B4, NEWFA4C1-NEWFA4C4
NEWFA4D1-NEWFA4D4, NEWFA4E1-NEWFA4E4 , NEWFA4F1-NEWFA4F4
These 24 variables replace the 4 variables NEWFAC1-NEWFAC4. The item about the type of facility the provider was changed from a single response question to a multiple response item. (See Appendix B.)

PERSPE11-PERSPE14, PERSPE21-PERSPE24, PERSPE31-PERSPE34
PERSPE41-PERSPE44, PERSPE51-PERSPE54, PERSPE61-PERSPE64
PERSPE71-PERSPE74, PERSPE81-PERSPE84   These 32 variables were created when a new item was added to the questionnaire that asked for the medical specialty of the person who ordered the vaccinations for the child. (See Appendix B)

PERSP   This composite variable combines the responses from all providers about the medical specialty of the person who ordered the vaccinations for the child into a single child-level variable.

REG1-REG4   These 4 variables come from a new item that was added to the IHQ which asked whether the child's immunizations were reported to a state or local registry. (See Appendix B.)

REGISTRY This composite variable combines the responses from the individual providers. It indicates whether any of the child's providers reported his or her shots to a registry.

HEP_IFLG   This variable indicates whether the first hepatitis B shot date for the child was imputed.

5.5.2   Variables with Different Response Categories

HIBTY1-HIBTY8   The 8 variables that indicate the type of Hib vaccination administered for each provider-reported dose include HepB-Hib as a type.

BHIBTY1 -BHIBTY8 The 8 variables that indicate the type of Hib vaccination administered for each best value dose include HepB-Hib as a type.

5.5.3   Variables Not Included in 1999 Data File

In addition to the variables that were replaced by new versions described above, 13 variables were eliminated due to changes to the IHQ.   Two questions were dropped: one item that asked if the provider was the medical home for the child; and a second that asked for the medical specialty of the child's primary care provider.

5.6 Explanatory Notes for Specific Variables

ADJ_GRP   The adjudication groups are used for assessing agreement and consistency between the provider report(s) and the household report of vaccinations. See Section 2.3.2 for a more detailed explanation of the matching and reconciliation procedures.

Household reports from shot record
R1   All dates and number of doses match provider reports
R2   All numbers of doses match provider reports, but at least one date is discrepant
R3   At least one discrepancy in number of doses; all discrepancies involve a household over-report
R4   At least one discrepancy in number of doses; all discrepancies involve a household under-report
R5   At least two discrepancies in number of doses; at least one over-report and one under-report

Household reports from memory recall
H1   No discrepancies in number of doses (includes cases where the household responds ADon=t Know@)
H2   At least one discrepancy in number of doses; all discrepancies involve a

household over-report

H3   At least one discrepancy in number of doses; all discrepancies involve a household under-report

H4   At least two discrepancies in number of doses; at least one over-report and one under-report

Multiple provider reports

M   Children with non-identical reports from two or more providers

DISPCODE   The DISPCODE refers to the completeness and validity of the immunization information from all the Immunization History Questionnaires returned for the child.

1   All identified providers responded, no problems indicated in cross-check between household and provider shot dates.

2   All identified providers responded, no shot card to cross-check.

3   All identified providers responded, poor immunization history matching results.

4   All identified providers responded, poor immunization history matching results, additional mismatch indicators present.

5   Some but not all identified providers responded, but provider information indicates 4:3:1:3:3 up-to-date.

6   Some but not all identified providers responded, but provider information matches shot card immunization history.

7   Some but not all identified providers responded, completeness of provider immunization history is unknown.

8   Some but not all identified providers responded, but provider information indicates 4:3:1:3:3 up-to-date when immunizations after the interview date are included.

9   Some but not all identified providers responded, but provider information indicates at least as many doses for each vaccine as the household respondent (or at least 1 dose for MCV).

10   Some but not all identified providers responded, but the household reported an inexact number of vaccinations (AAll,@ ADon=t Know,@ ARefused@ or missing) for one or more vaccines, and any exact responses meet previous criteria (for DISPCODE 9).

11   Some but not all identified providers responded, but definite number of shots was reported by household not from a shot card for one or more vaccines, and any other vaccines meet previous criteria (for DISPCODE 9 or 10).

When analyzing children with provider data, cases with DISPCODE = 7 should not be included.

NUM_DTP, NUM_POLI, NUM_MMR, NUM_HIB, NUM_HEPB, NUM_CPOX
These variables were calculated by totaling the number of each type of vaccination reported by the household respondent in the NHIS/IM, either from a shot card or from recall.

PSU The variable identifies the primary sampling unit (PSU) and is used in variance estimation. Refer to the NHIS/IM documentation for more information.

STRATUM To calculate the standard errors of the best value estimates of vaccination coverage, the original NHIS strata need to be collapsed. See Appendix E for an example program.

5.7 Flags

The following flag variables are included in the data file:

BDOBFLAG A value of 1 indicates that no provider date of birth information was obtained and BEST_DOB is the date of birth reported by the household respondent.

BESTVAL A value of 1 indicates that Abest value@ vaccination dates were determined. A value of 2 indicates that the child does not have Abest values.@

BRDOBFLG A value of 1 indicates that BEST_DOB was assigned after recontacting the household and/or providers to reconcile differences.

IMP_FLAG A value of 1 indicates that Abest value@ vaccination dates were imputed.

PRO_FLAG A value of 1 indicates that the child was 4:3:1:3 up-to-date according to the household=s shot record. A value of 2 indicates the child was not 4:3:1:3 up-to-date. The value is missing for children in households that did not use shot cards.

HEP_IFLG This variable indicates whether the first hepatitis B shot date for the child was imputed.

5.8 Data Alerts

The information provided in this section details known problems with the data.

Although all provider-reported shot dates are reviewed and sent for reconciliation, some inconsistencies may remain in the data that could not be verified. These include shot dates that are too close together, and certain shots given before 38 days of age that are not recommended.

Further, any variables derived from the provider reports (e.g., VISITS) may contain inaccuracies if those data could not be reconciled or verified.

5.9 Code Book

A complete listing of the variables included in the public-use data file is available in the *1999 National Health Interview Survey/National Immunization Provider Record Check Study Public-Use Data File Code Book*. The code book contains a table of contents and an alphabetic list of variables. Then each variable is listed with either 1) the frequency of a given response, the response value, and the formatted response label; 2) a count of missing and non-missing values with summary statistics; or 3) a count of missing/non-missing values.

For categorical variables, the code book gives the frequency of each category. For continuous variables, the mean, median, minimum, and maximum values are displayed.

5.10 Guidelines for Citation of Data

Any published material derived from the data should acknowledge NCHS as the original source. The suggested citation to appear at the bottom of all tables is as follows:

> Source: CDC, NIP and NCHS (2002), 1999 National Health Interview Survey/National Immunization Provider Record Check Study

In a bibliography, the citation should read:

> U.S. Department of Health and Human Services. 1999 National Health Interview Survey/National Immunization Provider Record Check Study (machine readable data file and documentation). National Center for Health Statistics, Centers for Disease Control and Prevention, Hyattsville, MD, 2002.

The published material should also include a disclaimer that credits any analyses, interpretations, or conclusions reached to the author (recipient of the data file) and not to NCHS, which is responsible only for the initial data. Consumers who wish to publish a technical description of the data should make an effort to ensure that the description is not inconsistent with that published by the NCHS.

Please place the acronym NHIS/NIPRCS in the titles, keywords, or abstracts of journal articles and other publications in order to facilitate the retrieval of such materials in bibliographic searches.

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APPENDICES

APPENDIX A
ESTIMATES OF VACCINATION COVERAGE AMONG
CHILDREN AGED 19-35 MONTHS

Estimates of Vaccination Coverage in the 1999 NHIS/NIPRCS

| Vaccination Or Series[1] | Provider-Adjusted Estimates | | | Best Value Estimates and Standard Errors | | | | |
| | Initial Estimate[2] | Initial + Reconciliation | Final Provider-Adjusted[3] | Before NRFUS Adjustment[4] | Final Best Values[5] | | Including Imputed Best Values[6] | |
					Estimate	S.E	Estimate	Rao-Shao S.E. [7]
DTP	81.5	83.1	82.7	84.6	84.2	1.3	84.5	1.3
DTP3	95.5	96.0	96.2	96.6	96.8	0.7	96.7	0.6
POLIO	89.3	89.6	89.7	91.1	91.2	1.0	91.0	1.2
MCV	91.7	92.1	92.3	92.2	92.4	1.0	92.1	1.1
HIB	92.3	93.5	93.3	93.9	93.7	0.9	93.7	0.7
HEPB	86.9	87.7	87.5	89.8	89.6	1.0	90.0	1.0
4:3:1	78.3	79.6	79.5	81.3	81.2	1.4	81.0	1.4
4:3:1:3	76.4	78.3	78.1	80.0	79.8	1.4	79.7	1.4
4:3:1:3:3	71.4	73.3	72.8	75.6	75.1	1.4	75.3	1.4

1 4:3:1 means up-to-date with 4 or more doses of DTP, 3 or more doses of polio and 1 or more doses of MCV. 4:3:1:3 includes 3 or more doses of Hib. 4:3:1:3:3 includes 3 or more doses of HepB.
2 Provider-adjusted estimates are calculated from provider-reported data.   See Section 4.1 for a complete description on how provider-adjusted estimates are calculated.   The initial estimate is calculated from unreconciled data and cannot be reproduced using the public-use file.
3 The provider-adjusted estimates, including reconciliation, are multiplied by a ratio calculated from the 1996 NRFUS. See Section 3.3 for a description of the NRFUS adjustment procedures.
4 Best value estimates are calculated for all children with best vaccination values. The weight used to calculate these estimates is WT_BV2. See Section 3.4 for a description of the best value procedures.
5 The Final Best Value estimates have the NRFUS adjustment applied. See Section 4.4 for a description of the standard errors.
6 The up-to-date status is imputed for children who do not have best value vaccination values. See Section 3.6 for a description of the imputation process.
7 See Section 4.4 for a description of variance estimation for imputed values.

APPENDIX B
1999 NHIS/NIPRCS IMMUNIZATION HISTORY QUESTIONNAIRE

NATIONAL IMMUNIZATION PROVIDER RECORD CHECK STUDY: IMMUNIZATION HISTORY QUESTIONNAIRE

The Immunization History Questionnaire is voluntary. The National Center for Health Statistics, the Centers for Disease Control and Prevention, their contractors or grantees will use this information only for statistical purposes in health research, and no information which identifies the child, the child's family, doctors or other medical care providers will ever be released or published. (Title 42, United States Code, Section 242k).

INSTRUCTIONS: Please review your records and complete this questionnaire for the child identified below. Then mail it in the postage-paid envelope provided or FAX it to: *1-800-293-5155.*

1. Which of the following best describes your records of immunizations for this child? (Check only one box.)

1 ☐ a. Have immunization record for this child. (Go to Question 2 below.)

2 ☐ b. Have provided care to this child, but do not have his/her immunization record.
      (Go to Question 2 below.)

3 ☐ c. Have no record of providing care to this child.
      (Return questionnaire to CDC as instructed above.)

4 ☐ d. Other (Explain): _____

2. According to your records, what is this child's date of birth? _____ - _____ - _____
                                     mm   dd   yyyy

or 8 ☐ Don't Know

Referring to all sources of immunization history, please specify below the month, day and year when each of the following immunizations was given, either by your office or by another provider (OP), as documented in your records. If you prefer, you may attach a copy of the complete immunization history record for this child and just complete Questions 2 through 12.
NOTE: Circle the "OP" above the date of immunization for any immunization given by another provider; then please complete Question 12 at the end of the questionnaire.

Dates of Immunization (month, day, year)

DTP/DTaP/DT (check one box per date)	DTP-Hib (Tetramune or Acthib/DTP) DTaP-Hib (TriHibit) (check one box per date)	Hep B-Hib (e.g. Comvax)	Hib (check one box per date)	Hepatitis B (enter date or check box)	Polio (OPV or IPV) (check one box per date)	MMR	Measles Only	Varicella	Rotavirus	Other Vaccines (Specify)
☐ DT ☐ DTP ☐ DTaP OP	☐ DTP/Hib ☐ DTaP/Hib OP	OP	☐ PedvaxHIB ☐ Other OP	☐ Administered at birth OP	☐ OPV ☐ IPV OP	OP	OP	OP	OP	OP
☐ DT ☐ DTP ☐ DTaP OP	☐ DTP/Hib ☐ DTaP/Hib OP	OP	☐ PedvaxHIB ☐ Other OP	OP	☐ OPV ☐ IPV OP	OP	OP	OP	OP	OP
☐ DT ☐ DTP ☐ DTaP OP	☐ DTP/Hib ☐ DTaP/Hib OP	OP	☐ PedvaxHIB ☐ Other OP	OP	☐ OPV ☐ IPV OP	OP	OP	OP	OP	OP
☐ DT ☐ DTP ☐ DTaP OP	☐ DTP/Hib ☐ DTaP/Hib OP	OP	☐ PedvaxHIB ☐ Other OP	OP	☐ OPV ☐ IPV OP	OP	OP	OP	OP	OP
☐ DT ☐ DTP ☐ DTaP OP	☐ DTP/Hib ☐ DTaP/Hib OP	OP	☐ PedvaxHIB ☐ Other OP	OP	☐ OPV ☐ IPV OP	OP	OP	OP	OP	OP
☐ DT ☐ DTP ☐ DTaP OP	☐ DTP/Hib ☐ DTaP/Hib OP	OP	☐ PedvaxHIB ☐ Other OP	OP	☐ OPV ☐ IPV OP	OP	OP	OP	OP	OP

3. What was the date of this child's *first* visit, for any reason, to this place of practice?

___ mm ___ - ___ dd ___ - ___ yyyy ___   or   8 ☐ Don't Know

4. What was the date of this child's *most recent* visit, for any reason, to this place of practice?

___ mm ___ - ___ dd ___ - ___ yyyy ___   or   8 ☐ Don't Know

5. Which types of care does this facility routinely provide? (Check all that apply.)

1 ☐ a. Comprehensive well-child care (examination, anticipatory guidance, screening)
2 ☐ b. Acute illness care
3 ☐ c. Follow-up visits
4 ☐ d. After-hours telephone coverage
5 ☐ e. WIC Program/services
6 ☐ f. Other (Describe): _____

6. Which of the following best describes this facility? (Check only one box, representing the most specific description.)

1 ☐ a. Federally-qualified health center, including community/migrant/rural/Indian health center
2 ☐ b. Hospital-based clinic, including university clinic or residency teaching practice
3 ☐ c. Private practice, including solo, group practice or HMO
4 ☐ d. Public health department-operated clinic
5 ☐ e. Military health care facility
6 ☐ f. Other (Describe:) _____

7. Is this facility a Vaccines for Children provider?

1 ☐ a. Yes
2 ☐ b. No
3 ☐ c. Unknown

8. Did you or your facility report *any* of this child's immunizations to your community or state immunization registry?

1 ☐ a. Yes
2 ☐ b. No
3 ☐ c. Not applicable (There is no registry in my community/state.)

9. Please indicate the clinical specialty of the person(s) at this facility who ordered all this child's vaccination(s). (Check all that apply.)

1 ☐ a. Pediatrician
2 ☐ b. Family Physician
3 ☐ c. General Practitioner
4 ☐ d. Nurse (Specify RN, LPN, etc.:) _____
5 ☐ e. Pediatric Nurse Practitioner
6 ☐ f. Family Nurse Practitioner
7 ☐ g. Physician Assistant
8 ☐ h. Other Practitioner (Specify:) _____

10. Name of person completing questionnaire: _____

Phone: (___) _____

11. According to your records, did this child ever use another last name (excluding names prior to adoption)?

1 ☐ Yes [Specify name(s):] _____
2 ☐ No

INSTRUCTIONS: If you know of other providers that may have immunization records for this child, please continue with Item 12. Otherwise, return this questionnaire to CDC. Call 1-877-652-1244 with any questions. Thank you.

---

12. Please enter below the names, addresses and telephone numbers of other providers who may have an immunization record for this child, and the name and address for any provider of immunizations with OP circled in the shot grid.

(1) _____   (2) _____

_____   _____

_____   _____

_____   _____

APPENDIX C
ESTIMATES OF VACCINATION COVERAGE AMONG CHILDREN
AGED 12-18 MONTHS

ESTIMATES OF VACCINATION COVERAGE AMONG CHILDREN
AGED 12-18 MONTHS

Weighted Best Value Estimates of Vaccination Coverage Among Children Aged 12-18 Months (n=464) , 1999 NHIS/NIPRCS

Vaccine/ Series	Percent of children receiving number of doses of vaccines										Total
	None		1		2		3		4+		
	Est (%)	S.E.	Est (%)	S.E.	Est (%)	S.E.	Est (%)	S.E.	Est (%)	S.E.	
DTP	-	-	1.9	0.8	4.0	1.1	63.3	2.5	30.8	2.2	**100%**
Polio[1]	-	-	2.1	0.8	41.7	2.8	56.2*	2.7	-	-	**100%**
MCV	40.0	2.4	60.0*	2.4	-	-	-	-	-	-	**100%**
Hib	-	-	3.1	1.0	8.4	1.5	88.5*	1.6	-		**100%**
HepB	2.3	0.7	2.9	0.9	12.8	1.8	82.0*	1.7	-	-	**100%**

Note: A dash in the cell means that the sample contained no children in this category.

*This number may include children who have more than the recommended number of doses (i.e., more than 1 MCV or varicella vaccination, or more than 3 polio, Hib, or Hep B vaccinations.)

---

[1] In 1999, the Advisory Council on Immunization Practices changed the recommendation for childhood polio vaccinations from 2 doses of injected poliovirus (IPV) and two doses of oral poliovirus (OPV) to four doses of IPV. The third polio vaccination is recommended for children between 6-18 months of age. See http://www.cdc.gov/epo/mmwr/preview/mmwrhtml/mm4827a4.htm for more information.

APPENDIX D
WEIGHTING CLASSES AND CALCULATIONS
FOR PROVIDER-ADJUSTED ESTIMATES

Provider adjusted estimates
Children 19-35 months old
DTP

Number of Doses Reported By Household	Without Provider Data	Total With Provider Data	Up_to_ date	Percent	Total	Final Provider adjusted up-to-date	Final Provider adjusted up-to-date(%)
Shot Card, 4+	333609	893242	838915	93.92	1226851	1152258	
3	141716	221610	148909	67.19	363326	244119	
2	39617	19629	11292	57.53	59246	34084	
1	34146	36479	28809	78.97	70625	55773	
0	13129	12533	8179	65.26	25662	16747	
DK/Missing	0	0	0	0.00	0	0	
No Shot Card, 4+	27552	68368	63472	92.84	95920	89052	
3	55282	93577	71784	76.71	148859	114190	
2	38693	67787	51933	76.61	106480	81574	
1	20307	30784	20441	66.40	51091	33924	
0	126265	35104	26466	75.39	161369	121656	
All	1212326	1413491	1173849	83.05	2625817	2180741	
DK/Missing	293356	238891	187873	78.64	532247	418559	
Total	2335998	3131495	2631922	84.05	5467493	4542677	83.09

Provider adjusted estimates
Children 19-35 months old
DTP3

Number of Doses Reported By Household	Without Provider Data	Total With Provider Data	Up_to_date	Percent	Total	Final Provider adjusted up-to-date	Final Provider adjusted up-to-date(%)
Shot Card, 3+	475325	1114852	1102651	98.91	1590177	1572844	
2	39617	19629	12513	63.75	59246	37769	
1	34146	36479	32196	88.26	70625	62334	
0	13129	12533	12533	100.00	25662	25662	
DK/Missing	0	0	0	0.00	0	0	
No Shot Card, 3+	82834	161945	154596	95.46	244779	233666	
2	38693	67787	64465	95.10	106480	101262	
1	20307	30784	22167	72.01	51091	36791	
0	126265	35104	31245	89.01	161369	143635	
All	1212326	1413491	1354817	95.85	2625817	2516846	
DK/Missing	293356	238891	232783	97.44	532247	518621	
Total	2335998	3131495	3019966	96.44	5467493	5249430	96.01

Provider adjusted estimates
Children 19-35 months old
POLIO

Number of Doses Reported By Household	Without Provider Data	Total With Provider Data	Up_to_date	Percent	Total	Final Provider adjusted up-to-date	Final Provider adjusted up-to-date(%)
Shot Card, 3+	432834	1004422	950011	94.58	1437256	1359357	
2	75256	111662	99387	89.01	186918	166376	
1	32302	42435	34549	81.42	74737	60851	
0	21825	24974	24974	100.00	46799	46799	
DK/Missing	0	0	0	0.00	0	0	
No Shot Card, 3+	66676	108880	104648	96.11	175556	168727	
2	50777	99530	72249	72.59	150307	109108	
1	19900	56078	39793	70.96	75978	53914	
0	117465	42178	34206	81.10	159643	129470	
All	1205916	1404570	1252144	89.15	2610486	2327248	
DK/Missing	313047	236766	206373	87.16	549813	479217	
Total	2335998	3131495	2818334	90.00	5467493	4901067	89.64

```
                               Provider adjusted estimates
                                Children 19-35 months old
                                          MMR

                                                                                     Final
                                                                        Final      Provider
                 Number of      Without     Total With                Provider     adjusted
                Doses Reported   Provider     Provider    Up_to_                    adjusted      up-to-
                By Household      Data         Data        date     Percent   Total  up-to-date    date(%)

     Shot Card,  1+             508530       1110493      1072739     96.60   1619023   1563976
                 0               53687        73000        54614      74.81    126687    94775
                 DK/Missing          0            0            0       0.00         0        0
  No Shot Card,  1+             147370       245010       212433      86.70    392380   340193
                 0              164282       122194       106982      87.55    286476   250810
                 All          1126377      1310868      1192505      90.97   2437245  2217162
                 DK/Missing    335752       269930       252663      93.60    605682   566918
                 Total        2335998      3131495      2891936      92.35   5467493  5033834       92.07


                               Provider adjusted estimates
                                Children 19-35 months old
                                          HIB

                                                                                     Final
                                                                        Final      Provider
                 Number of      Without     Total With                Provider     adjusted
                Doses Reported   Provider     Provider    Up_to_                    adjusted      up-to-
                By Household      Data         Data        date     Percent   Total  up-to-date    date(%)

     Shot Card,  3+             383991       946006       924856      97.76   1329997  1300205
                 2               64833        75491        57477      76.14    140324   106843
                 1               48430        89593        81622      91.10    138023   125739
                 0               64963        72403        68138      94.11    137366   129275
                 DK/Missing          0            0            0       0.00         0        0
  No Shot Card,  3+              47658       101515        94172      92.77    149173   138388
                 2               53629        41164        35890      87.19     94793    82650
                 1               35753        55334        37380      67.55     91087    61529
                 0              189232       119963       109246      91.07    309195   281584
                 All          1068166      1307577      1229543      94.03   2375743  2233911
                 DK/Missing    379343       322449       298326      92.52    701792   649298
                 Total        2335998      3131495      2936650      93.78   5467493  5109422       93.45
```

Provider adjusted estimates
Children 19-35 months old
HEP B

Number of Dosed Reported By Household	Without Provider Data	Total With Provider Data	Up_to_date	Percent	Total	Final Provider adjusted up-to-date	Final Provider adjusted up-to-date(%)
Shot Card, 3+	437452	1029993	940591	91.32	1467445	1340071	
2	45651	77453	70063	90.46	123104	111360	
1	38418	34946	28991	82.96	73364	60863	
0	40696	41101	37810	91.99	81797	75245	
DK/Missing	0	0	0	0.00	0	0	
No Shot Card, 3+	85012	191562	181228	94.61	276574	261667	
2	34992	84472	74586	88.30	119464	105487	
1	33696	40492	25681	63.42	74188	47050	
0	191727	117559	87911	74.78	309286	231284	
All	1003493	1215478	1055356	86.83	2218971	1926733	
DK/Missing	424861	298439	261530	87.63	723300	633828	
Total	2335998	3131495	2763747	88.26	5467493	4793588	87.67

Provider adjusted estimates
Children 19-35 months old
4:3:1

Number of Doses Reported By Household	Without Provider Data	Total With Provider Data	Up_to_date	Percent	Total	Final Provider adjusted up-to-date	Final Provider adjusted up-to-date(%)
Shot Card, Up-to-Date	301380	843307	762954	90.47	1144687	1035598	
Not Up-to-Date	260837	340186	231981	68.19	601023	409838	
DK/Missing	0	0	0	0.00	0	0	
No Shot Card, Up-to-Date	1128663	1322296	1068807	80.83	2450959	1981110	
Up-to-Date, Number	11940	52562	47666	90.69	64502	58497	
Not Up-to-Date	308302	319321	219128	68.62	627623	430675	
DK/Missing	324876	253823	192076	75.67	578699	437902	
Total	2335998	3131495	2522612	80.56	5467493	4353620	79.63

Provider adjusted estimates
Children 19-35 months old
4:3:1:3

Number of Doses Reported By Household	Without Provider Data	Total With Provider Data	Up_to_date	Percent	Total	Final Provider adjusted up-to-date	Final Provider adjusted up-to-date(%)
Shot Card, Up-to Date	261786	727579	654559	89.96	989365	890033	
Not Up-to-Date	300431	455914	321524	70.52	756345	533374	
DK/Missing	0	0	0	0.00	0	0	
No Shot Card, Up-to-Date	1016897	1228146	973857	79.29	2245043	1780095	
Up-to-Date -Number	3836	40664	39033	95.99	44500	42716	
Not Up-to-Date	388568	389231	272279	69.95	777799	544070	
DK/Missing	364480	289961	216613	74.70	654441	488867	
Total	2335998	3131495	2477865	79.13	5467493	4279155	78.27

Provider adjusted estimates
Children 19-35 months old
4:3:1:3:3

Number of Doses Reported By Household	Without Provider Data	Total With Provider Data	Up_to_ date	Percent	Total	Final Provider adjusted up-to-date	Final Provider adjusted up-to-date(%)
Shot Card, Up-to-Date	246588	687880	577878	84.01	934468	785047	
Not Up-to-Date	315629	495613	340852	68.77	811242	557891	
DK/Missing	0	0	0	0.00	0	0	
No Shot Card, Up-to-Date	927989	1128735	820579	72.70	2056724	1495238	
Up-to-Date, Number	0	39214	37583	95.84	39214	37583	
Not Up-to-Date	433096	447445	289886	64.79	880541	570503	
DK/Missing	412696	332608	250022	75.17	745304	560245	
Total	2335998	3131495	2316800	73.98	5467493	4006507	73.28

APPENDIX E
EXAMPLE OF A SAS-CALLABLE SUDAAN PROGRAM FOR
CALCULATING STANDARD ERRORS

```
*********************************************************************************
SE_NIPR99.SAS

THIS PROGRAM WILL PRODUCE ESTIMATES AND STANDARD ERRORS FOR BEST VALUE
UP-TO-DATE STATUS 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.
*********************************************************************************;

title 'SUD_NIPR.SAS';

options nofmterr ls=80;

libname data v612  'c:\nprpuf99';     **** SPECIFY PATH TO SAS DATA SET;

proc format ;
      value utdf 1='UP-TO-DATE'
                 2='NOT UP-TO-DATE';
run;

data o;
set data.nprpuf99                        /** SPEIFY NAME OF THE DATA SET **/
(where=(19<=icagemr<=35 and bestval=1));   ** AGE 19-35 MO **
                                           ** AND HAVE BEST VALUE **;
run;

/*****AUTOMATICALLY COLLAPSES STRATA TO HAVE AT LEAST TWO PSU PER STRATUM

If the original NHIS stratum has 2 PSUs with eligible children, it is retained.  If the NHIS stratum contains
only one non-empty PSU, it is merged with the last retained stratum.    See the list of original and new collapsed
strata in the table following this program to collapse the strata manually.   *****/

/*** DEFINE UP-TO-DATE STATUS FOR EACH VACCINE AND SERIES ***/

proc sort nodupkey out=o1(keep=stratum psu);
by stratum psu ;

data o2(keep=stratum goodstra);
set o1;
by stratum psu ;
retain goodstra 1 ;

if first.stratum and ^last.stratum  then do;  /* STRATA WITH 2 PSU */
goodstra=stratum; end;

if last.stratum and first.stratum  then do;   /* STRATA WITH ONE PSU */
 output;    end;

proc sort nodupkey;
by stratum;

proc sort data=o;
by stratum;

data o;
merge o(in=_1) o2(in=_2);
by stratum;
if _1;
if _2 then stratum=goodstra;
format b_u: but: utdf.;
```

```
run;

proc sort;                         /* SORT BY NEST VARIABLES */
by stratum psu;
run;

proc crosstab data=o filetype=sas design=wr;                    /* CALLABLE SUDAAN PROCEDURE */
weight wt_bv2;
nest stratum psu/missunit;
subgroup b_utddtp b_utddt3 b_utdpol b_utdmmr b_utdhib b_utdhib b_utdhep
    b_utd431 butd4313 but43133;
levels      2 2 2 2 2 2 2 2 2 2;
tables   b_utddtp b_utddt3 b_utdpol b_utdmmr b_utdhib b_utdhib b_utdhep
    b_utd431 butd4313 but43133  ;
output / filename=se tablecell=default replace;
run;
```

COLLAPSED STRATA: Table to show which NHIS strata were collapsed in to new
NHIS/NIPRCS strata for analysis

Stratum with 1 PSU	Stratum Collapsed Into
3	2
4	2
5	2
6	2
9	8
13	12
14	12
17	16
18	16
19	16
21	20
23	22
24	22
25	22
29	28
35	34
36	34
37	34
38	34
39	34
40	34
44	43
45	43
47	46
48	46
49	46
51	50
55	54
57	56
59	58
60	58
63	62
66	65
72	71
82	79
86	85
88	87
90	89
97	96
99	98
101	100
103	102
104	102
110	109
111	109
113	112
117	116
119	118
121	120
125	124
130	129
135	134
139	138
146	144
151	150
156	155
162	161
165	164
166	164
169	168
170	168
173	172
174	172
177	176
178	176
184	183

185	183
189	187
191	190
192	190
194	190
197	196
198	196
199	196
205	203
206	203
207	203
210	208
213	212
214	212
216	215
217	215
220	219
221	219
223	222
224	222
227	226
229	228
230	228
236	234
237	234
243	242
246	245
248	247
250	249
252	249
254	253
257	256
263	262
264	262
268	267
273	272
274	272
276	275
277	275
278	275
281	280
282	280
283	280
285	284
291	290
292	290
294	293
295	293
300	299
303	302
307	306
308	306
313	312
316	314
318	317
328	326
331	330
335	334
336	334
338	334
339	334

APPENDIX F
UNWEIGHTED DISTRIBUTION OF CHILDREN AGED 12-35 MONTHS IN THE 1999 NHIS/NIPRCS
BY SELECTED DEMOGRAPHIC CHARACTERISTICS

UNWEIGHTED DISTRIBUTION OF AGED 12-35 MONTHS CHILDREN IN THE 1999 NHIS/NIPRCS
BY SELECTED DEMOGRAPHIC CHARACTERISTICS

Demographic Characteristic	Immunization Supplement (n %)	Shot Card Users (n %)	No Shot Card Users (n %)	With Provider Data (n %)	No Provider Data (n %)
Total	2565	890	1675	1427	1138
Age of Child					
1. 12-18	772 30.1	294 33.0	478 28.5	431 30.2	341 30.0
2. 19-24	597 23.3	208 23.4	389 23.2	337 23.6	260 22.8
3. 25-29	533 20.8	177 19.9	356 21.3	311 21.8	222 19.5
4. 30-35	663 25.8	211 23.7	452 27.0	348 24.4	315 27.7
Gender of Child					
1. Male	1343 52.4	472 53.0	871 52.0	742 52.0	601 52.8
2. Female	1222 47.6	418 47.0	804 48.0	685 48.0	537 47.2
Race/Ethnicity of Child					
1. Hispanic	748 29.2	328 36.9	420 25.1	382 26.8	366 32.2
2. Black, nonHispanic	394 15.4	102 11.5	292 17.4	181 12.7	213 18.7
3. White, nonHispanic	1325 51.7	425 47.8	900 53.7	821 57.5	504 44.3
4. Other, nonHispanic	98 3.8	35 3.9	63 3.8	43 3.0	55 4.8
Poverty Status					
1. Below	457 17.8	193 21.7	264 15.8	261 18.3	196 17.2
2. Above	1564 61.0	574 64.5	990 59.1	961 67.3	603 53.0
3. Unknown	544 21.2	123 13.8	421 25.1	205 14.4	339 29.8
Income					
1. $20,000 and above	1789 69.7	611 68.7	1178 70.3	1041 73.0	748 65.7
2. Less than $20,000	662 25.8	250 28.1	412 24.6	349 24.5	313 27.5
3. Unknown	114 4.4	29 3.3	85 5.1	37 2.6	77 6.8
Education of Mother					
1. Less than High School	528 20.6	202 22.7	326 19.5	274 19.2	254 22.3
2. High School	650 25.3	221 24.8	429 25.6	352 24.7	298 26.2
3. Some College	681 26.5	225 25.3	456 27.2	399 28.0	282 24.8
4. College Graduate	503 19.6	175 19.7	328 19.6	303 21.2	200 17.6
5. Unknown	203 7.9	67 7.5	136 8.1	99 6.9	104 9.1

Demographic Characteristic	Immunization Supplement (n %)		Shot Card Users (n %)		No Shot Card Users (n %)		With Provider Data (n %)		No Provider Data (n %)	
Census Region										
1. Northeast	446	17.4	131	14.7	315	18.8	219	15.3	227	19.9
2. Midwest	531	20.7	165	18.5	366	21.9	342	24.0	189	16.6
3. South	905	35.3	304	34.2	601	35.9	539	37.8	366	32.2
4. West	683	26.6	290	32.6	393	23.5	327	22.9	356	31.3
MSA										
1. 5,000,000 or more	291	11.3	103	11.6	188	11.2	107	7.5	184	16.2
2. 2,500,000 - 4,999,999	364	14.2	120	13.5	244	14.6	206	14.4	158	13.9
3. 1,000,000 - 2,499,999	681	26.5	240	27.0	441	26.3	351	24.6	330	29.0
4. 500,000 - 999,999	293	11.4	105	11.8	188	11.2	174	12.2	119	10.5
5. 250,000 - 499,999	273	10.6	86	9.7	187	11.2	158	11.1	115	10.1
6. Under 250,000	192	7.5	57	6.4	135	8.1	118	8.3	74	6.5
7. Non-MSA	471	18.4	179	20.1	292	17.4	313	21.9	158	13.9
RACE										
1. White	1857	72.4	663	74.5	1194	71.3	1088	76.2	769	67.6
2. Black	382	14.9	97	10.9	285	17.0	173	12.1	209	18.4
3. AIAN	25	1.0	7	0.8	18	1.1	15	1.1	10	0.9
4. API	63	2.5	24	2.7	39	2.3	26	1.8	37	3.3
5. Other	158	6.2	67	7.5	91	5.4	77	5.4	81	7.1
6. Multiple race	69	2.7	26	2.9	43	2.6	43	3.0	26	2.3
7. Unknown	11	0.4	6	0.7	5	0.3	5	0.4	6	0.5
HISPNR_P										
0. Multiple Hispanic	18	0.7	9	1.0	9	0.5	12	0.8	6	0.5
1. Puerto Rican	54	2.1	10	1.1	44	2.6	19	1.3	35	3.1
2. Mexican	165	6.4	80	9.0	85	5.1	75	5.3	90	7.9
3. Mexican-American	383	14.9	186	20.9	197	11.8	218	15.3	165	14.5
4. Cuban/Cuban-American	16	0.6	2	0.2	14	0.8	6	0.4	10	0.9
5. Dominican Republic	18	0.7	6	0.7	12	0.7	7	0.5	11	1.0
6. Central of South America	68	2.7	27	3.0	41	2.4	28	2.0	40	3.5
8. Other Spanish	14	0.5	4	0.4	10	0.6	8	0.6	6	0.5
9-11. Hispanic/Spanish, unk	12	0.5	4	0.4	8	0.5	9	0.6	3	0.3
12. Non Hispanic/Spanish Orig	1817	70.8	562	63.1	1255	74.9	1045	73.2	772	67.8

**APPENDIX G
WEIGHTED DISTRIBUTION OF CHILDREN AGED 12-35 MONTHS IN THE 1999
NHIS/NIPRCS BY SELECTED DEMOGRAPHIC CHARACTERISTICS**

WEIGHTED DISTRIBUTION OF CHILDREN Aged 12-35 MONTHS IN THE 1999 NHIS/NIPRCS BY SELECTED DEMOGRAPHIC CHARASTERISTICS (WEIGHT = WTFA_IM)

Demographic characteristic	Immunization Supplement (n %)		Shot Card Users (n %)		No Shot Card (n %)		With Provider Data (n %)		No Provider Data (n %)	
Total	7781211		2585902		5195309		4471486		3309725	
Age of Child										
1. 12-18	2313718	29.7	840192	32.5	1473526	28.4	1339991	30.0	973727	29.4
2. 19-24	1822162	23.4	631405	24.4	1190757	22.9	1063927	23.8	758235	22.9
3. 25-29	1640999	21.1	513528	19.9	1127471	21.7	997070	22.3	643929	19.5
4. 30-35	2004332	25.8	600777	23.2	1403555	27.0	1070498	23.9	933834	28.2
Gender of Child										
1. Male	3977070	51.1	1351267	52.3	2625803	50.5	2283358	51.1	1693712	51.2
2. Female	3804141	48.9	1234635	47.7	2569506	49.5	2188128	48.9	1616013	48.8
Race/Ethnicity of Child										
1. Hispanic	1448876	18.6	599339	23.2	849537	16.4	735714	16.5	713162	21.5
2. Black, nonHispanic	1110629	14.3	295326	11.4	815303	15.7	520818	11.6	589811	17.8
3. White, nonHispanic	4879022	62.7	1565508	60.5	3313514	63.8	3057915	68.4	1821107	55.0
4. Other, nonHispanic	342684	4.4	125729	4.9	216955	4.2	157039	3.5	185645	5.6
Poverty Status										
1. Below	1161560	14.9	459699	17.8	701861	13.5	673277	15.1	488283	14.8
2. Above	5083832	65.3	1802305	69.7	3281527	63.2	3169702	70.9	1914130	57.8
3. Unknown	1535819	19.7	323898	12.5	1211921	23.3	628507	14.1	907312	27.4
Income										
1. $20,000 and above	5737631	73.7	1911001	73.9	3826630	73.7	3420877	76.5	2316754	70.0
2. Less than $20,000	1710430	22.0	596023	23.0	1114407	21.5	933707	20.9	776723	23.5
3. Unknown	333150	4.3	78878	3.1	254272	4.9	116902	2.6	216248	6.5
Education of Mother										
1. Less than High School	1259247	16.2	421120	16.3	838127	16.1	675136	15.1	584111	17.6
2. High School	1985001	25.5	657067	25.4	1327934	25.6	1100383	24.6	884618	26.7
3. Some College	2223042	28.6	726059	28.1	1496983	28.8	1337866	29.9	885176	26.7
4. College Graduate	1770478	22.8	626216	24.2	1144262	22.0	1094974	24.5	675504	20.4
5. Unknown	543443	7.0	155440	6.0	388003	7.5	263127	5.9	280316	8.5

Demographic characteristic	Immunization Supplement (n %)		Shot Card Users (n %)		No Shot Card (n %)		With Provider Data (n %)		No Provider Data (n %)	
Census Region										
1. Northeast	1482360	19.1	428170	16.6	1054190	20.3	770621	17.2	711739	21.5
2. Midwest	1828351	23.5	569279	22.0	1259072	24.2	1198824	26.8	629527	19.0
3. South	2719339	34.9	866390	33.5	1852949	35.7	1631754	36.5	1087585	32.9
4. West	1751161	22.5	722063	27.9	1029098	19.8	870287	19.5	880874	26.6
MSA										
1. 5,000,000 or more	729084	9.4	243634	9.4	485450	9.3	295251	6.6	433833	13.1
2. 2,500,000 - 4,999,999	1127847	14.5	371840	14.4	756007	14.6	656406	14.7	471441	14.2
3. 1,000,000 - 2,499,999	2027835	26.1	685584	26.5	1342251	25.8	1086250	24.3	941585	28.4
4. 500,000 - 999,999	885519	11.4	313822	12.1	571697	11.0	526559	11.8	358960	10.8
5. 250,000 - 499,999	862575	11.1	261191	10.1	601384	11.6	496639	11.1	365936	11.1
6. Under 250,000	618730	8.0	166035	6.4	452695	8.7	385427	8.6	233303	7.0
7. Non-MSA	1529621	19.7	543796	21.0	985825	19.0	1024954	22.9	504667	15.2
RACE										
1. White	5867859	75.4	1988676	76.9	3879183	74.7	3536916	79.1	2330943	70.4
2. Black	1059472	13.6	274566	10.6	784906	15.1	494988	11.1	564484	17.1
3. AIAN	75432	1.0	18364	0.7	57068	1.1	43333	1.0	32099	1.0
4. API	224417	2.9	87383	3.4	137034	2.6	97693	2.2	126724	3.8
5. Other	328492	4.2	132045	5.1	196447	3.8	163463	3.7	165029	5.0
6. Multiple race	201637	2.6	73337	2.8	128300	2.5	126132	2.8	75505	2.3
7. Unknown	23902	0.3	11531	0.4	12371	0.2	8961	0.2	14941	0.5
HISPNR_P										
0. Multiple Hispanic	36974	0.5	15025	0.6	21949	0.4	21424	0.5	15550	0.5
1. Puerto Rican	115097	1.5	17821	0.7	97276	1.9	41513	0.9	73584	2.2
2. Mexican	314248	4.0	146192	5.7	168056	3.2	151692	3.4	162556	4.9
3. Mexican-American	721185	9.3	339169	13.1	382016	7.4	399676	8.9	321509	9.7
4. Cuban/Cuban-American	27009	0.3	2488	0.1	24521	0.5	9585	0.2	17424	0.5
5. Dominican Republic	35630	0.5	10929	0.4	24701	0.5	13481	0.3	22149	0.7
6. Central of South America	146029	1.9	53810	2.1	92219	1.8	67248	1.5	78781	2.4
8. Other Spanish	29283	0.4	6739	0.3	22544	0.4	15898	0.4	13385	0.4
9-11. Hispanic/Spanish, unk	23421	0.3	7166	0.3	16255	0.3	15197	0.3	8224	0.2
12. Non Hispanic/Spanish Orig	6332335	81.4	1986563	76.8	4345772	83.6	3735772	83.5	2596563	78.5

APPENDIX H
DESCRIPTIVE STATISTICS FOR TWO SAMPLING WEIGHT VARIABLES
INCLUDED IN THE 1999 NHIS/NIPRCS DATA FILE

DESCRIPTIVE STATISTICS FOR TWO SAMPLING WEIGHT VARIABLES INCLUDED IN 1999 NHIS/NIPRCS DATA FILE

CHILDREN AGED 12-35 MONTHS IN IMMUNIZATION SUPPLEMENT

NIPRCS 1999
WEIGHT - WTFA_IM

	NUMBER CHILDREN	SUM OF WEIGHTS	MINIMUM VALUE	MAXIMUM VALUE	MEAN	COEFFICIENT OF VARIATION
Total	2565	7781211	778	8280	3033.61	39.2981
Age of Child						
1. 12-18	772	2313718	778	8222	2997.04	41.7643
2. 19-35	1793	5467493	815	8280	3049.35	38.2240
Gender						
1. Male	1343	3977070	778	7705	2961.33	39.0218
2. Female	1222	3804141	914	8280	3113.05	39.4044
Race/Ethnicity						
1. Hispanic	748	1448876	778	6640	1937.00	44.6198
2. Black, nonHispanic	394	1110629	1033	7682	2818.86	32.4918
3. White, nonHispanic	325	4879022	1007	8280	3682.28	25.4055
4. Other, nonHispanic	98	342684	1007	8280	3496.78	29.2396

CHILDREN AGED 12-35 MONTHS WITH BEST VALUES FOR DATES

NIPRCS 1999
WEIGHT - WT_BV2

	NUMBER CHILDREN	SUM OF WEIGHTS	MINIMUM VALUE	MAXIMUM VALUE	MEAN	COEFFICIENT OF VARIATION
Total	1533	7781211.00	910.85	18169.74	8075.81	47.9177
Age of Child						
1. 12-18	464	2313718.01	910.85	18169.74	4986.46	49.2188
2. 19-35	1069	5467492.99	1017.04	17848.02	5114.59	47.3683
Gender						
1. Male	800	3951675.58	910.85	17848.02	4939.59	48.2715
2. Female	733	3829535.42	1017.04	18169.74	5224.47	47.4002
Race/Ethnicity						
1. Hispanic	423	1448876.00	1017.04	17328.41	3425.24	63.0488
2. Black, nonHispanic	195	1110628.99	1731.84	12907.33	5695.53	40.2736
3. White, nonHispanic	886	4952485.22	910.85	18169.74	5718.81	38.7513
4. Other, nonHispanic	49	269220.79	2077.90	11612.59	5494.30	40.0001