



RESULTS OF THE 2023 IMMUNIZATION STATUS SURVEY OF 24-MONTH-OLD CHILDREN IN TENNESSEE



Acknowledgements

Birth data were provided by the Tennessee Department of Health, Office of Vital Records and Statistics. Women, Infants, and Children (WIC) Program data were provided by the Tennessee Department of Health, Division of Family Health and Wellness. Immunization data were collected by county and regional health department nurses, immunization representatives and disease investigation staff. Data entry, analysis and reporting were conducted by staff of the Tennessee Vaccine-Preventable Diseases and Immunization Program. Survey data were collected using REDCap electronic data capture tools hosted at the Tennessee Department of Health. REDCap (Research Electronic Data Capture, <http://projectredcap.org/>) is a secure web-based application designed to support data capture.

Executive Summary

The 2023 Immunization Status Survey of 24-month-old Children (Immunization Status Survey) in Tennessee is conducted by the Tennessee Department of Health (TDH) Vaccine-Preventable Diseases and Immunization Program (VPDIP) and Tennessee's 13 Regional and Metro Health Departments. The purpose of this survey is to track progress toward achieving the national Healthy People objectives for immunization coverage with Advisory Committee on Immunization Practices (ACIP) routinely recommended early childhood vaccines.

This survey utilizes a retrospective cohort research design to determine the up-to-date (UTD) immunization rates for 24-month-old children born in Tennessee. The survey population is composed of random samples drawn from birth certificates of infants born in each of the 13 health department regions. The children sampled for the survey were born during the first quarter of 2021 and celebrated their second birthdays between January 1 and March 31, 2023. Identifying information was obtained from electronic birth records, and immunization history data were collected primarily via the statewide immunization registry, Tennessee Immunizations Information System (TennIIS).

Immunization rates for the Full Series (4:3:1:FS:3:1:FS) (4 DTaP, 3 Polio, 1 MMR, 3 Hib, 3 Hepatitis B, 1 Varicella, and 4 PCV) were based on the childhood immunization and catch-up schedules recommended by the ACIP. The results of the survey are aggregated to give regional and statewide statistics on immunization coverage rates in Tennessee and track the progress toward achieving Healthy People objectives. Additionally, VPDIP set a Tennessee specific goal of 90% coverage with on-time immunization for each routinely recommended vaccine before age two years.

Each child's immunization record was reviewed to determine if they were UTD. If the child was not UTD, an effort was made by local public health staff to contact parents, guardians, and providers to obtain any missing immunization history data. If further follow-up revealed that the child was truly not UTD, the data collection process served as a reminder-recall system for parents and providers.

If all Full Series (4:3:1:FS:3:1:FS) vaccination dates occurred before the child reached 24 months of age or if the series was completed according to the Centers for Disease Control and Prevention's (CDC) catch-up schedule guidance, the child was classified as UTD by 24 months. Children were excluded from the UTD by 24 months

classification if at least one of the Full Series (4:3:1:FS:3:1:FS) dates occurred after the child reached 24 months of age and did not meet the catch-up schedule recommendations.

In 2023, the Tennessee statewide UTD immunization rate by 24 months increased to 77.7% from 77.1% in 2022 (Table 3, pg. 18). Historically, Tennessee has high vaccination rates, but has not achieved many prior or current Healthy People objectives. In 2023, Tennessee did not achieve any of the three HP2030 objectives. Tennessee ranks in the bottom 25% of states for the completion of Full Series (4:3:1:FS:3:1:FS) ranking 41st in the nation and sixth out of eight in Region 4 of the United States Department of Health and Human Services (HHS), which includes Alabama, Florida, Georgia, Kentucky, Mississippi, North Carolina, Tennessee, and South Carolina.^{1,2}

Additionally, there was considerable variation by region in the percent of children found to be UTD by 24 months (*with data collection*), ranging from 66.1% in the Memphis-Shelby County Region (MSR) to 91.0% in the Northeast Region (NER). Caution should be taken when interpreting immunization rates for a region with a low response rate because children who are excluded from the study due to being unable-to-locate (UTL) could also be the least UTD. The greatest UTD by 24 months improvement was observed in Upper Cumberland Region, which had a 13.6 percentage point increase from 2022 to 2023 (Table 8, pg. 38).

A preliminary immunization rate was calculated: UTD by 24 months (*as reported to TennIIS*). This rate represents the percentage of study participants whose vaccines were UTD by 24 months based only on the information found in TennIIS prior to the survey, *i.e.*, no follow up with parents or providers. In Tennessee, providers voluntarily report vaccine administration to TennIIS other than vaccines that are provided through a federally-funded program such as the Vaccines for Children (VFC) Program. For all 24-month-old children in Tennessee, the Full Series (4:3:1:FS:3:1:FS) UTD immunization rate for all vaccines based on TennIIS data alone was 37.3%, 5.5 percentage points higher than 2022, and 40.4 percentage points below the UTD by 24 months rate (77.7%) based on survey data. This suggests that there is substantial underreporting to TennIIS by Tennessee healthcare providers.

IMMUNIZATION STATUS SURVEY – 2023

The percentage of Tennessee children who received the fourth dose of DTaP by 24 months of age decreased by 0.5 percentage points from 2022 to 2023. This rate continues to be significantly lower than the percentage of children who received the third dose by 24 months of age.

Historically, Tennessee has not met the Healthy People 2030 objective for DTaP. In fact, 92.8% of children received three doses of DTaP by 24 months of age while only 80.5% received their fourth dose in 2023 (Figure 16, pg. 35). The third dose of DTaP can be given as early as 6 months of age; however, the fourth dose must be delayed until at least 12 months of age and 6 months after the third dose. These results suggest that patient outreach efforts specific to the fourth dose of DTaP may be helpful for parents after their child's one year check-up.

Although young children have increased risk of developing serious flu-related complications such as pneumonia, dehydration and death, Tennessee children continue to be under vaccinated against influenza.³ Therefore, promoting timely immunization practices with influenza vaccine remains a high priority for VPDIP. Among the 2023 cohort, only 41.2% of 24-month-old children had received two doses of influenza vaccine by 24 months of age, a significant decrease from 48.3% in 2022 (Table 3, pg. 18).

In addition to individual vaccine analysis, multiple risk factors and their potential effects on UTD status were evaluated. These risk factors include safety-net program enrollment, race, number of siblings, etc. Enrollment in medical safety-net programs, TennCare and Women, Infants, and Children (WIC), was analyzed to determine if a child had ever been enrolled in one or both programs at any time. Participants were assigned into categories based on their enrollment status (TennCare only, WIC only, or enrollment in both programs). The UTD rate by 24 months for children who were enrolled in WIC only (76.4%) was lower than in any of the other categories (Table 4, pg. 24).

The 2023 Immunization Status Survey report offers the people of Tennessee and its health regions a chance to study demographic and immunization history data simultaneously, so that evidence-based programs can be created to raise immunization rates across the state of Tennessee.

Definitions of Abbreviations

Organizations and Terminology

TDH: Tennessee Department of Health
VPDIP: Vaccine-Preventable Diseases and Immunization Program
ACIP: Advisory Committee on Immunization Practices
CDC: Centers for Disease Control and Prevention
FDA: Food and Drug Administration
HHS: United States Department of Health and Human Services
TennIIS: Tennessee Immunizations Information System
NIS: National Immunization Survey (CDC)
WIC: Women, Infants, and Children Program
VFC: Vaccines for Children
UTD: Up-to-Date
UTL: Unable-to-Locate

Vaccines

COVID: coronavirus disease vaccine
DTaP: diphtheria, tetanus, acellular pertussis vaccine
IPV: inactivated polio vaccine
HAV: hepatitis A vaccine
HBV: hepatitis B vaccine
HIB: *Haemophilus influenzae*, type B vaccine
MMR: measles, mumps, rubella vaccine
VAR: varicella (chickenpox) vaccine
PCV: pneumococcal conjugate vaccine
Full Series (4:3:1:FS:3:1:FS): combined DTaP, IPV, MMR, HIB, HBV, VAR, and PCV vaccine series
FLU: seasonal influenza vaccine
RTV: rotavirus vaccine

Public Health Regions

Rural, multi-county regions

- I. WTR: West Tennessee Region
- II. SCR: South Central Region
- III. MCR: Mid-Cumberland Region
- IV. UCR: Upper Cumberland Region
- V. SER: Southeast Region
- VI. ETR: East Tennessee Region
- VII. NER: Northeast Region

Metropolitan, single county regions

- I. MSR: Memphis-Shelby County Region
- II. JMR: Jackson-Madison County Region
- III. NDR: Nashville-Davidson County Region
- IV. CHR: Chattanooga-Hamilton County Region
- V. KKR: Knoxville-Knox County Region
- VI. SUL: Sullivan County Region

Table of Contents	
Contents	Page
Acknowledgements	3
Executive Summary	4
Definitions of Abbreviations	6
Table of Contents	7
Section I: Survey Overview	
Introduction	9
Table 1. ACIP List of Diseases to Prevent through Vaccination of Children Less than 24 Months of Age	10
Table 2. Catch-Up Guidance for PCV and HIB, Centers for Disease Control and Prevention	11
Methods	14
Section II: Statewide Results	
Statewide Mapping	17
Figure 1 (A-C): Tennessee Mapping	17
2023 Sample Population	18
Table 3-A: Survey Sampling	18
Table 3-B: Survey Size and Response Rate by Region	18
Immunization Rates	19
Table 4-A: Immunization Rates by Series and Vaccine Antigen	19
Figure 2: Immunization Rates (%) by Series and Vaccine Antigen	20
Figure 3: UTD by 24 Months Immunization Rates by Vaccine Antigen	21
Table 4-B: Vaccine Refusal by Region	22
Figure 4 (A-B): Vaccine Refusal Trends	23
Table 4-C: Survey Demographics and Immunization Rates	24
Risk Factor Analysis	25
Figure 5: Comparison of UTD Children by Program Enrollment	25
Table 5: Prevalence of Risk Factors for Delayed Immunizations	26
Figure 6: Comparison of UTD Children by Immunization Provider Type	26
Figure 7: Comparison of UTD Children by Number of Siblings	27
Figure 8: Comparison of UTD Children by Age at First Administration	27
Table 6-A: UTD Immunization Rate by Program Enrollment Groups	28
Table 6-B: Survey Results Compared to Healthy People Objectives	29
Figure 9: Comparison of Immunization Rates by Series and Vaccine Antigen by Race	30
Figure 10: Comparison of UTD Children by Race Trend	30
Figure 11: Seasonal Influenza Vaccines by 24 Months of Age	30
Seasonal Influenza Vaccination	31
Figure 12: One Dose of Seasonal Influenza Vaccines by 12 Months	31
Figure 13: First Influenza Dose by One Year by Region	32
Figure 14: Two Doses of Seasonal Influenza Vaccines by Race	33
Figure 15: One Dose of Seasonal Influenza Vaccine by Race	33
Opportunities for Improvement	34
Figure 16: Percentage of Children with Complete DTaP Three Dose vs Four Dose Series by Region	34
Figure 17: Percentage of Children with Complete HIB Series with ACIP vs CDC Catch-Up Schedule by Region	35
Figure 18: Percentage of Children with Complete PCV Series with ACIP vs CDC Catch-Up schedule by Region	35
Regional Immunization Rates	36
Table 7: UTD Immunization Rates by Region	36
Figure 19: UTD Immunization Rates by Region	36
Table 8: Regional Champions	37
Summary of Key Findings	38
Discussion	39
References	43

Section III: Health Region Results	
Memphis-Shelby County Region	44
West Tennessee Region	47
Jackson-Madison County Region	50
South Central Region	53
Mid-Cumberland Region	56
Nashville-Davidson County Region	59
Upper Cumberland Region	62
Southeast Region	65
Chattanooga- Hamilton County Region	68
East Tennessee Region	71
Knoxville-Knox County Region	74
Northeast Region	77
Sullivan County Region	80
Appendices	
Appendix I: Regional Antigen Specific Results	82
DTaP & Polio	83
MMR & Haemophilus influenzae type b	84
Hepatitis B (3-dose coverage) & Hepatitis B (birth dose)	85
Varicella & Pneumococcus	86
4:3:1:FS:3:1:FS series & Hepatitis A	87
Rotavirus & Influenza (2-dose coverage)	88
Coronavirus (2-dose coverage)	89
Appendix II: Data Tables for Selected Analyses	90
Series Complete (4:3:1:FS:3:1:FS)	91
Series Complete (4:3:1:FS:3:1:FS) by Provider Type	91
Series Complete (4:3:1:FS:3:1:FS) by Race	92
Series Complete (4:3:1:FS:3:1:FS) by Number of Siblings	92
Series Complete (4:3:1:FS:3:1:FS) by TennCare Enrollment	93
Series Complete (4:3:1:FS:3:1:FS) by WIC Enrollment Philosophical	93
Appendix III: Regional One Page Summaries	94
Memphis-Shelby County Region	95
West Tennessee Region	96
Jackson-Madison County Region	97
South Central Region	98
Mid-Cumberland Region	99
Nashville-Davidson County Region	100
Upper Cumberland Region	101
Southeast Region	102
Chattanooga- Hamilton County Region	103
East Tennessee Region	104
Knoxville-Knox County Region	105
Northeast Region	106
Sullivan County Region	107
Appendix IV: Map of Regional and Metropolitan Health Departments in Tennessee	108

SECTION I

Introduction

An annual Immunization Status Survey of 24-month-old Children in Tennessee is conducted by the Tennessee Department of Health's (TDH) Vaccine-Preventable Diseases and Immunization Program (VPDIP) to track progress toward achieving Health People objectives and at least 90% on-time immunization with each routinely recommended vaccine antigen for before age two years.* The survey is composed of random samples drawn from birth certificates of infants born in each of the 13 health department regions, which are aggregated to give statewide and regional statistics on immunization coverage rates in Tennessee.

Safety and Efficacy of Immunizations

The United States has the safest and most effective vaccine supply in its history. Prior to licensure, rigorous clinical trials are carried out by the vaccine manufacturers and reviewed by the Food and Drug Administration (FDA). Vaccines are recommended only when proven to be safe, effective, and beneficial. After licensure, vaccines continue to be monitored for rare adverse reactions. Most vaccinated children never experience an adverse reaction. The most frequently reported adverse reactions are minor and include soreness at injection site, a rash, or a mild fever that subsides within one to two days.³

Vaccines help the body build immunity against disease. Because of the success of vaccines, many diseases that were historically commonplace have become rare or have been eliminated from the United States. By vaccinating a child, benefits also extend to others. Individuals who cannot develop immunity from vaccines, have medical conditions that do not allow them to be vaccinated, and babies who are too young to be vaccinated rely on the immunity of those around them to protect them from serious infectious diseases.⁴

Value of Immunizations

Timely routine vaccination of children protects community health, prevents outbreaks, and saves money and lives. The federal Vaccines for Children (VFC) Program, implemented in 1994, assures affordable access to all

routine vaccines for children who are without private insurance coverage. In Tennessee, over 650 providers across the state are enrolled as VFC providers and there is at least one VFC provider in each of Tennessee's 95 counties. The CDC estimates that the routine vaccines given to U.S. children born between 1994 and 2021 **will prevent an average of 472 million childhood illnesses and prevent the premature death of 1,052,000 of these children over their lifetimes.**⁵ Additionally, CDC calculates that vaccination of each U.S. birth cohort according to the current immunization schedule yields a net savings of nearly \$479 billion in direct medical costs and \$2.2 trillion in total costs to society.⁶ With roughly two percent of the U.S. population living in Tennessee, this suggests Tennessee has benefitted from the prevention of approximately 9.4 million cases of disease in the past decade, with **annual savings of \$9.6 billion in direct medical costs and \$44 billion in total costs to society.**

In Tennessee, unvaccinated and under-vaccinated children have comprised substantial proportions of reported vaccine-preventable infections such as measles, mumps, and pertussis (whooping cough). Most children who die each year from seasonal influenza are unvaccinated.^{7,8} These diseases not only place Tennesseans at risk for significant morbidity and mortality, but also create significant fiscal burden upon the State. Even small outbreaks place tremendous strain upon our public health system and divert attention from other critical public health initiatives.

* In accordance with ACIP recommendations, coverage needed for herd immunity, and Tennessee's previous challenges in achieving HP2020 goals, an internal goal of 90% on-time immunization rates has been set by VPDIP.

Vaccines Assessed

This survey assesses vaccine completion according to the Advisory Committee on Immunization Practices’ (ACIP) recommendations for protection against fifteen serious illnesses before the age of 24 months: diphtheria, tetanus, pertussis (combined as DTaP), poliomyelitis (IPV), measles, mumps, rubella (combined as MMR), *Haemophilus*

influenza type B (HIB), hepatitis B (HBV), varicella (VAR), and *Streptococcus pneumoniae* or “pneumococcus” (PCV). Combined, these are known as the 4:3:1:FS:3:1:FS series.⁹ Additionally, this survey analyzes completion of hepatitis A (HAV), rotavirus (RTV), seasonal influenza (Flu), and seasonal coronavirus disease (COVID) vaccines.

Table 1. ACIP List of Diseases to Prevent through Vaccination of Children Less than 24 Months of Age

Disease(s)	Possible complications of disease
Coronavirus disease (COVID)	Multisystem inflammatory syndrome in children (MIS-C), post-COVID conditions (PCC), hospitalization, respiratory failure, death
Diphtheria, Tetanus, Pertussis (DTaP)	<i>Diphtheria</i> : upper airway obstruction, pneumonia, respiratory failure, death
	<i>Tetanus</i> : spasms of respiratory and skeletal muscles, death
	<i>Pertussis</i> : severe, long-term cough, vomiting, breathlessness, death in infants
Poliomyelitis (IPV)	Paralysis, death
Measles, Mumps, Rubella (MMR)	<i>Measles</i> : ear infections, pneumonia, cardiac and neurologic problems, encephalitis, death
	<i>Mumps</i> : decreased fertility, meningitis, arthritis, hearing impairment
	<i>Rubella</i> : arthritis, encephalitis, birth defects
<i>Haemophilus influenzae</i> type B (HIB)	Pneumonia, meningitis, neurologic problems, death
Hepatitis B (HBV)	Fulminant hepatitis, jaundice, liver cancer, cirrhosis, premature death
Varicella (VAR/Chickenpox)	Rash illness, severe disease in immunocompromised, birth defects, encephalitis, death
Pneumococcus (PCV)	Ear infections, pneumonia, meningitis, blood stream infections, death
Hepatitis A (HAV)	Fever, nausea, jaundice, death
Influenza (Flu)	Secondary pneumonia, exacerbation of chronic diseases, hospitalization, death
Rotavirus (RTV)	Dehydration, hospitalization, death

Vaccine Completion Logic

Complete on-time immunization in this survey is defined as having received four doses of DTaP vaccine, three doses of IPV vaccine, one dose of MMR vaccine, three or four doses of HIB vaccine (depending on brand received or any child clinically considered complete based on the CDC’s “catch-up” schedule), three doses of HBV vaccine, one dose of VAR vaccine and four doses of PCV vaccine (or any child clinically considered complete based on the CDC’s “catch-up” schedule).

This survey accounts for the vaccine brand, if known, and classifies a child as complete only if the appropriate number of doses have been administered. If any documented HIB dose was given as the four-dose product, then only receipt of four doses was considered as a complete series. In the absence of documentation of vaccination brand, receipt of four doses of HIB is classified as series completion. Likewise, if any documented RTV dose was given as the three-dose product, then only receipt of three doses was considered as a complete series. In the absence of documentation of vaccination

brand, three doses of RTV are classified as series completion. This methodology change accounts for both the vaccine schedule and vaccine brand to ensure that only children who have received the vaccine on the correct schedule and with the correct brand are considered complete. As a result, point estimates for HIB and RTV coverage rates are lower than previous estimates, but also more accurate and more consistent with methods used by the CDC.

In 2019, additional analyses were included to account for the HIB and PCV catch-up schedules. Prior to 2019, counts of vaccinations were used to calculate series completion for both HIB and PCV. However, this method inaccurately captured completion for these vaccines due to the unique vaccination schedules that exist when a child receives their first dose after the recommended age, but prior to 24 months. By assessing completion based upon requirements for the age of first vaccination, HIB and PCV completeness more accurately mirrors ACIP forecasting and clinical decision-making.

Table 2. Catch-Up Guidance for PCV and HIB, Centers for Disease Control and Prevention¹⁰

Age at Dose 1	Age at Dose 2	Age at Dose 3	Recommendation
PCV			
< 12 months old	< 12 months old	< 12 months old	Needs 4th dose 8 weeks later
< 12 months old	Between 7-11 months old		Needs 3rd dose 8 weeks later
> 12 months old			Needs 2nd dose 8 weeks later
24-25 months			No additional dose needed
HIB			
< 12 months old	< 12 months old	< 12 months old	Needs 4th dose 8 weeks later
< 12 months old	Between 12-14 months old		Needs 3rd dose 8 weeks later
< 12 months old	> 15 months old		No additional dose needed
Between 12-14 months			Needs 2nd dose 8 weeks later
> 15 months old			No additional dose needed

Special Vaccine Considerations

Hepatitis A vaccine (HAV)

HAV is a two-dose series, starting on or after the first birthday. As the recommended dose spacing is six months, children who have only one dose by the second birthday are still on schedule. For this reason, this survey reports 24-month-old children as up-to-date with one dose of HAV. Tennessee experienced a multi-state epidemic of acute hepatitis A that began in 2017 and spanned more than two and a half years. Over the course of the outbreak, 3,149 Tennesseans were infected, 1,923 were hospitalized, and 28 died because of their illness.

Hepatitis B vaccine (HBV) birth dose

HBV birth dose is one dose of HBV vaccine, given between 24 hours and three days of life. In 2016, CDC revised its guidance to recommend routine administration of a hepatitis B birth dose within 24 hours of life (rather than prior to hospital discharge). This survey utilizes the maximum number of days past birth (3 days) to evaluate HBV birth dose. Birth dose hepatitis B is a key strategy to eliminate transmission of the hepatitis B virus from an infected mother to her infant. The Vaccine Preventable Diseases and Immunizations Program (VPDIP) manages the cases of more than one hundred infants who are exposed to the hepatitis B virus through their infected mothers each year. These infants are at high risk of chronic liver disease and early death, which can be avoided with appropriate vaccination.

Influenza vaccine (Flu)

Influenza vaccine (Flu) is given annually to children aged six months and older; two doses should be given during a child's first influenza season. Because protection is conferred only after two doses for this populations, this survey measures the proportion of children who have received two or more doses by their second birthday. Many children who die each year from influenza failed to receive an annual influenza vaccination.

Haemophilus influenzae type B vaccine (HIB)

HIB is either a three or four-dose series, starting on or after the second month of life. Two HIB schedules exist, depending upon the vaccine used. The full series (FS) of the Merck® product requires three doses; the FS of the Sanofi Pasteur® product requires four doses. Any mixed-brand schedule requires four doses. Any child receiving one or more doses of the 4-dose HIB product must have received four doses before the 25th month of life to be considered complete and on-time. This classification by HIB products administered reduces the degree of overestimation of on-time completion demonstrated by

past reports. Since the introduction of the HIB vaccine in 1987, the annual incidence of invasive Hib disease in children aged younger than 5 years old decreased by 99%.¹¹ In 2022, Tennessee had fewer than 5 reported cases of invasive *Haemophilus influenzae* type b (HIB) statewide.

Rotavirus vaccine (RTV)

RTV is either a two or three-dose series, starting on or after the second month of life. As with HIB vaccine, two rotavirus vaccine products are available with different dosing schedules. Rotateq® (Merck), requires three doses; Rotarix® (GSK) requires two doses. Mixed brand schedules require three doses. RTV is unique among vaccines as the series must be initiated no later than 15 weeks of age and no doses should be given after eight months of age. Prior to the introduction of the vaccine in 2006, RTV was the leading cause of severe diarrhea among infants and young children. Each year, the vaccine prevents an estimated 40,000 to 50,000 hospitalizations among U.S. infants and young children.

Coronavirus disease vaccine (COVID)

COVID is either a two or three dose series, recommended for children aged six months and older. As with HIB vaccine, two COVID vaccine products are available with different dosing schedules. Pfizer- BioNTech® requires three doses; Moderna® requires two doses. Due to the introduction of the COVID vaccine and the annual booster needed to maintain immunity, this survey measures the proportion of children who have received two or more doses by their second birthday.

Health People Framework

Healthy People 2030 Objectives

Healthy People 2030 (HP2030) objectives are established by the federal Department of Health and Human Services (HHS) to provide national targets for population health to be achieved prior to January 1, 2030. These objectives include vaccine coverage rates among children 2 years of age and are tracked nationally through the National Immunization Survey (NIS). TDH aims to reach or exceed each of these targets as quickly as possible and maintain those high rates of immunization coverage among children.

The following objectives for the percentage of children immunized by 2 years of age have been established by HP2030 and are relevant comparisons to the results of this survey:

- 90% complete DTaP vaccination with four or more doses
- 90.8% complete MMR vaccination with one or more doses
- ≤1.3% of children receive 0 doses of recommended vaccines

Methods

Survey Design

The annual Immunization Status Survey of 24-month-old Children in Tennessee utilizes a retrospective cohort research design to determine the up-to-date (UTD) immunization rates for 24-month-old children born in the state of Tennessee. The survey is composed of a representative random sample drawn from birth certificates of 1,558 (comprised of approximately 121 children from each of the 13 health department regions) infants born during the first quarter of 2021 in Tennessee. These children celebrated their second birthdays between January 1 and March 31, 2023. Identifying information was obtained from electronic birth records and immunization data were collected primarily via the Tennessee Immunization Information System (TennIIS). Immunization rates for the Full Series (4:3:1:FS:3:1:FS) (4 DTaP, 3 Polio, 1 MMR, 3 Hib, 3 Hepatitis B, 1 Varicella and 4 PCV vaccine doses) were based on the childhood immunization and catch-up schedules recommended by the Advisory Committee on Immunization Practices (ACIP) and Centers for Disease Control and Prevention (CDC) in 2023.

During the three-month data collection period, each immunization date was compared to the child's birth date to determine whether it was administered before or after 24 months of age and if it was a valid administered vaccine according to the ACIP vaccine schedule. If all Full Series (4:3:1:FS:3:1:FS) vaccine dates occurred before the child reached 24 months of age or if the series was completed according to the CDC's catch-up schedule guidance, the child was classified as up-to-date by 24 months. Children were excluded from the up-to-date by 24 months classification if at least one of the Full Series (4:3:1:FS:3:1:FS) dates occurred after the child reached 24 months of age and did not meet the ACIP on-time or CDC catch-up schedule recommendations.

A rate was calculated, up-to-date (UTD) by 24 months (*as reported to TennIIS*), served to ascertain how accurately TennIIS data reflect UTD immunization rates by 24 months of age, without parent/provider contact. Immunization rates of the UTD by 24 months (*with data collection*) were calculated for the entire sample and health region-specific samples. The UTD immunization rates were also calculated for demographic subgroups within these samples.

Target Population and Sample Selection

A random sample of 1,558 children born between January 1 and March 31, 2021, was selected to represent all children born in Tennessee in 2021 (approximately 79,122 live births). The sample was stratified by health jurisdiction to generate regional estimates. The sample size per region depends on the number of children born in that region and the racial demographic represented in that region.

Data Collection

Passive Data Collection

Data pertaining to the survey sample was requested from: electronic birth records supplied by Tennessee Department of Health, Office of Vital Records and Statistics, the Tennessee Women, Infants, and Children Supplemental Nutrition Program (WIC) and TennIIS.

Information from electronic birth records was used for sample selection and as a source of demographic data. The type of information obtained on each child *included*:

- Child's first, middle and last name
- Child's sex, race, ethnicity, and date of birth
- Mother's residential county
- Mother's first and last name
- Father's first and last name
- Mother's level of education, marital status, and age at delivery
- Father's level of education and age at delivery

The WIC enrollment variable was determined for each child by matching each child's name and date of birth with WIC enrollment data. Children enrolled in WIC for any amount of time during the first 24 months of life were designated as "enrolled in WIC". If a child was only ever enrolled in WIC, the "Program Enrollment" variable was determined to be "WIC Only."[†] The TennCare (Medicaid) enrollment variable was determined for each child by matching each child's name and date of birth with TennCare enrollment data. Children enrolled in TennCare for any amount of time during the first 24 months of life were designated as "enrolled in TennCare". If a child was only ever enrolled in TennCare, the "Program Enrollment" variable was determined to be "TennCare Only." If a child was found to have ever been enrolled in TennCare and

[†] Infants in WIC have immunization records reviewed at WIC visits. Targeted education and telephone follow-up are the primary tools used to encourage catch-up immunization of WIC infants.

IMMUNIZATION STATUS SURVEY – 2023

WIC, the “Program Enrollment” variable was determined to be “TennCare and WIC Enrollment.”

The “Vaccination Source” variable was determined based on the location where each individual vaccine was administered. If a child received vaccines exclusively in private provider offices, the child was classified as “Private Medical Provider Only.” If a child received vaccines exclusively in public clinics, the child was classified as “Health Department Only.” If a child received vaccines in both private provider offices and public clinics, the child was classified as “Both Private Medical Provider and Health Department.” If a vaccination source was unable to be determined, it was defined as “Unknown Vaccination Source.” Vaccinations given before 28 days of age were typically administered in hospital; they are considered as “Private Medical Provider” in provider type calculations.

Active Data Collection

An electronic web-based data collection system called REDCap was used to collect information for each child in the sample. The sampling frame, determined from birth records, was imported into REDCap to review immunization histories from TennIIS. TennIIS follows the recommended schedule of childhood immunizations approved by the ACIP to determine complete vaccine histories. The REDCap data collection system contains six distinct sections to be completed by the public health data collectors: Demographics (child), Demographics (parents), TennCare and WIC Status, Survey Eligibility and Exemption Status, Providers and Immunization History, Notes. Data collection was carried out by county and regional public health nurses. An initial immunization history check was performed by a VPDIP epidemiologist via TennIIS data to determine the up-to-date (UTD) status of the sample. If a child was UTD at this point, the child was noted as “Complete, Based on Initial TennIIS Records,” and no longer required follow-up. If a child was not UTD at this point, the data collection process was passed to the regional staff, with the dates found in TennIIS already entered in the REDCap system. Data collectors used the following protocol:

Step 1: Search for immunization records

Data collectors reviewed TennIIS records or health department records for additional immunization history. If the child’s immunization record was still incomplete, the data collectors proceeded to Steps 2 and 3.

Step 2: Contact the parent(s) and/or guardian(s)

Data collectors used contact information from the birth certificate, or any updated information found at the health department, provider’s office or in TennIIS to contact the child’s parent/guardian. Parents were then contacted by phone and/or by letter and asked to provide an immunization history or the location of immunization information for their child (*i.e.*, the name of the doctor or clinic office). In some cases, representatives made home visits. If parents disclosed that they chose not to vaccinate their children for any reason, the child was classified as “Refused Vaccination” and further grouped into refusal reason categories based on information received from the parent. The reasons for vaccine refusal are separated into two categories: beliefs or medical.

Step 3: Contact private physician(s)

Data collectors contacted private physicians by phone or fax and requested the child’s immunization history.

Step 4: Data checked for accuracy

Using the REDCap system, data collectors completed follow up on all children by the end of the three-month data collection period. All completed records were reviewed by a VPDIP epidemiologist throughout the process. Attempts were made to resolve any unclear information before data cleaning.

Data Analysis

Up-to-date (UTD) immunization rates were calculated using each individual vaccine date for each participant. An immunization was classified as given prior to the 24-month birthday if the difference between the dose date and the child’s date of birth was equal to or less than 24 months; this was the case even for dates that were not originally found in the child’s TennIIS record. For a child to be considered UTD by 24 months, all the doses in the Full Series (4:3:1:FS:3:1:FS) series had to be given within 24 months of the child’s birth date or had to meet the CDC catch-up conditions by 24 months. Statewide immunization rates are calculated, as well as rates for the six major metropolitan counties and seven rural regions. County rates within the rural regions are not calculated due to the small number of children sampled in each county. Completion of on-time immunization, or UTD, in the 2023 survey of Tennessee 24-month-old children is defined as receipt of four doses of diphtheria, tetanus, and acellular pertussis (DTaP) vaccine, three doses of inactivated polio virus (IPV) vaccine, one dose of measles, mumps, and rubella (MMR) vaccine, three or four

IMMUNIZATION STATUS SURVEY – 2023

doses of *Haemophilus influenzae* type b (HIB) vaccine (depending on brand received) or any child clinically considered complete for HIB based on the CDC's "catch-up" schedule, three doses of hepatitis B (HBV) vaccine, one dose of varicella (VAR) vaccine and four doses of pneumococcal conjugate (PCV) vaccine or any child considered complete for PCV based on the CDC's "catch-up" schedule. Combined, these are known as the Full Series (4:3:1:FS:3:1:FS). Additionally, this survey analyzes hepatitis A vaccine (HAV), rotavirus vaccine (RTV), seasonal influenza (Flu) vaccines, and seasonal COVID-19 (COVID) vaccines.

Since the sampling frame is stratified by region, not every child has the same probability of being selected for the sample. To account for this, sampling weights were calculated based on the total number of births in each region and were applied when calculating rate estimates. Margins of error are provided for most rate estimates. The margin of error is the 95% confidence interval range, for example, 77.7 ± 2.2 represents the confidence interval (75.5, 79.8) for the statewide UTD by 24 months estimate of 77.7%. Ninety-five percent confidence intervals (CI) are displayed as grey bands on the graphs in this report to permit readers to visualize the statistical significance (or absence of significance) of differences in point estimates ($p < 0.05$). Significance testing for differences in rates was performed using Statistical Analysis System (SAS), utilizing a 2-sample t-test for difference of means.

Limitations

The following describe important limitations of the study that should be considered when interpreting its findings:

A. There were five limitations related to sampling:

- 1) Since the study sample is selected from children born in Tennessee between January and March 2021, it cannot account for variations that routinely occur in other months of the year.
- 2) There may be children who were erroneously included in the eligible sample and listed as unable-to-locate,

but should have been excluded from the sample population. Examples of this type of error include cases where a child died, was adopted, or was part of a military family, but the child's ineligibility related to these circumstances never became known to the public health data collectors because the child or family could not be found.

- 3) The survey is designed to allow valid statistical comparisons of the populations in each of the 13 health department regions; however, the sample size within multi-county regions is too small for meaningful results at the county level or useful comparisons among subpopulations within a region.
 - 4) For the seven multi-county TDH regions (Northeast [NER], East Tennessee [ETR], Southeast [SER], Upper Cumberland [UCR], South Central [SCR], Mid-Cumberland [MCR], West Tennessee [WTR]) in this survey, children were chosen in different proportions from the counties that make up each region. There is no consistent pattern for choosing these participants from year to year. Results are presented as the summation of all counties in that region; therefore, use of the results of this survey for county-level estimates is not appropriate.
- B. Response rates for each region are included on the first and second pages of all regional reports. Response rate is calculated by subtracting the number of "Unable-to-Locate" children by the number of eligible participants and then dividing by the number of eligible participants. Caution should be taken when interpreting immunization rates for a region with a low response rate. The reason for this necessary caution is that the children who are unable-to-locate (UTL) could also be the least up-to-date (UTD). However, we cannot use their immunization history without knowing that it is current, so they must be excluded. Table 4-A (pg. 21) shows how the response rate was calculated for the state sample; this same method was used for each of the health department region samples.

SECTION II

Statewide Results

Figure 1-A: Location of Tennessee in U.S. Department of Health & Human Services Region 4 States



Figure 1-B: Sampling of Tennessee, 2023

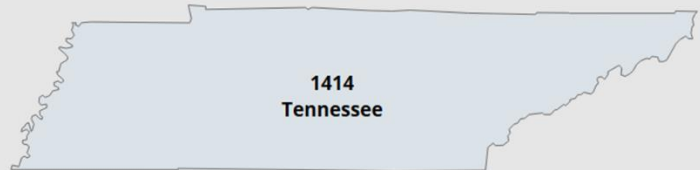
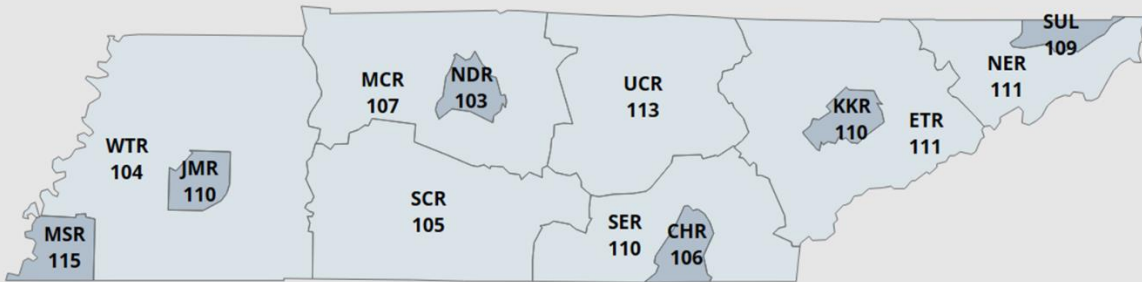


Figure 1-C: Sampling (N) of Tennessee Health Department Regions, 2023



2023 Sample Population

Ineligibility & Participation Refusal

Of the 1,557 children originally sampled for the survey, 71 children were determined to be ineligible for the survey and 29 children had guardians refuse survey participation. Ineligibility is defined as children who moved out of the state, for whom the birth record was sealed (e.g., through adoption or placement in foster care), and children who had died. After these children were removed from the survey, 1,457 eligible children were retained.

Unable to Locate (UTL)

Of the 1,457 eligible children included in the survey, 43 had incomplete information in the Tennessee Immunization Information System (TennIIS) and could neither be located nor confirmed as having moved out of state. Overall, 3.0% (43/1457) of eligible children were unable to be located for survey participation. Due to the inability to accurately assess the immunization status of these children due to incomplete records, they were removed from the survey.

Final Sample Size & Response Rate

The final sample size for the survey was 1,414, approximately 90.8% (1414/1557) of the original sampled children and 97.0% (1414/1457) of the eligible sampled children. The final response rate to the 2023 immunization status survey was 97.0%. The 2023 response rate was higher than last year's with 2022 having a response rate of 95.1% (1399/1471).

Table 3-A: Survey Sampling, Tennessee, 2023

	2022	2023
Original sample (n)	1574	1557
Ineligible (n)	80 (5.1%)	71 (4.6%)
Refused Participation (n)	23 (1.5%)	29 (1.9%)
Eligible sample (n)	1471	1457
Unable to locate [†] (n)	72 (4.6%)	43 (3.0%)
Final sample (n)	1399	1414
Response Rate (%)[*]	95.1	97.0

[†] Children are classified as "Unable to Locate" after multiple attempts were unsuccessful in locating and communicating with the child's guardian and/or the child's provider was either unknown or also unable to locate the guardian.

* Response Rate (%) is the number of survey responses from eligible children

Table 3-B: Sample Size & Response Rate by Region, Tennessee, 2023

Region	Original Sample	Ineligible (N)	Refused Participation		Eligible Sample		UTL		Final Sample (N)	Response Rate (%)
			(N)	(N)	(N)	%		%		
MSR	119	2	1	116	97.5	1	0.9	115	99.1	
WTR	120	6	3	111	92.5	7	6.3	104	93.7	
JMR	121	5	6	110	90.9	-	-	110	100.0	
SCR	120	1	12	107	89.2	2	1.9	105	98.1	
MCR	119	4	1	114	95.8	7	6.1	107	93.9	
NDR	119	7	-	112	94.1	9	8.0	103	92.0	
UCR	120	5	1	114	95.0	1	0.9	113	99.1	
SER	120	9	1	110	91.7	-	-	110	100.0	
CHR	120	12	2	106	88.3	-	-	106	100.0	
ETR	119	5	-	114	95.8	3	2.6	111	97.4	
KKR	121	2	-	119	98.3	9	7.6	110	92.4	
NER	119	6	2	111	93.3	-	-	111	100.0	
SUL	120	7	-	113	94.2	4	3.5	109	96.5	
STATE	1557	71	29	1457	93.6	43	3.0	1414	97.0	

Immunization Rates

The up-to-date (UTD) immunization rates as reported to TennNIS by 24 months, and by the end of data collection were calculated using the ACIP’s Full Series (4:3:1:FS:3:1:FS) vaccination schedule and catch-up schedule. Individual antigen vaccination rates were calculated using the same ACIP guidance. The estimate for the percent UTD for the combination series and individual antigens are displayed in Table 3 along with the accompanying margin of error. Rates that decreased are shown in red in Table 3. Significant differences (p<0.05) between the 2022 and 2023 rates are **italicized and bolded** in Table 3.

Statewide, the UTD immunization rate as reported to TennNIS was 37.3%, which was higher than the 2022 rate (31.8%). The UTD immunization rate by end of data collection was 77.7%, which was higher than the 2022 rate (77.1%).

Few vaccine specific rates changed significantly from the previous year. Flu was the only vaccination where a significant difference was observed. The UTD immunization rates and rates by individual antigen from 2017 to 2023 are show in Figure 2.

Immunization Administration

Statewide, 33,978 vaccine doses were administered to the study cohort; 32,063 (94.4%) were administered by private providers, 871 (2.6%) were administered by public health providers, and 1,044 (3.1%) were administered by an unconfirmed source.

Table 4-A: Immunization Rates by Series and Vaccine Antigen, Tennessee,

	2022 (n=1399) (%)	2023 (n=1414) (%)	Increase/ Decrease (2022 to 2023)
Up to Date (UTD):			
UTD immunization rate* (as reported to TennNIS)	31.8 ± 2.5	37.3 ± 2.5 ↑	+ 5.5
UTD immunization rate* (with data collection)	77.1 ± 2.2	77.7 ± 2.2 ↑	+ 0.6
ACIP Recommended Vaccine Series (By 24 Months of Age)			
DTaP (4 Doses)	81.3 ± 2.0	80.8 ± 2.1 ↓	- 0.5
IPV (3 DOSES)	92.9 ± 1.3	91.3 ± 1.5 ↓	- 1.6
MMR (1 DOSE)	91.0 ± 1.5	90.5 ± 1.5 ↓	- 0.5
HBV (3 DOSES)	93.9 ± 1.3	92.9 ± 1.3 ↓	- 0.9
HBV, Birth Dose	82.8 ± 2.1	77.0 ± 2.2 ↓	- 5.8
Hib (Full Series)	79.6 ± 2.1	77.5 ± 2.2 ↓	- 2.1
VAR (1 DOSE)	90.3 ± 1.6	90.4 ± 1.5 ↑	+ 0.1
PCV (Full Series)	82.1 ± 2.0	79.1 ± 2.1 ↓	- 3.0
Full Series (4:3:1:FS:3:1:FS)	77.1 ± 2.2	77.7 ± 2.2 ↑	+ 0.6
Additional Vaccines of Interest (By 24 Months of Age)			
HAV (1 DOSE)	90.6 ± 1.5	90.5 ± 1.5 ↓	- 0.1
RTV (Full Series)	77.7 ± 2.2	76.1 ± 2.2 ↓	- 1.6
FLU (2 Doses)	48.3 ± 2.6	41.2 ± 2.6 ↓	- 7.1
COVID (2 Doses)	- ± -	5.9 ± 1.2	+5.9

* Includes children up-to-date by ACIP-recommended catch-up schedule
 Red font indicated a rate decrease since 2022
Italicized and bolded font indicates a significant difference with 2022 rate

IMMUNIZATION STATUS SURVEY – 2022

Figure 2 shows Tennessee's trend for each individual vaccine series over the seven years. The red lines represent HP2030 objectives for each antigen assessed. Gray fill represents the TN Immunization Program goal for 90% coverage rate. Tennessee children have not met the Healthy People objective for DTaP anytime in the past seven years.

Figure 2: Immunization Rates (%) by Series and Vaccine Antigen, Tennessee, 2017-2023

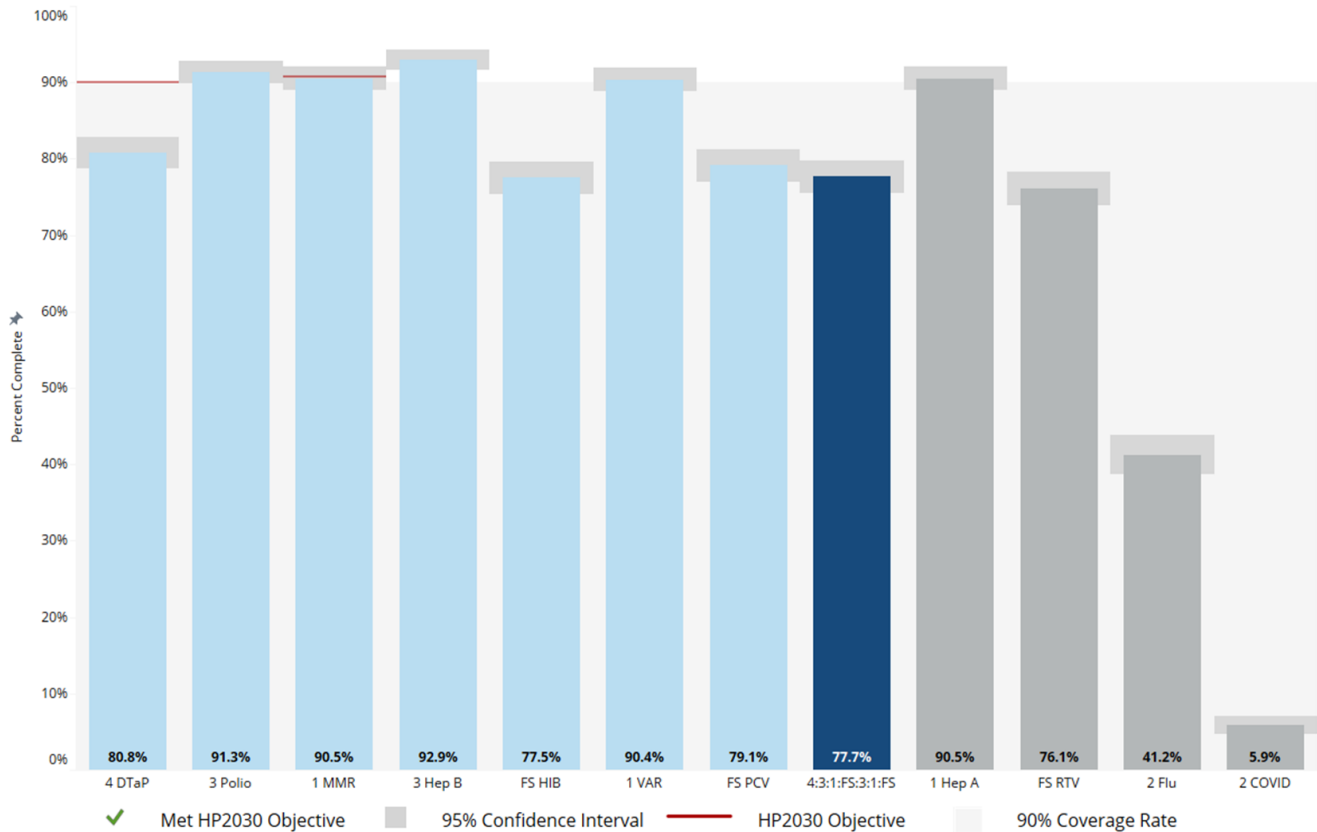


Progress Towards Healthy People Objectives

Since 2020, Tennessee has not met the HP2030 objective of 90% on time completion of DTaP. In the past, Tennessee has met the HP2030 objective of 90.8% completion of MMR every year except 2021 and now again in 2023. In 2023, Tennessee did not achieve either of the two vaccines specific HP2030 objectives nor did it meet the third objective of limiting the percentage of children who receive zero doses of recommended vaccines by age two years to 1.3%. Tennessee failed to meet the third non-antigen specific goal with a rate of children with no vaccines at 2.8%. This is the first time that Tennessee has not met a single Healthy People objective since it started using Healthy People objectives as comparison measures.

The overall statewide coverage estimates for the recommended Full Series (4:3:1:FS:3:1:FS) are shown in Figure 3. The light blue bars represent the individual antigens that make up the Full Series (4:3:1:FS:3:1:FS), the navy bar is the Full Series (4:3:1:FS:3:1:FS), and the dark grey bars represent the additional antigens assessed in the survey. The red lines represent HP2030 objectives for each antigen assessed and the grey bands represent the 95% Confidence Intervals (CI). The lighter grey background represents the TN immunization Program’s goal of a 90% coverage rate for each antigen.

Figure 3. Percent of 24-Month-Old Children With UTD Immunization Status by Antigen, Tennessee, 2023



Vaccine Refusals

There were 42 (3.0%) documented vaccine refusals reported among the final records kept for analysis (n=1414) after removal of ineligible children, parents who refused survey participation, and children who were unable to be located. (Table 4-C). Forty-one parents claimed beliefs as reason for vaccine refusal, and one claimed medical reasons. Regionally, vaccine-refusals ranged from 0.0% to 5.8% of the sampled populations. Fourteen of the 42 children whose parents' refused vaccines were partially immunized (ranging from 1-29 total doses). All parents of the partially immunized children cited beliefs as reasons for refusal of vaccines.

Medical reasons for vaccine refusal typically occurs when a child has a medical condition that a provider has determined might be exacerbated or impacted by vaccines, therefore, vaccine administration could be unsafe for the child. Parents and/or guardians who claim beliefs as a reason for vaccine refusal typically do so due to conflicts with their religious tenets or practices, personal beliefs, or philosophical reasons (i.e., safety concerns, natural immunity, low risk, etc.).

In 2023, vaccine refusals increased from 2.1% to 3.0% (42/1414). The percentage of children who did not receive one or more vaccinations due to medical reasons remains consistently low (<1.0%), while refusal based on beliefs has continued to fluctuate. In 2023, 97.6% (n=41) of refusals were due to beliefs. A year over year comparison of UTD children and children whose guardians refused vaccines can be shown in Figure 4-A. Figure 4-B is a year over year breakdown of the 2023 refusals by refusal type. Table 4-C contains a regional breakdown of 2023 refusals by refusal type.

Tennessee TCA 1200-14-01-29 describes minimum immunization requirements for attending childcare, pre-school, and public school. The state's immunization requirements follow the current schedule published by the Centers for Disease Control and Prevention (CDC) and endorsed by the American Academy of Pediatrics (AAP) and American Academy of Family Physicians (AAFP). All 50 states have legislation requiring specified vaccines for students, including for attendance at childcare centers.

Table 4-B: Vaccine Refusal by Region, Tennessee, 2023

Region	Survey Sample (N)	Refused Vaccination		Beliefs %		Medical %	
		(N)	%	%	%	%	
MSR	115	3	2.6	3	2.6	-	-
WTR	104	5	4.8	4	3.8	1	1.0
JMR	110	4	3.6	4	3.6	-	-
SCR	105	1	1.0	1	1.0	-	-
MCR	107	1	0.9	1	0.9	-	-
NDR	103	6	5.8	6	5.8	-	-
UCR	113	4	3.5	4	3.5	-	-
SER	110	5	4.5	5	4.5	-	-
CHR	106	4	3.8	4	3.8	-	-
ETR	111	4	3.6	4	3.6	-	-
KKR	110	1	0.9	1	0.9	-	-
NER	111	4	3.6	4	3.6	-	-
SUL	109	-	-	-	-	-	-
STATE	1414	42	3.0	41	2.9	1	0.1

Figure 4-A: Seven-Year Comparison of UTD Children vs Refusals, Tennessee, 2023

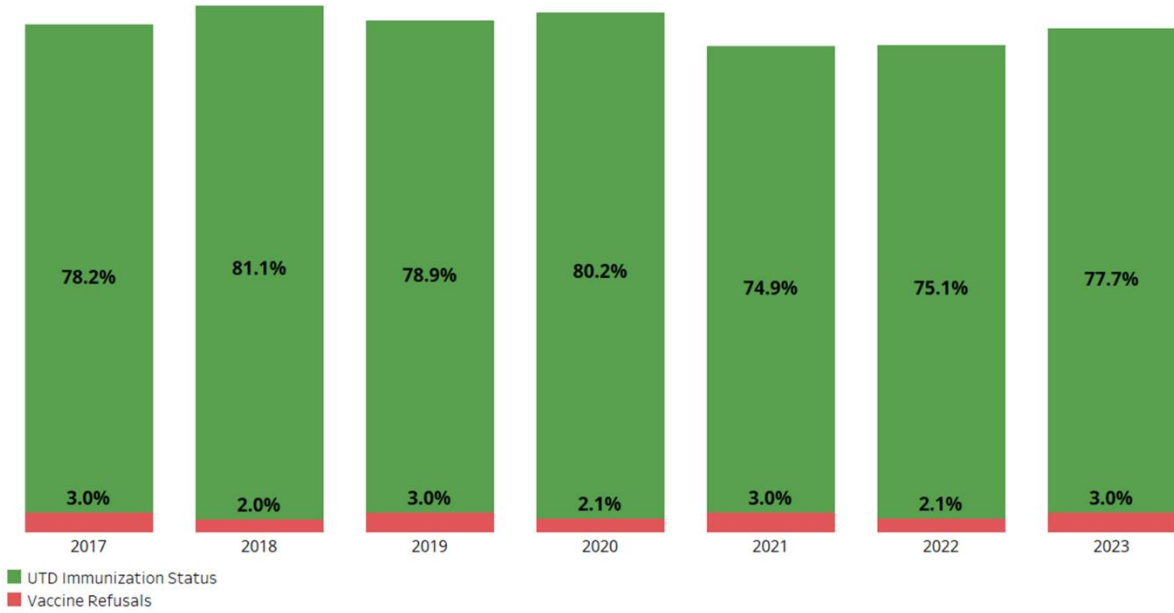
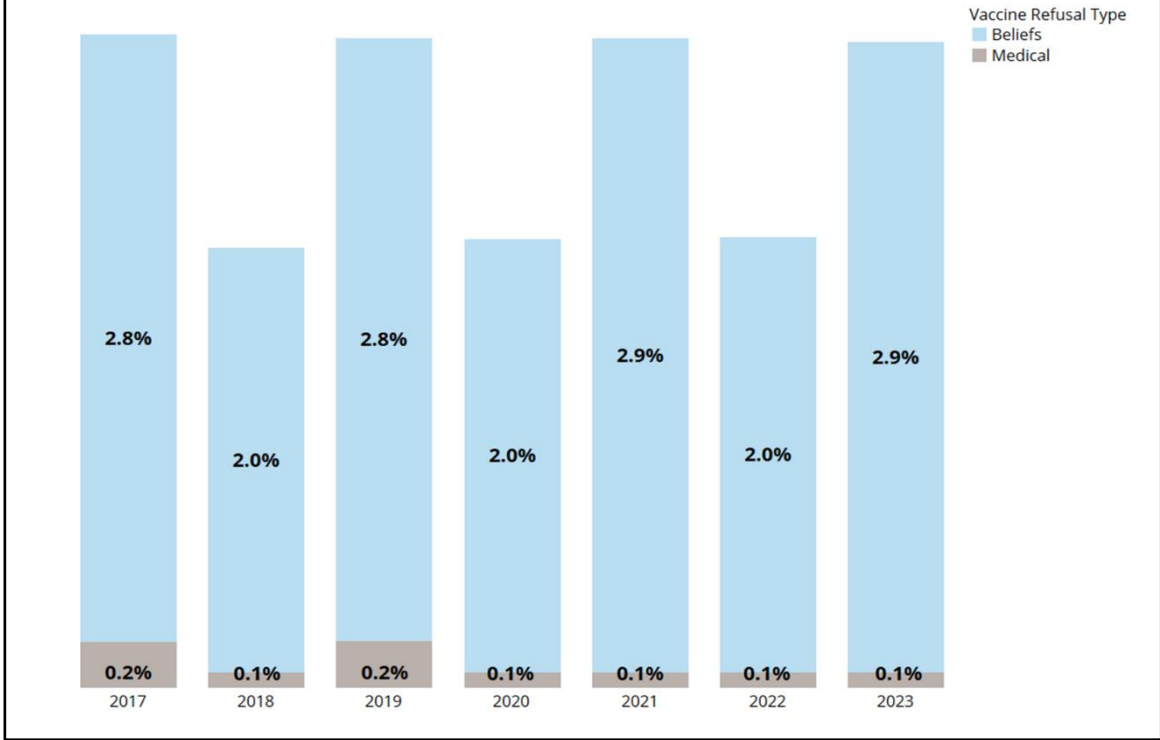


Figure 4-B: Seven Year Trend of Refusals by Reason, Tennessee, 2023



Demographics

The demographic breakdown of the survey sample alongside the UTD immunization rates by demographic groups are displayed in Table 4-D. Significant differences (p<0.05) in UTD by 24-months rates between demographic subgroups from the previous year are **italicized and bolded**. NOTE: Brackets are used to indicate significantly different results between subgroups.

Groups with significant differences (p-value < 0.05) in UTD by 24-month rates were:

- Race
- Siblings
- Vaccination Source
- Father Age
- Parent Education (Mother and Father)

Table 4-C: Survey Demographics and Immunization Rates, Tennessee, 2023

Group	Subgroup	Sample (n=1414)	UTD n=1414 (%)	Group	Subgroup	Sample (n=1414)	UTD n=1414 (%)
Race	Black	234	16.5%	65.8 ± 6.1			
	White	1153	81.5%	79.9 ± 2.3			
	Other	27	1.9%	85.2 ± 14.3			
Ethnicity	Hispanic	126	8.9%	82.5 ± 6.7			
	Non-Hispanic	1288	91.1%	77.2 ± 2.3			
Sex	Male	745	52.7%	78.3 ± 3.0			
	Female	669	47.3%	77.0 ± 3.2			
Siblings	0	547	38.7%	86.5 ± 2.9			
	1	479	33.9%	75.4 ± 3.9			
	2+	388	27.4%	68.0 ± 4.7			
Vaccination Source	Private Medical Provider	1079	76.3%	79.0 ± 2.2			
	Health Department	18	1.3%	50.0 ± 25.6			
	Both	269	19.0%	87.0 ± 4.1			
	Missing	48	3.4%	14.6 ± 10.4			
Program Enrollment	TennCare Only	303	21.4%	77.6 ± 4.7			
	WIC Only	127	9.0%	76.4 ± 7.5			
	Both (TennCare + WIC)	438	31.0%	77.4 ± 4.9			
	Not Enrolled	546	38.6%	78.2 ± 3.5			
					Mother Age		
					≤24	448	31.7%
					25-34	771	54.5%
					≥35	195	13.8%
					Father Age		
					≤24	264	18.7%
					25-34	664	47.0%
					≥35	319	22.6%
					Unknown	167	11.8%
					Mother Education		
					< High School Diploma/ GED	184	13.0%
					High School Diploma/ GED	420	29.7%
					> High School Diploma/ GED	809	57.2%
					Father Education		
					< High School Diploma/ GED	145	10.3%
					High School Diploma/ GED	423	29.9%
					> High School Diploma/ GED	639	45.2%
					Unknown	191	13.5%
					Marriage Status		
					Married	772	54.6%
					Unmarried	642	45.4%

* Includes children up-to-date by ACIP-recommended catch-up schedule
Italicized and bolded font indicates a significant difference with 2022 rate
 Brackets [] indicate a significant difference between subgroups

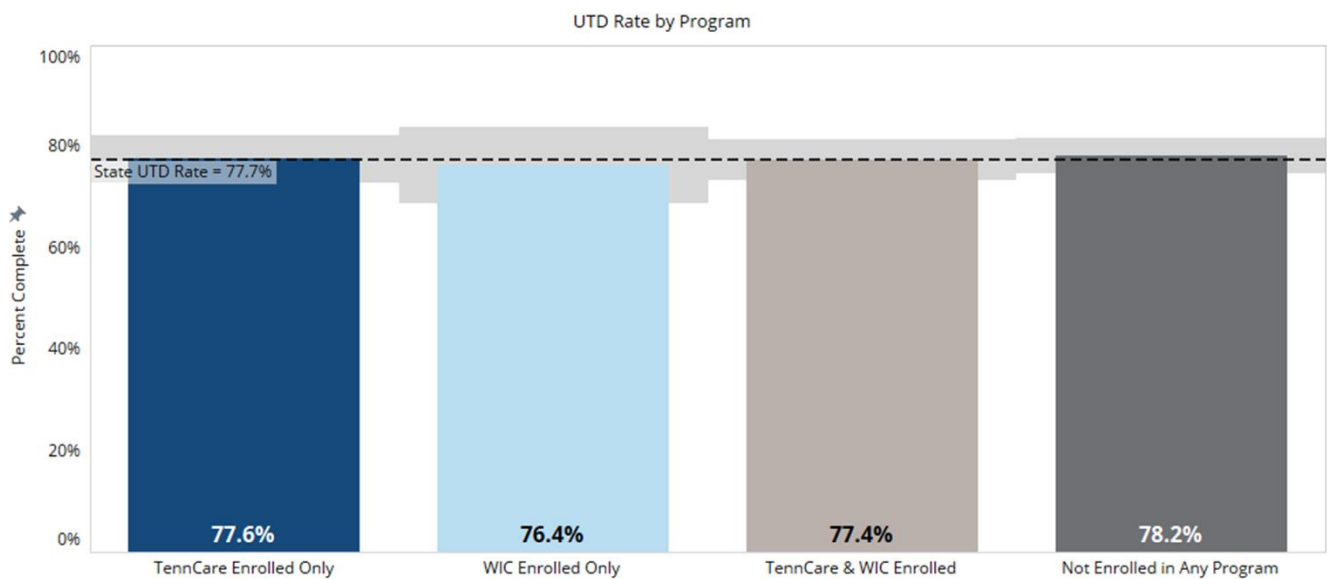
Risk Factor Analysis

Many risk factors can compound to affect a child’s likelihood to attain UTD vaccination status. These risk factors include safety net program enrollment, immunization source, number of siblings, age at first vaccination, race, and many more factors that are not evaluated in this survey. It is important to note that in this section no one risk factor can completely explain why a child may or may not be UTD.

Program Enrollment

Of the 1,414 children included in this survey, 303 (21.4%) were enrolled in TennCare only, 127 (9.0%) were enrolled in WIC only, 438 (31.0%) were enrolled in both programs, and 546 (38.6%) were not enrolled in any programs. Children were more likely to be up-to-date (UTD) if they were not enrolled in any programs and less likely to be UTD if enrolled in TennCare only (77.6%), WIC Only (76.4%), or both TennCare and WIC (77.4%). In 2023, there were no significant differences ($p < 0.05$) in UTD rate by program enrollment. Data can be seen in Figure 5.

Figure 5: Comparison of UTD Children by Program Enrollment, Tennessee, 2023



IMMUNIZATION STATUS SURVEY – 2023

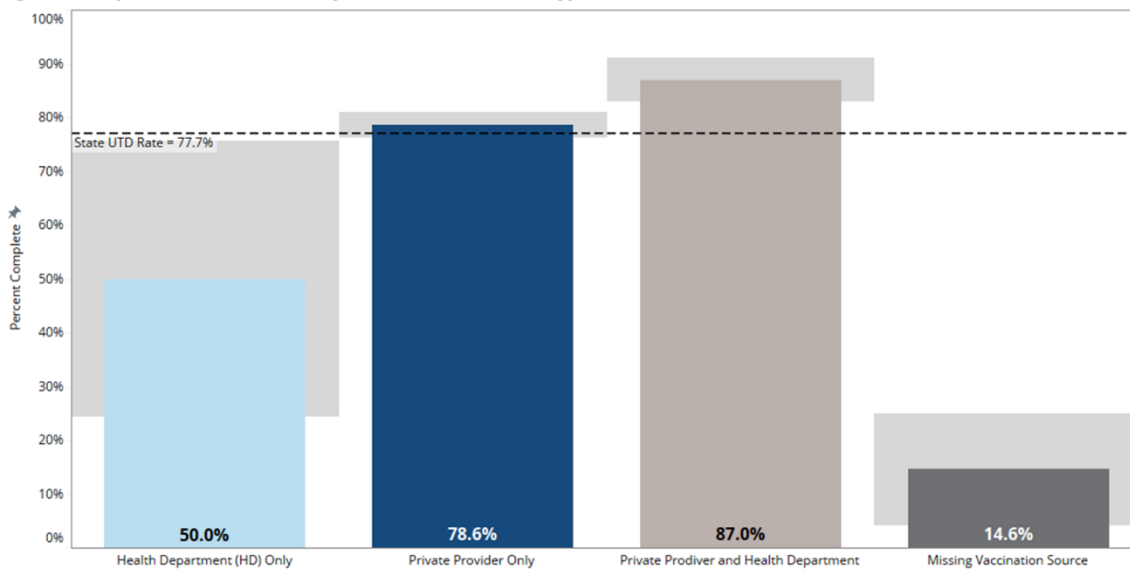
Immunization Source

Of the children sampled, 1,079 (76.3%) were immunized by a private medical provider only, 18 (1.3%) children sampled were immunized by a health department only, 269 (19.2%) children sampled were immunized by both a private provider and a health department, and 48 (3.4%) children sampled had records that were missing an immunization source. Children who received vaccines from a combination of private medical providers and health departments (87.0%) were significantly ($p < 0.05$) more likely to be UTD compared to children vaccinated by a health department only (50.0%), private medical provider only (78.6%), and children with missing a vaccination source (14.6%). Data can be seen in Table 5 and Figure 6.

	Black Race	2+ Siblings	Age at First Immunization*	Any Risk Factor
Immunized Exclusively by Health Department	33.3% (1/3)	45.5% (5/11)	50.0% (2/4)	78.7% (5/11)
Immunized Exclusively by Private Medical Provider	65.2% (122/187)	71.0% (210/296)	29.6% (8/27)	69.5% (303/436)
Immunized Exclusively by Health Department and Private Medical Provider	79.0% (30/38)	76.2% (48/63)	37.5% (3/8)	78.7% (70/89)
Immunized by Unknown Source	16.7% (1/6)	5.6% (1/18)	-	10.0% (2/20)

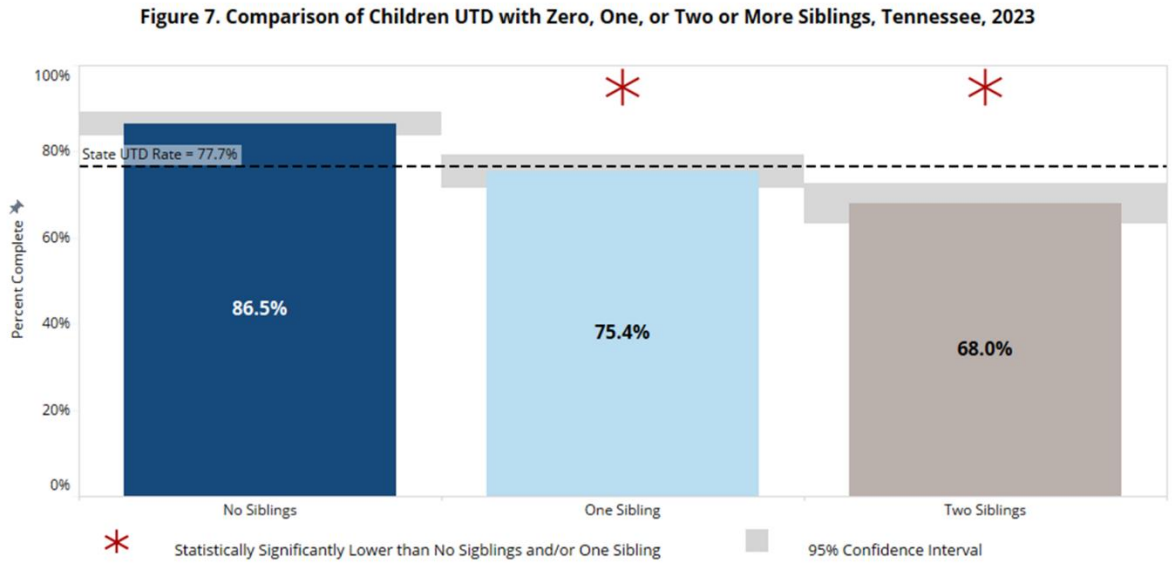
*First immunization received after four months of age

Figure 6: Comparison of Children UTD by Immunization Provider Type, Tennessee, 2023



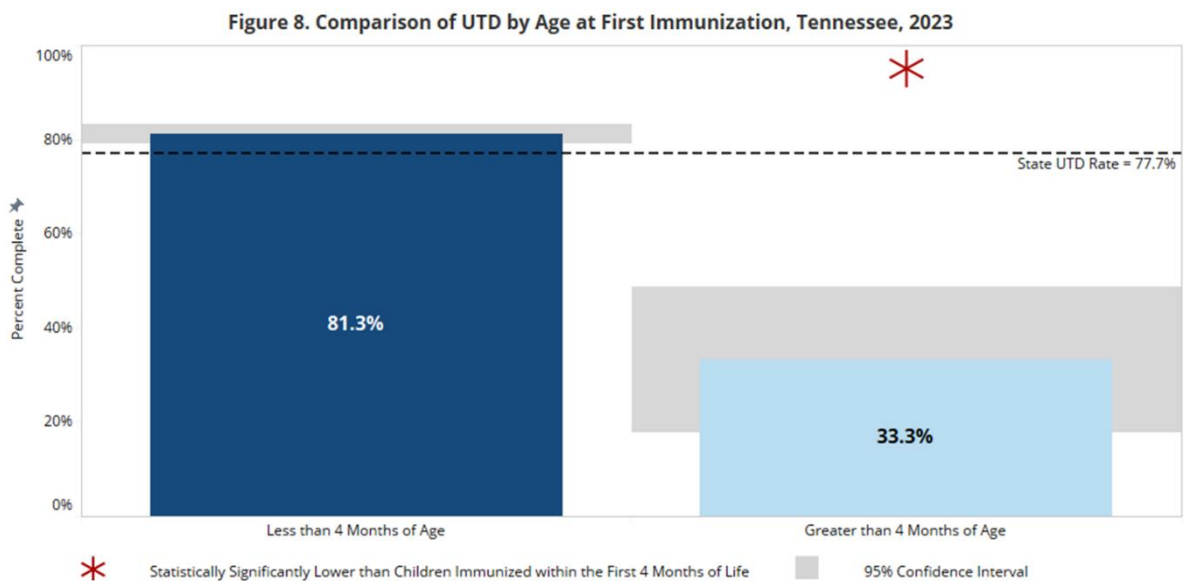
Association of Siblings and Immunization Completion

Of the 1,414 children included in the survey, 547 (38.8%) had no siblings, 479 (33.8%) had one sibling, and 388 (27.2%) had two or more siblings. Children who had no siblings were significantly ($p < 0.05$) more likely to be UTD compared to children with siblings. While 86.5% children with no siblings were UTD, only 75.4% of children with one sibling and 68.0% with two or more siblings achieved series completion (Figure 7).



Association of Age at First Immunization and Immunization Completion

Of the children surveyed, 1,335 (95.8%) began immunizations prior to 4 months of age and 81.3% of those children were UTD by 24 months of age, compared to only 33.3% of the 39 (2.8%) children who received immunizations after 4 months of age. This suggests that children who do not receive immunizations prior to 4 months of age are at higher risk of remaining under vaccinated at age 2 years as there is a significant difference ($p < 0.05$) difference between the two groups (Figure 8).



IMMUNIZATION STATUS SURVEY – 2023

Immunization Rates by Program Enrollment

The difference in UTD immunization rate by 24 months between TennCare and WIC enrolled children and those not enrolled in any program are shown in Table 6-A for each health region. Statewide, there was no significant difference found between program enrollees and non-enrollees. Children enrolled in WIC had the lowest UTD by 24 months immunization rate (76.4%) compared to children not enrolled in in both TennCare and WIC (77.4%), children enrolled in TennCare only (77.6%), and children not enrolled in any program (78.2%).

Table 6-A: UTD Immunization Rate by 24 Month By Program Enrollment Groups, Tennessee, 2023


Region	(N)	Immunization Rate for Children not Enrolled in		Immunization Rate for Children Enrolled in		Immunization Rate for Children Enrolled		Immunization Rate for Children Enrolled	
		Any Program	(N)	TennCare and WIC	(N)	in TennCare	(N)	in WIC	(N)
MSR	114	78.8%	33	54.1%	37	66.7%	42	66.7%	3
WTR	104	70.5%	44	74.1%	27	75.0%	20	69.2%	13
JMR	110	81.3%	32	60.9%	46	70.4%	27	20.0%	5
SCR	105	78.3%	23	76.9%	39	76.5%	34	55.6%	9
MCR	107	61.3%	62	81.3%	16	72.2%	18	90.9%	11
NDR	103	78.0%	59	85.7%	14	88.9%	18	83.3%	12
UCR	113	73.8%	42	73.1%	26	85.0%	20	84.0%	35
SER	110	82.0%	50	83.3%	30	62.5%	8	86.4%	22
CHR	106	82.2%	45	79.2%	24	81.8%	33	75.0%	4
ETR	111	79.3%	29	83.3%	54	80.0%	20	50.0%	8
KKR	110	91.5%	47	81.1%	37	82.6%	23	100.0%	3
NER	111	89.1%	46	93.3%	45	87.5%	16	100.0%	4
SUL	109	76.5%	34	83.7%	43	83.3%	24	75.0%	8
STATE	1414	78.2%	427	77.4%	438	77.6%	235	69.9%	97

IMMUNIZATION STATUS SURVEY – 2023

Statewide Results and Healthy People Comparison

The Healthy People initiative is designed to guide national health promotion and disease prevention efforts to improve the health of the nation. Released by the United States Department of Health and Human Services (HHS) every decade since 1980, Healthy People identifies science-based objectives with targets to monitor progress and focus action.

In 2020, new Healthy People objectives (HP2030), including three immunization-related objectives, were developed. Results of the state attainment of HP2030 objectives can be seen in Table 6-B. In Table 6-B HP2030 attainment is denoted by green fill while 90% coverage rate attainment is denoted by **bold text**.

Antigen Specific	TN 2023 (24 months)	HP2030 Objective	TN Immunization Program Objectives
Diphtheria, Tetanus, Pertussis (DTaP)	80.8%	90%	90%
Poliomyelitis (Polio)	91.3%	-	90%
Measles, Mumps, Rubella (MMR)	90.5%	90.8%	90%
Hepatitis B (HBV)	92.9%	-	90%
Hepatitis B, birth dose	80.5%	-	90%
Haemophilus influenzae, type B (HIB)	77.5%	-	90%
Varicella (VAR)	90.4%	-	90%
Pneumococcus (PCV)	79.1%	-	90%
Full Series	77.7%	-	90%
Hepatitis A (HAV)*	90.5%	-	90%
Rotavirus (RTV)	76.1%	-	90%
Influenza (Flu)	41.2%	-	90%
Coronavirus (COVID-19)	5.9%	-	90%
Non-Antigen Specific			
Children with no vaccinations	2.8%	1.3%	1.3%
<p> Indicates value is greater than or equal to the HP2030 objective</p> <p>Bold text indicates value greater than or equal to a 90% coverage rate</p> <p>*Tennessee measures receipt of one dose of Hepatitis A by 24 months as UTD</p>			

Racial Disparity

The 2023 survey population included 234 non-Hispanic Black children and 1,153 Non-Hispanic White children. Due to small sample size, children of other races (n= 27) and Hispanic ethnicity (n=126) were excluded from this analysis. The final sample for racial analysis consisted of 1,387 children. **Non-Hispanic Black children were less likely to be fully immunized for all recommended ACIP immunizations. This gap was significantly larger in DTaP, Hib, Var, PCV, Full Series (4:3:1:FS:3:1FS), RTV, and Flu compared to their Non-Hispanic White peers.**

Completion of the childhood Full Series (4:3:1:FS:3:1:FS) has been consistently lower for non-Hispanic Black children than non-Hispanic White children. The UTD rate was 12.4% lower among non-Hispanic Black children (65.8%) when compared to non-Hispanic White children (79.9%). Additionally, in 2023, only 22.2% of non-Hispanic Black children received at least two doses of influenza vaccine compared to 44.6% of non-Hispanic White children.

Figure 9: Statewide Percentage of Children with Age-Appropriate Immunization Rates, by Vaccine and Race, Tennessee, 2023

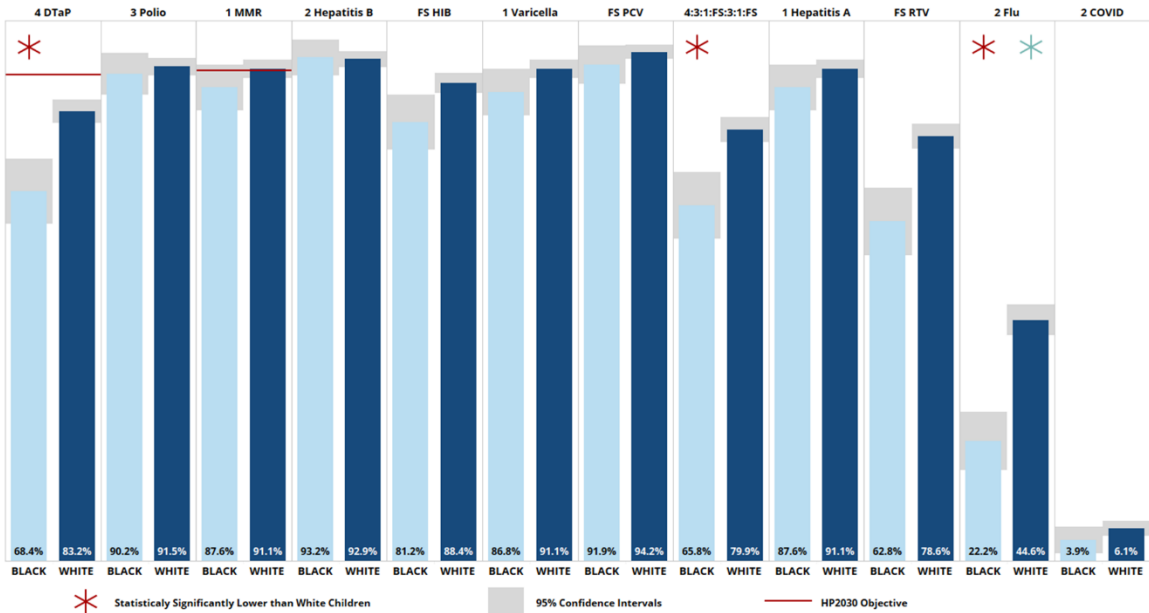
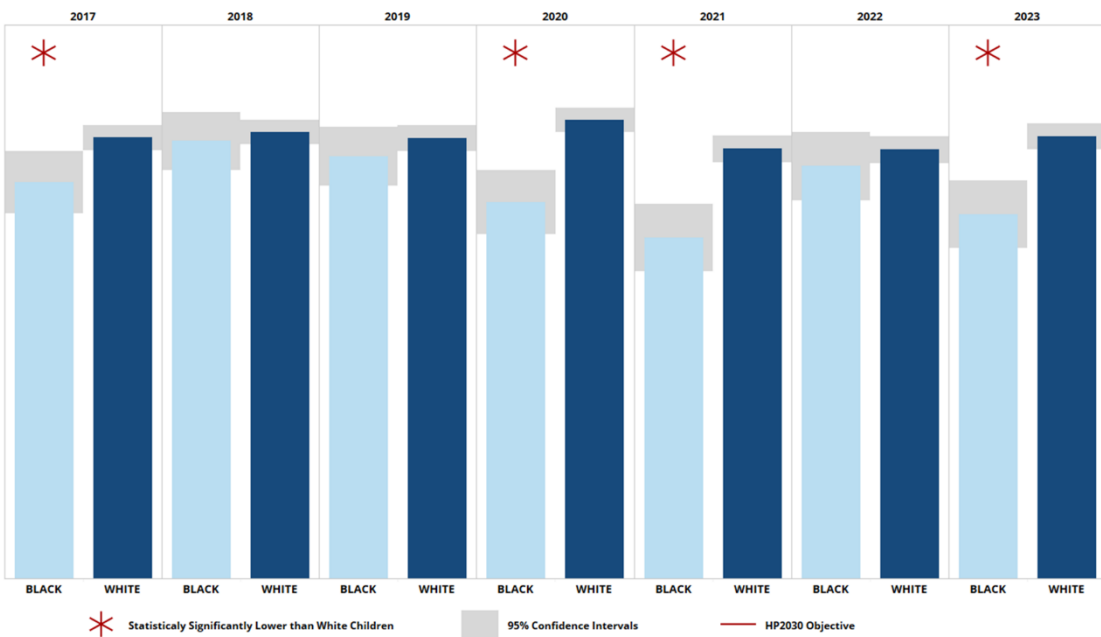


Figure 10: Comparison of UTD Children by Race, Tennessee, 2017-2023



Seasonal Influenza Vaccination

Impact on Pediatric Morbidity and Mortality

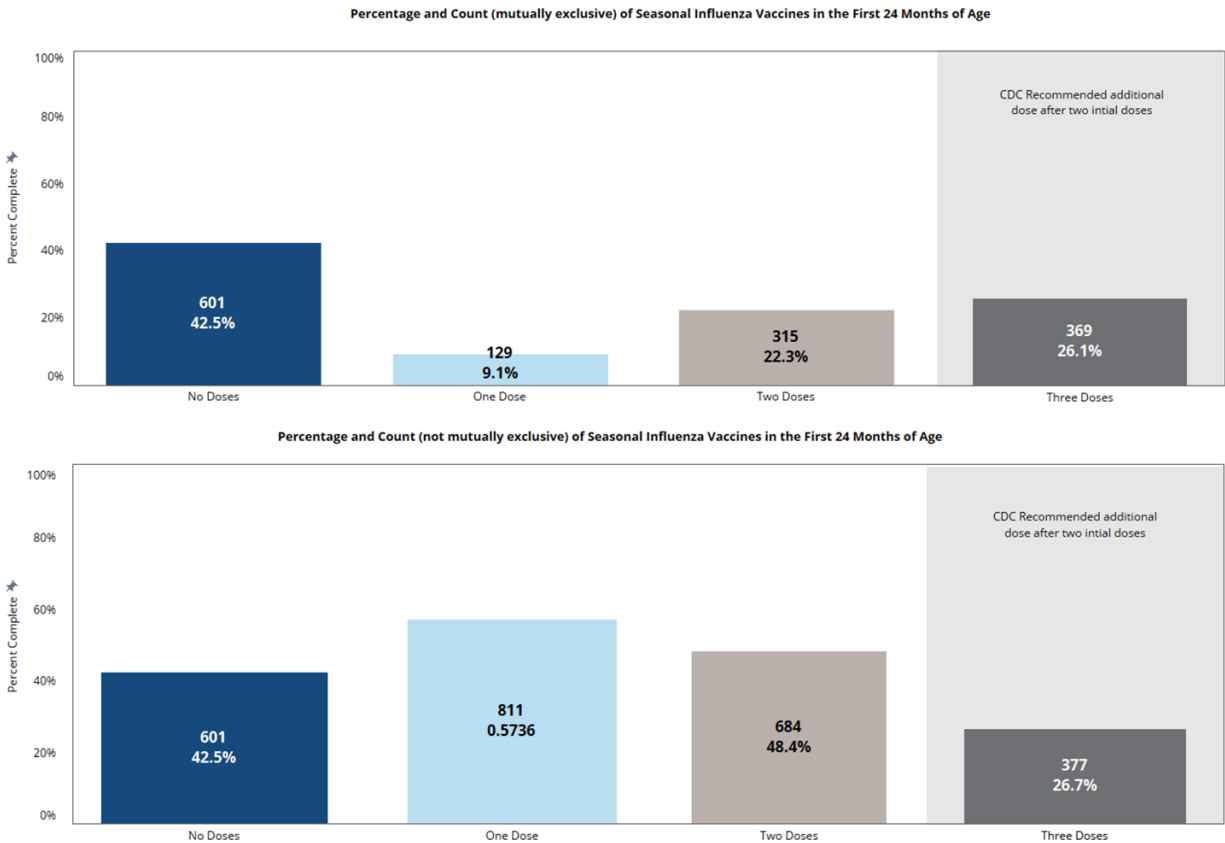
Children younger than 2 years old are at high risk of developing serious flu-related complications. These complications include pneumonia, dehydration, exacerbation of chronic illnesses (such as asthma), brain dysfunction (encephalopathy), and death. During the 2021-2022 flu season, 49 children were reported as dying from influenza within the United States. The CDC contributes the lower influenza activity and death rate to COVID-19 mitigation measures such as wearing face masks, staying home, hand washing, school closures, reduced travel, increased ventilation of indoor spaces, and physical distancing.³

The annual seasonal influenza vaccine helps save lives and reduce severe illness. Despite its benefits, influenza vaccine remains one of the least administered of the recommended immunizations in Tennessee. Only 813 (57.5%) of all children surveyed in 2023 had at least one dose of seasonal

influenza vaccine, 684 (48.4%) had two doses, and 369 (26.1%) received the recommended three doses of influenza vaccine prior to the second birthday. Missed influenza vaccinations increase the risk of morbidity and mortality among Tennesseans of all ages.

Figure 11 shows the number of flu vaccines received per child. Flu vaccine is given annually to children aged six months and older; two doses should be given during a child’s first influenza season to confer protection. This survey measures the proportion of children who have received two or more doses by their second birthday. However, an additional dose after the initial two dose series of flu vaccine is recommended for children annually until age seven to be fully covered. As seen in Figure 11, children in Tennessee are extremely under-vaccinated for influenza. Most children who die each year from influenza failed to receive an annual influenza vaccination.

Figure 11: Percentage and Count of Seasonal Influenza Vaccines in the First 24 Months of Age, Tennessee, 2023

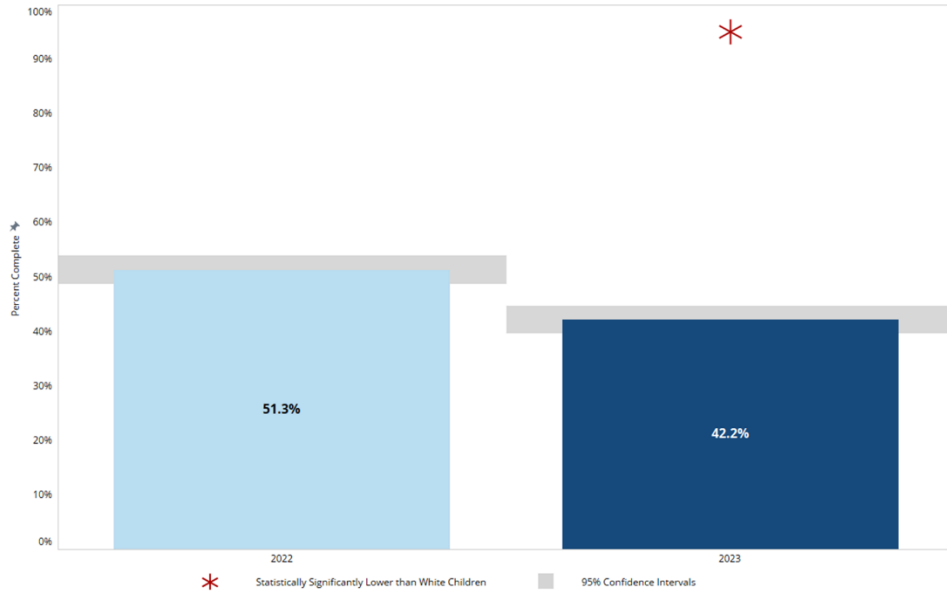


Seasonal Influenza Vaccination

Seasonal Influenza Vaccine in First Year of Life

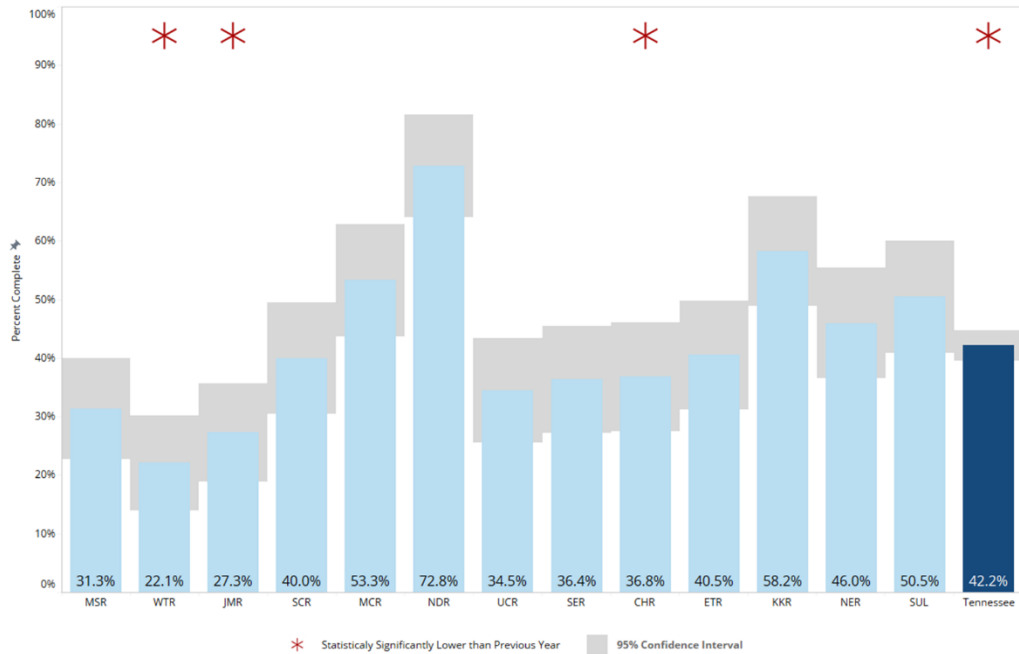
Of the 1,414 children surveyed, 42.2% received their first flu vaccine between 6 months and one year of age. In 2023, there are significantly ($p < 0.05$) fewer children who received their first dose of influenza vaccine between 6 months and one year of age compared to 2022 (51.3%).

Figure 12. Statewide Percentage of Children with One Dose of Seasonal Influenza Vaccine, Tennessee, 2022-2023



Flu data stratified by region can be seen in Figure 13. Health department regions WTR, JMR, and SER saw significantly fewer children receive their first dose of influenza vaccine between 6 months and one year of age compared to 2022. There was also a significant decrease in the state rate from 2022 to 2023.

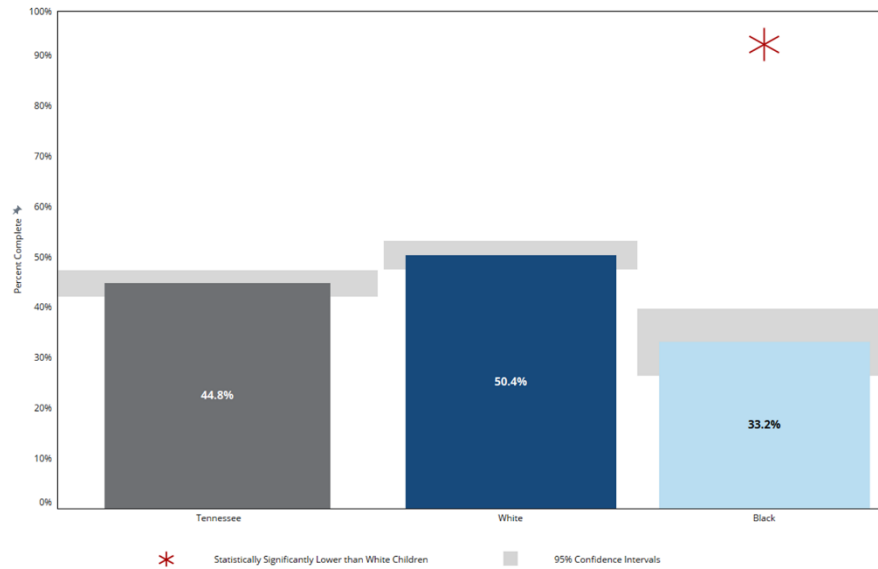
Figure 13. Percentage of Children Who Received First Dose of Influenza Vaccine in First Year of Life, by Health Department Region, Tennessee, 2023



Seasonal Influenza Vaccine & Racial Disparity

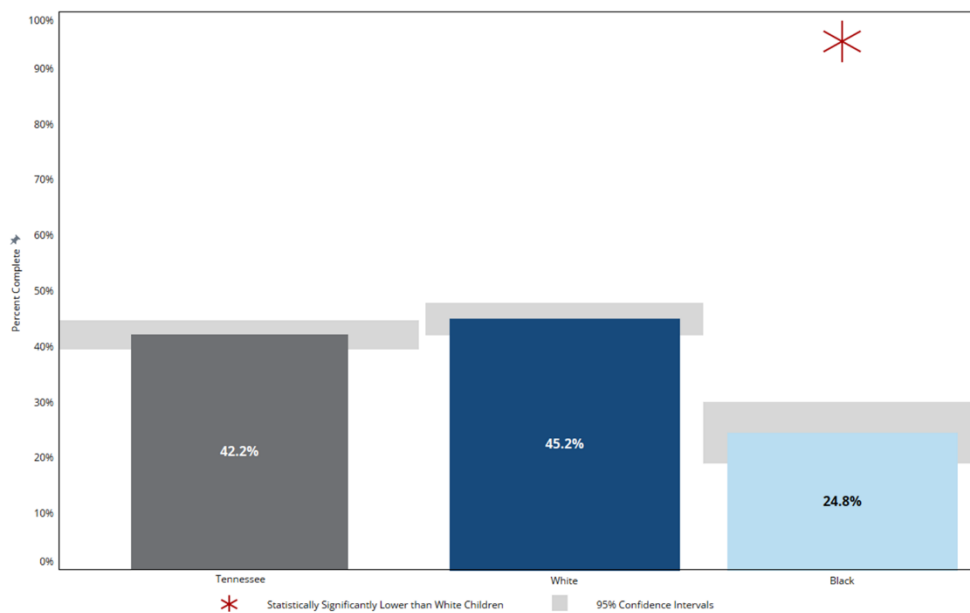
Influenza remains one of the vaccines with the lowest completion rate and most significant racial disparity. This difference has been documented annually since the first assessment of influenza coverage rates in 2007. In 2023, 33.2% of non-Hispanic Black received at least two doses of influenza vaccine compared to 50.4% of non-Hispanic White children (Figure 14). The causes are likely multifactorial and account for a 17.2% difference in completion rate non-Hispanic Black and non-Hispanic White children. Strategies to address the protection of this population are needed.

Figure 14. Statewide Percentage of Children with Two-Doses of Seasonal Influenza Vaccine, by Race, Tennessee, 2023



ACIP recommends all children over the age of 6 months receive annual influenza vaccine. Of the 1,414 surveyed children, 42.2% received their first dose between 6 months and one year of age. Non-Hispanic White children were more likely to receive their first dose of influenza vaccine before their first birthday than non-Hispanic Black children (45.2% compared to 24.8%, respectively) (Figure 15).

Figure 15. Statewide Percentage of Children with One Dose of Seasonal Influenza Vaccine, by Race, Tennessee, 2023

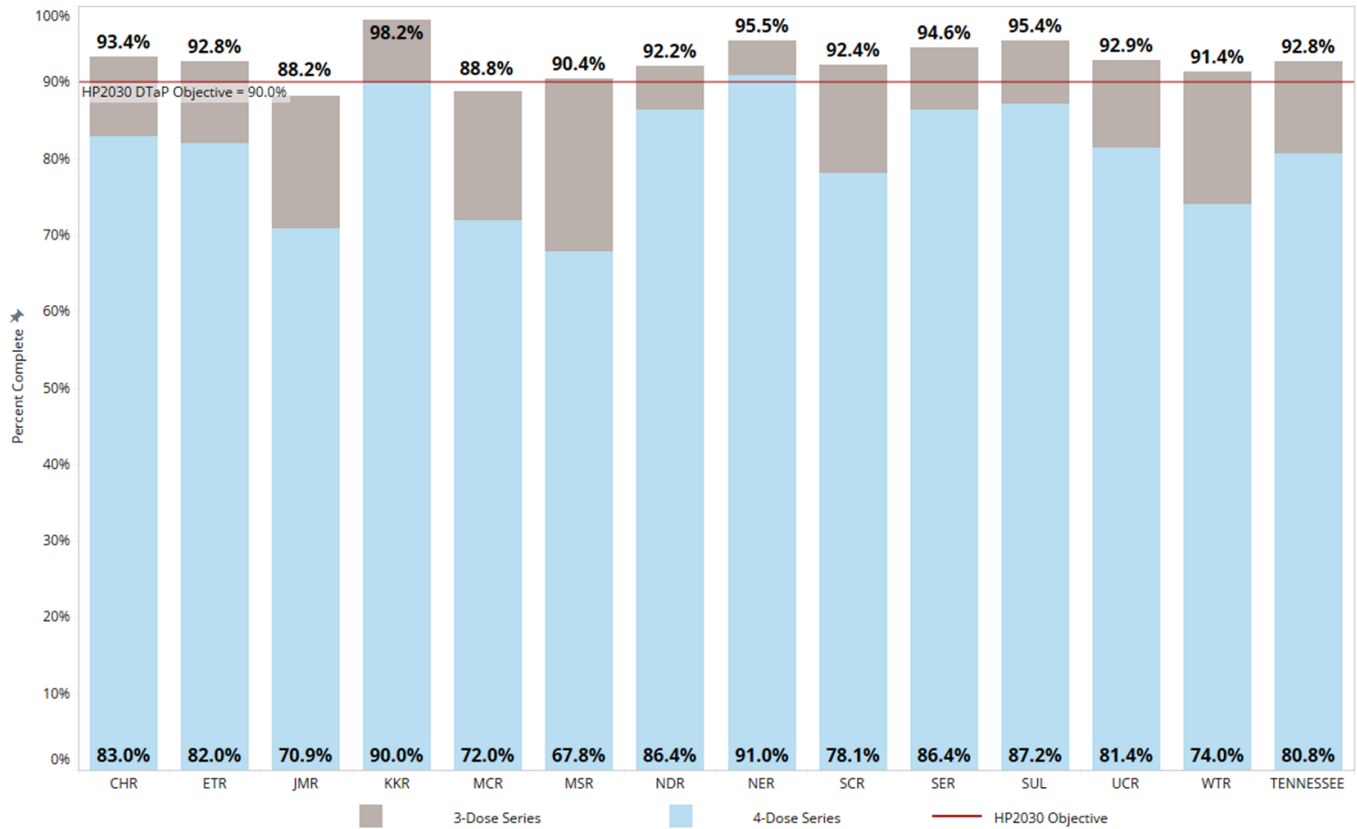


Opportunities for Improvement

Fourth DTaP

Figure 16 compares the regional percentages of children immunized with three and four doses of DTaP vaccine. The complete DTaP immunization rate for Tennessee was 80.8%. However, 92.8% of children had at least three doses of DTaP. The regional differences between receipt of three doses of DTaP vaccine compared to receipt of four doses of DTaP vaccine ranges from 4.5% to 22.6%. For a child to be properly protected against diphtheria, tetanus, and pertussis, a fourth dose of DTaP is necessary between 15-18 months of age. If all children who received three doses of DTaP received their fourth dose, Tennessee's coverage would increase by 12.0% and would surpass the HP2030 objective for DTaP immunization (90%).

Figure 16. Percentage of Children with Complete Diphtheria, Tetanus, Pertussis (DTaP) Three Dose vs Four Dose Series by Health Department Region, TN, 2023



IMMUNIZATION STATUS SURVEY – 2023

CDC Catch-up vs ACIP schedule

In 2019, TDH implemented analysis for the CDC’s alternative “catch-up” vaccine schedule to account for children whose vaccinations had been delayed but were still complete before 24 months. Specifically, a change in logic to determine series completion was made to account for children who began HIB or PCV vaccination outside of the ACIP-recommended age but prior to 24 months. This alternative vaccination timing is often referred to as a “catch-up” schedule.

In 2023, 375 (26.5%) of the 1,414 children surveyed were vaccinated according to a catch-up schedule. Of the 318 (82.6%) children vaccinated with HIB after the ACIP recommended, 135 (43.4%) were considered complete for HIB vaccine (Figure 17). Of the 295 (78.7%) children vaccinated with PCV after the ACIP recommended age, 199 (71.2%) were considered complete for PCV vaccine (Figure 18).

Figure 17. Percentage of Children with Complete HIB Series, by CDC Schedule, by Health Department Region, Tennessee, 2023

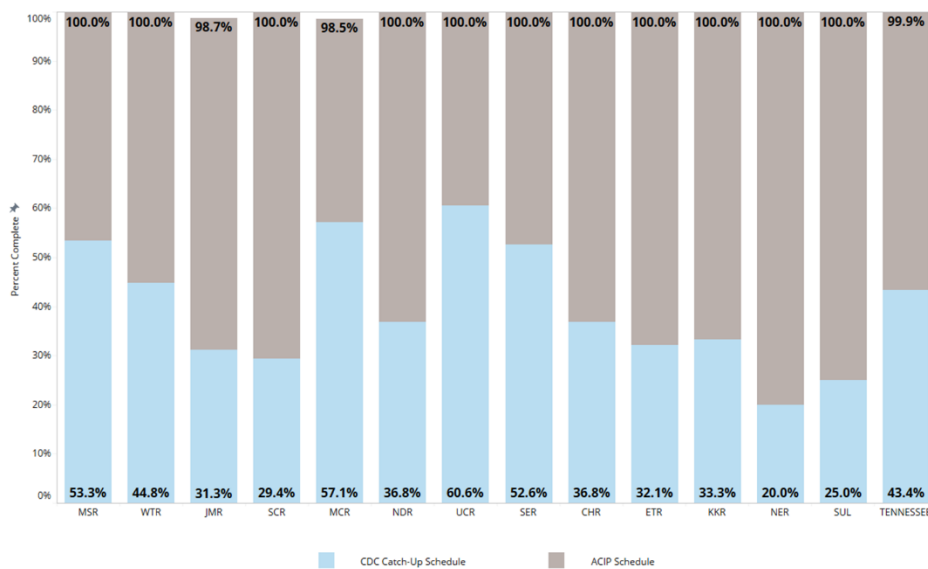
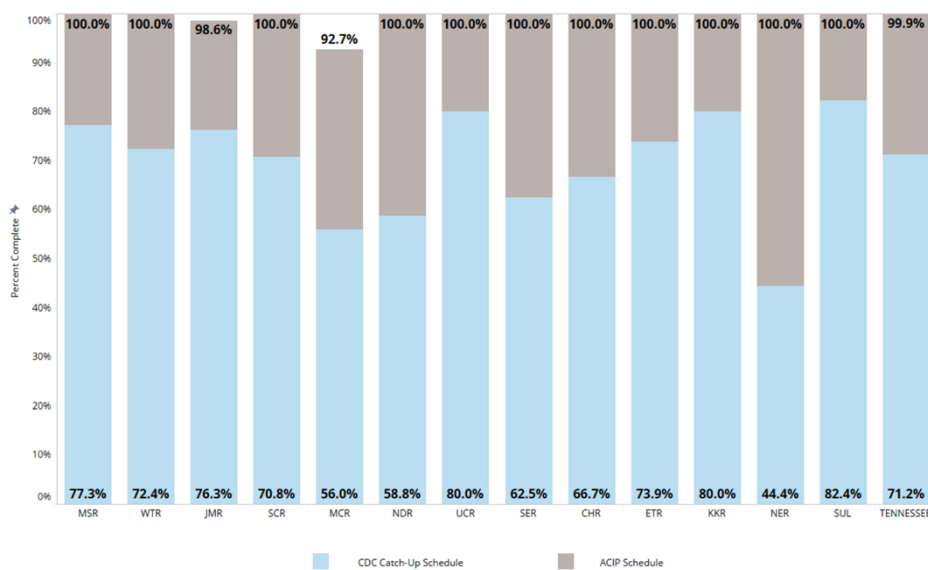


Figure 18. Percentage of Children with Complete PCV Series, by CDC Schedule, by Health Department Region, Tennessee, 2023



Regional Immunization Rates

Statewide, the UTD immunization coverage rate by 24 months was 77.7%. This rate varied per region ranging from 63.6% to 91.0%. The five regions with the highest UTD immunization rates by 24 months are shown in green, while the five regions with the lowest UTD immunization rates by 24 months are shown in red (Figure 19 and Table 7).

Response rates for each region are included on the second page of all regional reports (Section III). Caution should be taken when interpreting immunization rates for a region with a low response rate because children who were classified as unable-to-locate could also be the least UTD but must be excluded.

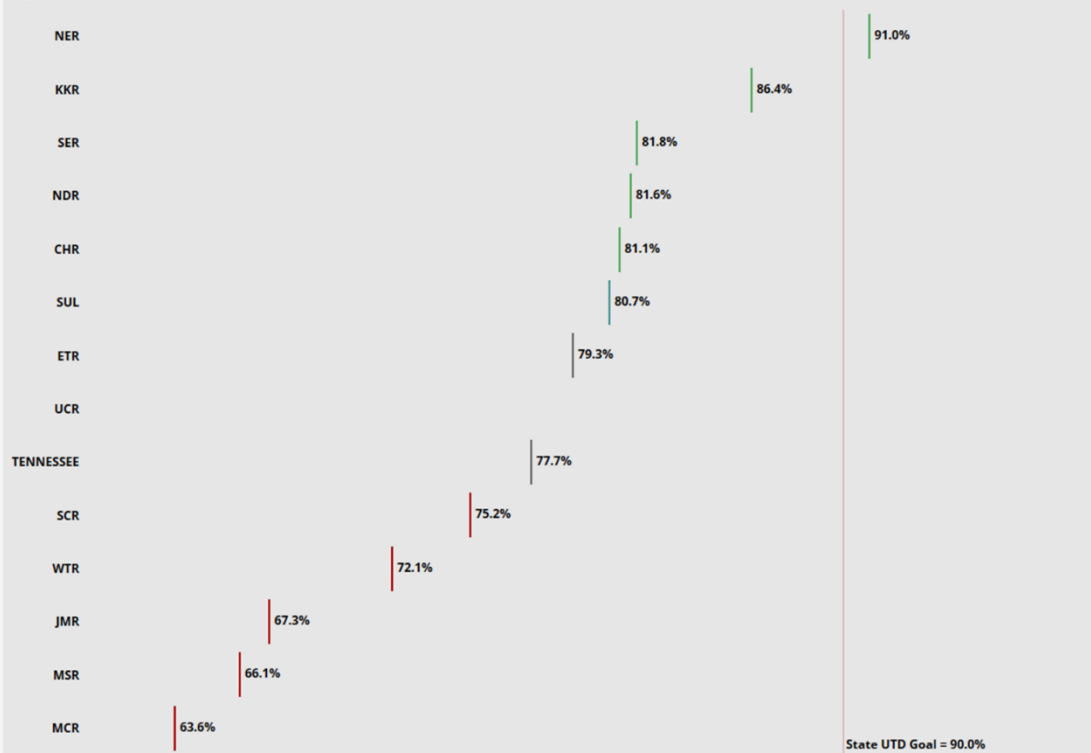
The difference between coverage rates as reported to TennIS alone compared to UTD at 24 months of age after manual investigation can also be noted in the regional reports in Section III. This difference suggests that many providers do not report all administered vaccines to TennIS, which is expected in the setting of a voluntary reporting system. Physicians are encouraged to voluntarily report complete immunization events and to utilize TennIS for immunization documentation. This would improve the ability of the statewide immunization registry to inform providers and public health about immunization practices across the state.

Table 7: UTD Immunization Rates by Region, Tennessee, 2023

Region	Survey Sample Size (N)	UTD TennIS Alone (%)	UTD by End of Survey (%)
MSR (Memphis-Shelby County Region)	115	19.1 ± 7.3	66.1 ± 8.8
WTR (West Tennessee Region)	104	39.4 ± 9.6	72.1 ± 8.8
JMR (Jackson-Madison County Region)	110	50.0 ± 9.5	67.3 ± 8.9
SCR (South Central Region)	105	45.7 ± 9.7	75.4 ± 8.4
MCR (Mid-Cumberland Region)	107	23.4 ± 8.1	63.6 ± 9.3
NDR (Nashville-Davidson County Region)	103	57.3 ± 9.7	81.6 ± 7.6
UCR (Upper Cumberland Region)	113	37.2 ± 9.1	77.9 ± 7.9
SER (Southeast Region)	110	49.1 ± 9.5	81.8 ± 7.3
CHR (Chattanooga-Hamilton County Region)	106	42.5 ± 9.6	81.1 ± 7.6
ETR (East Tennessee Region)	111	31.5 ± 8.8	79.3 ± 7.7
KKR (Knoxville-Knox County Region)	110	14.5 ± 6.7	86.4 ± 6.5
NER (Northeast Region)	111	54.1 ± 9.4	91.0 ± 5.4
SUL (Sullivan County Region)	109	23.9 ± 8.1	80.7 ± 7.5
Tennessee	1414	37.3 ± 2.5	77.7 ± 2.2

The five regions with the highest UTD immunization rates by 24 months are shown in green
 The five regions with the lowest UTD immunization rates by 24 months are shown in red

Figure 19: UTD by 24 Months Immunization Rates by Region, Tennessee, 2023



IMMUNIZATION STATUS SURVEY – 2023

Immunization Success Measures by Region

This study is conducted at the state level and allows for uniform data analysis covering all 13 health regions in Tennessee. Individual vaccine measures can indicate an individual health region’s success in achieving high UTD rates by 24 months of age among their childhood population.

Please refer to Table 8 for a list of these success measures and the first, second, and third-placing health regions as applicable to each measure.

The top portion of the table addresses the regions who have the highest immunization coverage rates and response rates as well as one-year increases. The lower portion of the table addresses the vaccine antigen-specific coverage rates by 24 months and only includes 2023 results.

Region Immunization Champions are those ranking in the top three for any of the categories.

Table 8: Health Department Region Immunization Champions, 2023

Category	Region with Highest Rate	Region with 2nd Highest Rate	Region with 3rd Highest Rate	State
Highest Response Rate	CHR/JMR/SER 100.0%	MSR/UCR 99.1%	SCR 98.1%	97.0%
Highest UTD immunization rate* (based on TennIS alone)	NDR 57.3%	NER 54.1%	JMR 50.0%	37.3%
Highest UTD immunization rate* (by end of data collection)	NER 91.0%	KKR 86.4%	SER 81.8%	77.7%
Greatest Increase in UTD by 24 months from 2021 to 2022	NER 18.4%	KKR 9.3%	CHR 8.3%	-7.5%
Highest Coverage DTaP (4 Doses)	NER 91.0%	KKR 90.0%	SUL 87.2%	80.8%
Highest Coverage IPV (3 DOSES)	KKR 98.2%	NER 94.6%	SUL 93.6%	91.3%
Highest Coverage MMR (1 DOSE)	KKR 95.5%	NER 93.7%	SER 93.6%	90.5%
Highest Coverage HBV (3 DOSES)	KKR 98.2%	SUL 97.3%	NER 94.6%	92.9%
Highest Coverage HBV, Birth Dose	SER 92.7%	SCR 85.7%	NDR 84.5%	80.5%
Highest Coverage Hib (Full Series)	KKR 91.8%	NER 91.0%	SUL 85.3%	77.5%
Highest Coverage VAR (1 DOSE)	KKR 96.4%	NER 94.6%	SER 92.7%	90.4%
Highest Coverage PCV (Full Series)	NER 91.9%	KKR 90.9%	SER 85.5%	79.1%
Highest Coverage Full Series 431:FS:314:FS	NER 91.0%	KKR 86.4%	SER 81.8%	77.7%
Highest Coverage HAV (1 DOSE)	KKR 95.5%	NER 94.6%	SUL 93.6%	90.5%
Highest Coverage RTV (Full Series)	KKR 87.3%	NER 86.5%	SUL 83.5%	76.1%
Highest Coverage FLU (2 Doses)	SUL 73.8%	KKR 60.0%	MCR 48.6%	41.2%
Highest Coverage COVID (2 Doses)	MCR 26.2%	SUL 17.4%	MSR 13.0%	5.9%

Summary of Key Findings

Below is the summary of coverage rates relative to Health People (HP) 2030 objectives:

Measurement	TN 2023 (24 Months)	HP2030 Objective (24 months)	TN Immunization Program Objectives
Full Series (4:3:1:FS:3:1:4)	77.7%	N/A	90.0%
Each vaccine in 4:3:1:FS:3:1:4 (DTaP, IPV, MMR, Hib, HBV, VAR, PCV)	3 doses of IPV (91.3%) 1 dose of MMR (90.5%) 3 doses of HBV (92.9%) 1 dose of Varicella (90.4%) 4 doses of DTaP (80.8%) Full series of HIB (77.5%) Full series of PCV (79.1%)	90% rate for DTaP 90.8% rate for MMR	90.0% rate for each of the 7 antigens
Hepatitis A vaccine	1 dose HAV (90.5%)	N/A	90.0%
Influenza vaccine	41.2% with 2 doses 22.6% with 3 doses	N/A	90.0% appropriately immunized
Rotavirus vaccine	76.1%	N/A	90.0%
COVID-19 vaccine	14.6%	N/A	90.0% appropriately immunized
Hepatitis B birth dose	80.5%	N/A	90.0% with 2 doses
3 doses DTaP vs 4 doses of DTaP	92.8% with 3 doses 80.8% with 4 doses	N/A	N/A
HIB Completion ACIP vs CDC Catch-Up	99.9% (ACIP) 43.3% (Catch-Up)	N/A	90.0% appropriately immunized
PCV Completion ACIP vs CDC Catch-Up	99.9% (ACIP) 71.2% (Catch-Up)	N/A	90.0% appropriately immunized
Percentage of Children with no Vaccines	2.8%	1.3%	1.30%

Indicates value met HP2030 objective

Bold text indicates value is above 90%

- Tennessee did not meet any of the three Healthy People 2030 objectives in 2023. This is the first time in Tennessee history that no Healthy People objectives were met since they were adopted as measurement tools.
- Hepatitis B has remained above the recommended 90% coverage rate as seen in the previous decade. This is potentially due to the initiation of the vaccine series administered by hospital staff within 24 hours of birth.
- Tennessee did not reach 90% coverage for the Full Series (4:3:1:FS:3:1:FS) at any point in the past decade nor did it achieve a 90% coverage rate in 2023.
- Black children were significantly less likely than white children to be completely immunized according to CDC recommendations.
- In 2023, parents of 3.0% of the surveyed children reported refusing some or all immunizations, compared to 2.1% in 2022.
- In 2023, 2.8% of Tennessee children received zero doses of recommended vaccines, failing to meet the HP2030 objective of limiting the percentage of children who receive zero doses of recommended vaccines by age two years to 1.3%.

Discussion

Overall, vaccination rates among children in Tennessee remain relatively high. However, the threat of previously eliminated vaccine-preventable diseases across the United States demonstrates the importance of continued vigilance. Ensuring that medically eligible children are fully vaccinated on-time and according to the Centers for Disease Control and Prevention (CDC) recommended childhood immunization schedule is critical.

The results from this report suggest that recent efforts to improve coverage rates may be succeeding in some areas. The varying improvement seen in 2023 did not yet return overall vaccine coverage to where it was prior to 2020. While vaccination rates among children in Tennessee increased in recent years prior to the COVID-19 pandemic, the pandemic has had a considerable negative impact on the vaccination rate of children. Efforts must be made to provide vaccinations to children who have fallen behind with routine childhood vaccinations to minimize outbreak risk of highly infectious, vaccine-preventable, diseases. Providers are encouraged to recall patients who have missed vaccinations and provide vaccinations at every opportunity, regardless of the reason for an office visit. Efforts around immunization education, addressing vaccine hesitancy and countering vaccine misinformation, are important. Delayed vaccine schedules and missed vaccinations increase risk for morbidity and mortality from vaccine-preventable disease for all Tennesseans.

As seen in the survey, most parents in Tennessee vaccinate their children on time and according to the CDC recommendations. Of the 1,414 children surveyed, only 3.0% (n=42) reported objection or refusals. Beliefs were cited by 2.9% of parents and medical reasons were cited by 0.1% of parents. As Tennessee law allows only religious and medical exemptions in lieu of complete immunization as required for public school entry, objections due to beliefs often transition to complete vaccination or the declaration of religious exemption prior to school entry.

3 Critical Elements for Vaccination

Three elements are critical to ensure that every medically eligible child in Tennessee is fully immunized on-time and according to the CDC's recommended childhood vaccination schedule:

1. Continued parental and community education about the safety, efficacy, and critical importance of childhood immunization and the severity of the diseases they prevent
2. Ready access to, and provision of, immunizations at every opportunity
3. Reliable and readily accessible immunization records that ensure immunizations are provided on-time while avoiding duplication

4 Key Strategies for Improving Immunization Rates Among 24-Month-Old Children

- 1. Parental and community education and messaging around the safety, efficacy, and critical importance of childhood immunizations**
 - Parents should seek credible sources of vaccine information and the advice of their child's medical provider when seeking information about vaccines.
 - Public health and healthcare providers should provide strong and credible messages emphasizing that "vaccines are safe, vaccines are effective, and vaccines save lives".
 - Public health and healthcare providers should adopt updated guidance and recommendations to optimize each visit and ensure children are fully protected from vaccine-preventable diseases on a safe and timely schedule.
- 2. Ready access to, and provision of, vaccinations at every opportunity**
 - VPDIP should maintain the federally funded Vaccines for Children (VFC) Program to ensure that children who are covered by TennCare or lack insurance coverage for vaccines can receive them free of charge through a statewide network of healthcare providers and local departments of health. Expanding this network of VFC Providers will provide more opportunities to vaccinate children.
 - Medical providers should review vaccine records and administer missing vaccinations during every opportunity.
 - Medical providers should utilize the Tennessee Immunization Information System (TennIIS) to evaluate UTD status with the ACIP forecast schedule for each patient, identifying gaps in immunizations, especially DTaP and Flu, at every opportunity.
- 3. Reliable and readily accessible vaccination records that ensure vaccinations are provided on-time while avoiding duplication**

IMMUNIZATION STATUS SURVEY – 2023

- VPDIP should continue promoting the Tennessee Immunization Information System, “TennIIS” (www.TennesseeIIS.gov). TennIIS is an online immunization registry available to all immunizing providers, including hospitals, clinics, and pharmacies, offering tools to improve immunization rates among children and adults.
- VPDIP should promote standards requiring clinics participating in the federal Vaccines for Children (VFC) Program to report all immunizations administered to children under 19 years of age to TennIIS, enabling providers to utilize system features designed to improve patient immunization services.
- VPDIP should remind all vaccinating providers to report all administered vaccinations to TennIIS, which establishes a permanent immunization record available to all healthcare providers. TennIIS is linked to the electronic health record (EHR) systems of hundreds of medical facilities and pharmacies statewide, facilitating seamless electronic immunization record reporting.
- VPDIP should promote TennIIS to medical providers for a validated immunization certificate, used for daycare, school, college entry, and employment requirements. Provider participation in TennIIS is critical for building these lifelong records and ensuring all Tennesseans are appropriately vaccinated.

4. Policy

- Providers should educate decision-makers about the impact of non-medical exemptions on immunization rates, as states without non-medical exemptions typically have higher overall immunization rates.

5 Recommendations to Improve Immunization Coverage in 24-month-old Children in Tennessee

The following recommendations may improve on-time immunization of Tennessee children:

1. Vaccination records should be examined for completeness at every medical visit, regardless of the reason for the visit, and vaccinations should be provided at every opportunity. Given the significant reduction in vaccinations provided to children during the COVID-19 pandemic, it is critical to the health of all Tennesseans to ensure every child is fully vaccinated, according to the CDC recommended childhood vaccination schedule.
2. Medical providers should implement strategies that alert parents when their children are due or overdue for booster doses of DTaP, Hib and PCV. Most children who fell short of complete immunization could have achieved series completion with just one additional immunization visit prior to the second birthday. Minority children are especially vulnerable to missing immunizations.
3. Parents and providers should adhere as closely as possible to the early infant schedule of immunizations at 2-, 4-, and 6-months. Doing so will enable providers to administer the 4th DTaP and all other needed immunizations as early as the first birthday, maximizing the number of opportunities to immunize children on time and ensuring that children are fully protected against vaccine-preventable diseases as early as possible.
4. All vaccinating providers should enroll in, and report vaccinations to, TennIIS for every patient. The Tennessee Immunization Information System (TennIIS) maintains patient immunization records and special tools which may assist providers in improving the quality of their immunization services. User guides and other TennIIS resources available through the training information posted at www.TennesseeIIS.gov may assist providers in recognizing opportunities to immunize their patients such as:
 - TennIIS provides individual patient forecasting of immunizations due, based upon the patient’s immunization history.
 - TennIIS can generate patient reminders using manual, auto dialer, text, or other reminder methods. This feature assists providers in reminding patients of immunization appointments and recalling children who are due or overdue for immunizations.
 - Medical practices may run their own practice-level immunization coverage reports based on their active patients in TennIIS. Coaching on the use of these reports is available in the training section of the TennIIS website.
 - There are more than 7,800 private medical provider offices enrolled in TennIIS. All immunizing providers should enroll and report immunizations to TennIIS. This will allow for more accurate shared clinical decision making and the most complete immunization record for Tennesseans.
5. All parents, especially those enrolled in WIC and TennCare, should continue to receive immunization education, immunization record review, and immunization administration at every opportunity.

References

1. CDC. Vaccination Coverage by Age 24 Months Among Children Born in 2015 and 2016 – National immunization Survey-Child, United States, 2016-2018. *Morbidity and Mortality Weekly Report*, 68(41);913-918.
2. America's Health Rankings analysis of CDC, Behavioral Risk Factor Surveillance System, United Health Foundation, AmericasHealthRankings.org, Accessed 2023.
3. CDC. Preliminary Estimated Influenza-Related Illnesses, Medical Visits, Hospitalizations, and Deaths in the United States – 2021-2022 Influenza Season. 2023 Nov 21.
4. CDC. Ensuring the Safety of Vaccines in the United States. Centers for Disease Control and Prevention. 2013 Feb 01.
5. CDC. VFC Infographic: Protecting America's Children Every Day. <https://www.cdc.gov/vaccines/programs/vfc/protecting-children.html>.
6. CDC. Benefits from Immunization During the Vaccines for Children Program Era — United States, 1994–2013. *Morbidity and Mortality Weekly Report*. 63(16);352-355.
7. CDC. Ten Great Public Health Achievements – United States 2001—2011. *Morbidity and Mortality Weekly Report*. 60(19);619-623.
8. Pradke, V., Bednarczyk, R., et al. Association between Vaccine Refusal and Vaccine-Preventable Diseases in the United States: A Review of Measles and Pertussis. *JAMA*. 2016 Mar 15; 315(11):1149-1158.
9. Flannery, B., Reynolds, S., et al. Influenza Vaccination Effectiveness against Pediatric Deaths: 2010-2014. *Pediatrics*. 2017, May; 139(5):e20164244.
10. American Academy of Pediatrics. Recommended Child and Adolescent Immunization Schedule for ages 19 years or younger, United States, 2019. Centers for Disease Control and Prevention. <https://www.cdc.gov/vaccines/schedules/hcp/imz/child-adolescent.html>
11. CDC. Haemophilus influenzae Disease (Including Hib). Surveillance. 2022 Mar 4.
12. CDC. Rotavirus. Rotavirus in the U.S. 2021 Mar 26.
13. CDC. Influenza (Flu) Home. 2020-21 Flu Season Summary FAQ. 2021 Oct 25.

Section III

Heath Region Results

Memphis-Shelby County Region	44
West Tennessee Region	47
Jackson-Madison County Region	50
South Central Region	53
Mid-Cumberland Region	56
Nashville-Davidson County Region	59
Upper Cumberland Region	62
Southeast Region	65
Chattanooga-Hamilton County Region	68
East Tennessee Region	71
Knoxville-Knox County Region	74
Northeast Region	77
Sullivan County Region	80

Memphis-Shelby County Region (MSR)

Figure 20-A: Location of Memphis-Shelby County Region (MSR)

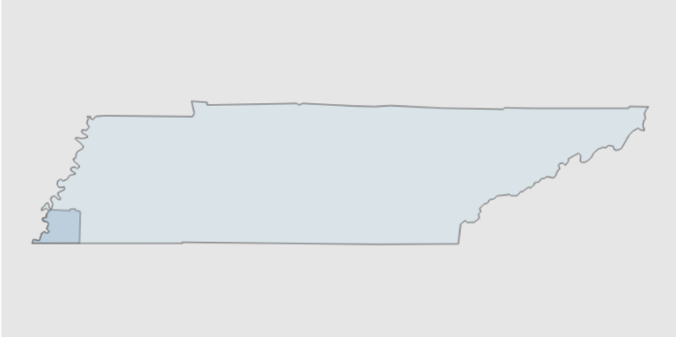
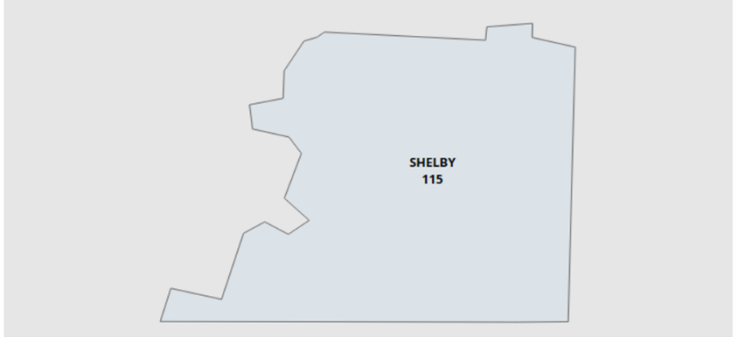


Figure 20-B: Sampling per County, MSR, 2023



Final Sample Determination

The initial 2023 sample for MSR consisted of 119 children born between January and March of 2021 (Table 9-A). After removing children who were determined to be ineligible, declined participation and were unable to be reached, the final sample size for MSR was 115. The response rate was calculated by dividing the number of participants in the final sample by the eligible sample. Compared to the previous year, the sample sized was larger and the response rate remained the same in 2023.

Immunization Rates

In MSR, the up-to-date (UTD) immunization rate by 24 months of age was 66.1%, which was lower than the 2022 rate (72.8%) and the state average (77.7%) (Table 9-B). The UTD immunization rate as reported to TennHS was 19.13%, higher than the 2022 rate (14.0%) but lower than the state rate (37.3%). All MSR vaccination rates for 2023 are higher than the 2022 rates except for DTaP, PCV, Full Series (4:3:1:FS:3:1:FS), RTV, and Flu.

The vaccine-specific rates demonstrate two significant differences when compared to the previous year and to the state overall (Table 9-B and Figure 20-C). Most notably Flu and PCV in MSR decreased more than 15% and 14%, respectively, in 2023. In Table 9-B, figures in **red** indicate a decrease in vaccines between 2022 and 2023 rates. **Italicized and bolded** figures indicate a significant difference ($p < 0.05$) in Flu, and VAR between 2022 and 2023 rates.

Immunization Administration

Of the 2,718 vaccines doses administered to the MSR children, 2,598 (95.6%) were administered by private providers, 25 (0.9%) were administered by public health providers and 69 (3.5%) were administered by an unknown source.

Table 9-A: 24-Month-Old Survey Sampling, MSR, 2023

	2022	2023	State 2023
Original sample (n)	121	119	1557
Ineligible (n)	5 (4.1%)	2 (1.7%)	71 (4.6%)
Refused Participation (n)	1 (0.8%)	1 (0.8%)	29 (1.9%)
Eligible sample (n)	115	116	1457
Unable to locate [†] (n)	1 (0.9%)	1 (0.9%)	43 (3.0%)
Final sample (n)	114	115	1414
Response Rate (%)[*]	99.1	99.1	97.0

[†] Children are classified as "Unable to Locate" after multiple attempts were unsuccessful in locating and communicating with the child's guardian and/or the child's provider was either unknown or also unable to locate the guardian.

^{*} Response Rate (%) is the number of survey responses from eligible children

Table 9-B: Immunization Rates by Series and Vaccine Antigen, MSR, 2023

	2022 (n=114) (%)	2023 (n=115) (%)	State 2023 (n=1414) (%)
Up-to-Date (UTD):			
UTD immunization rate[*] (as reported to TennHS)	14.0 ± 6.5	19.3 ± 7.3 ↑	37.3 ± 2.5
UTD immunization rate[*] (with data collection)	72.8 ± 8.3	66.1 ± 8.8 ↓	77.7 ± 2.2
ACIP Recommended Vaccine Series (By 24 Months of Age)			
DTaP (4 Doses)	77.2 ± 7.8	67.8 ± 8.7 ↓	80.8 ± 2.1
IPV (3 DOSES)	89.5 ± 5.7	90.4 ± 5.5 ↑	91.3 ± 1.5
MMR (1 DOSE)	88.6 ± 5.9	89.6 ± 5.7 ↑	90.5 ± 1.5
HBV (3 DOSES)	90.4 ± 5.5	92.2 ± 5.0 ↑	92.9 ± 1.3
HBV (Birth Dose)	67.5 ± 8.7	70.4 ± 8.5 ↑	77.0 ± 2.2
Hib (Full Series)	59.7 ± 9.1	60.9 ± 9.1 ↑	77.5 ± 2.2
VAR (1 DOSE)	87.7 ± 6.1	88.7 ± 5.9 ↑	90.4 ± 1.5
PCV (Full Series)	76.3 ± 7.9	61.7 ± 9.0 ↓	79.1 ± 2.1
Full Series (4:3:1:FS:3:1:FS)	72.8 ± 8.3	66.1 ± 8.8 ↓	77.7 ± 2.2
Additional Vaccines of Interest (By 24 Months of Age)			
HAV (1 DOSE)	87.7 ± 6.1	90.4 ± 5.5 ↑	90.5 ± 1.5
RTV (Full Series)	69.3 ± 8.6	67.0 ± 8.7 ↓	76.1 ± 2.2
FLU (2 Doses)	42.1 ± 9.2	27.0 ± 8.2 ↓	41.2 ± 2.6
COVID (2 Doses)	- ± -	13.0 ± 6.3	5.9 ± 1.2

^{*} Includes children up-to-date by ACIP-recommended catch-up schedule

Red font indicates a rate decrease since 2022

Italicized and bolded font indicates a significant difference ($p < 0.05$) with 2022 rate

IMMUNIZATION STATUS SURVEY – 2023

Figure 20-C shows the MSR trend for each individual vaccine series over the seven years. The red lines represent HP2030 objectives for each antigen assessed. MSR children have not met the Healthy People objectives for DTaP anytime in the past seven years.

Figure 20-C: Immunization Rates (%) by Series and Vaccine Antigen, MSR, 2017-2023



IMMUNIZATION STATUS SURVEY – 2023

Demographic Findings

The demographic breakdown of the MSR sample alongside the UTD immunization rates by demographic groups are shown in Table 9-C and 9-D.

Due to small sample sizes and inherent limitations of the data, significant differences in the UTD rates between the demographic subgroups in 2023 are not reported for MSR.

Table 9-C: Risk Factors and Immunization Rates, MSR, 2023

Group	Subgroup	Demographic Breakdown		UTD Immunization Rates			
		MSR [¶] (n=115)	State [¶] (n=1414)	MSR n=115 (%)		STATE n=1414 (%)	
Race**	Black	69 60.0%	234 16.5%	57.9	±	11.9	65.8 ± 6.1
	White	42 36.5%	1153 81.5%	76.2	±	13.4	79.9 ± 2.3
	Other	4 3.5%	27 1.9%	sample size is too small to generate estimates		85.2 ± 14.3	
Ethnicity**	Hispanic	14 12.2%	126 8.9%	85.7	±	20.9	82.5 ± 6.7
	Non-Hispanic	101 87.8%	1288 91.1%	63.2	±	9.6	77.2 ± 2.3
Sex*	Male	71 61.7%	745 52.7%	70.4	±	10.9	78.3 ± 3.0
	Female	44 38.3%	669 47.3%	59.1	±	15.1	77.0 ± 3.2
Siblings*	0	45 39.1%	547 38.7%	73.3	±	13.4	86.5 ± 2.9
	1	40 34.8%	479 33.9%	70.0	±	14.8	75.4 ± 3.9
	2+	30 26.1%	388 27.4%	50.0	±	18.9	68.0 ± 4.7
Vaccination Source	Private Medical Provider	72 97.4%	1079 76.3%	55.6	±	11.8	78.6 ± 2.5
	Health Department	0 0.0%	18 1.3%	sample size is too small to generate estimates		50.0 ± 25.6	
	Both	40 1.8%	269 19.0%	87.5	±	10.7	87.0 ± 4.1
	Unknown Source	3 0.9%	48 3.4%	sample size is too small to generate estimates		14.6 ± 10.4	
Program Enrollment	TennCare Only	42 36.5%	303 21.4%	66.7	±	14.9	77.6 ± 4.7
	WIC Only	3 2.6%	127 9.0%	sample size is too small to generate estimates		76.4 ± 7.5	
	Both (TennCare + WIC)	37 32.2%	438 31.0%	54.1	±	16.8	77.4 ± 3.9
	Not Enrolled	33 28.7%	546 38.6%	78.8	±	14.7	78.2 ± 3.5

¶ Percentages may not add up to 100% due to missing participant information
 * Information was collected from birth certificate at time of delivery
 + Does not distinguish between Hispanic whites and non-Hispanic whites

Table 9-D: Parent Demographics and Immunization Rates, MSR, 2023

Group	Subgroup	Demographic Breakdown		UTD Immunization Rates			
		MSR [¶] (n=115)	State [¶] (n=1414)	MSR n=115 (%)		STATE n=1414 (%)	
Mother Age*	≤24	40 34.8%	448 31.7%	60.0	±	15.9	77.7 ± 3.9
	25-34	62 53.9%	771 54.5%	64.5	±	12.2	76.9 ± 3.0
	≥35	13 11.3%	195 13.8%	92.3	±	16.8	80.5 ± 5.6
Father Age*	≤24	24 20.9%	264 18.7%	54.2	±	21.5	76.5 ± 5.2
	25-34	48 41.7%	664 47.0%	64.6	±	14.0	76.7 ± 3.2
	≥35	23 20.0%	319 22.6%	87.0	±	14.9	82.1 ± 4.2
	Unknown	20 17.4%	167 11.8%	60.0	±	23.5	74.9 ± 6.7
Mother Education*	< High School Diploma/ GED	20 17.4%	184 13.0%	60.0	±	23.5	74.5 ± 6.4
	High School Diploma/ GED	32 27.8%	420 29.7%	46.9	±	18.3	74.8 ± 4.2
	> High School Diploma/ GED	63 54.8%	809 57.2%	77.8	±	10.6	79.9 ± 2.8
Father Education*	< High School Diploma/ GED	20 17.4%	161 11.4%	65.0	±	23.5	77.6 ± 6.5
	High School Diploma/ GED	30 26.1%	423 29.9%	50.0	±	18.9	74.0 ± 4.2
	> High School Diploma/ GED	45 39.1%	639 45.2%	80.0	±	12.2	80.3 ± 3.1
	Unknown	20 17.4%	191 13.5%	60.0	±	23.5	77.0 ± 6.0
Marriage Status*	Married	44 38.3%	772 54.6%	72.7	±	13.7	79.4 ± 2.9
	Unmarried	71 61.7%	642 45.4%	61.9	±	11.6	75.6 ± 3.3

¶ Percentages may not add up to 100% due to missing participant information
 * Information was collected from birth certificate at time of delivery

West Tennessee Region

Figure 21-A: Location of West Tennessee Region (WTR)

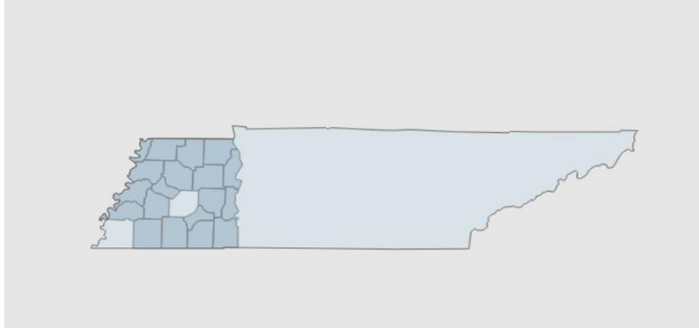
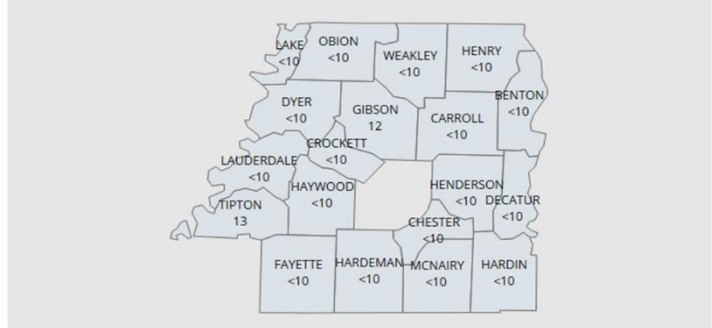


Figure 21-B: Sampling per County, WTR, 2023



Final Sample Determination

The initial 2023 sample for WTR consisted of 120 children born between January and March of 2021 (Table 10-A). After removing children who were determined to be ineligible, declined participation and were unable to be reached, the final sample size for WTR was 104. The response rate was calculated by dividing the number of participants in the final sample by the eligible sample. Compared to the previous year, a smaller sample was used for analysis and there was a lower response rate in 2023.

Table 10-A: 24-Month-Old Survey Sampling, WTR, 2023

	2022	2023	State 2023
Original sample (n)	121	120	1557
Ineligible (n)	6 (5.0%)	6 (5.0%)	71 (4.6%)
Refused Participation (n)	0 (0.0%)	3 (2.5%)	29 (1.9%)
Eligible sample (n)	115	111	1457
Unable to locate [†] (n)	3 (2.6%)	7 (6.3%)	43 (3.0%)
Final sample (n)	112	104	1414
Response Rate (%)[*]	97.4	93.7	97.0

[†] Children are classified as "Unable to Locate" if every conceivable effort was made to locate and communicate with the child's guardian and/or the child's provider was either unknown or also unable to locate the guardian.

^{*} Response Rate (%) is the number of survey responses from eligible children

Immunization Rates

In WTR, the up-to-date (UTD) immunization rate by 24 months of age was 72.1%, which was higher than the 2022 rate (68.8%), but lower than the state average (77.7%) (Table 10-B). The UTD immunization rate as reported to TennHS was 39.4%, higher than the 2022 rate (31.3%) and the state rate (37.3%).

Table 10-B: Immunization Rates by Series and Vaccine Antigen, WTR, 2023

	2022 (n=112) (%)	2023 (n=104) (%)		State 2023 (n=1414) (%)
Up to Date (UTD):				
UTD immunization rate[*] (as reported to TennHS)	31.3 ± 8.7	39.4 ± 9.6	↑	37.3 ± 2.5
UTD immunization rate[*] (with data collection)	68.8 ± 8.7	72.1 ± 8.8	↑	77.7 ± 2.2
ACIP Recommended Vaccine Sereis (By 24 Months of Age)				
DTaP (4 Doses)	74.1 ± 8.2	74.0 ± 8.6	↓	80.8 ± 2.1
IPV (3 DOSES)	88.4 ± 6.0	90.4 ± 5.8	↑	91.3 ± 1.5
MMR (1 DOSE)	87.5 ± 6.2	86.5 ± 6.7	↓	90.5 ± 1.5
HBV (3 DOSES)	89.3 ± 5.8	91.4 ± 5.5	↑	92.9 ± 1.3
HBV, Birth Dose	85.7 ± 6.6	78.9 ± 7.9	↓	77.0 ± 2.2
Hib (Full Series)	70.5 ± 8.6	72.2 ± 8.8	↑	77.5 ± 2.2
VAR (1 DOSE)	87.5 ± 6.2	86.5 ± 6.7	↓	90.4 ± 1.5
PCV (Full Series)	69.6 ± 8.7	72.1 ± 8.8	↑	79.1 ± 2.1
Full Series (4:3:1:FS:3:1:FS)	68.8 ± 8.7	72.1 ± 8.8	↑	77.7 ± 2.2
Additional Vaccines of Interest (By 24 Months of Age)				
HAV (1 DOSE)	86.6 ± 6.4	87.5 ± 6.5	↑	90.5 ± 1.5
RTV (Full Series)	71.4 ± 8.5	72.1 ± 8.8	↑	76.1 ± 2.2
FLU (2 Doses)	39.3 ± 9.2	25.9 ± 8.6	↓	41.2 ± 2.6
COVID (2 Doses)	- ± -	1.0 ± 1.9		5.9 ± 1.2

^{*} Includes children up-to-date by ACIP-recommended catch-up schedule

Red font indicates a rate decrease since 2022

Italicized and bolded font indicates a significant difference with 2022 rate

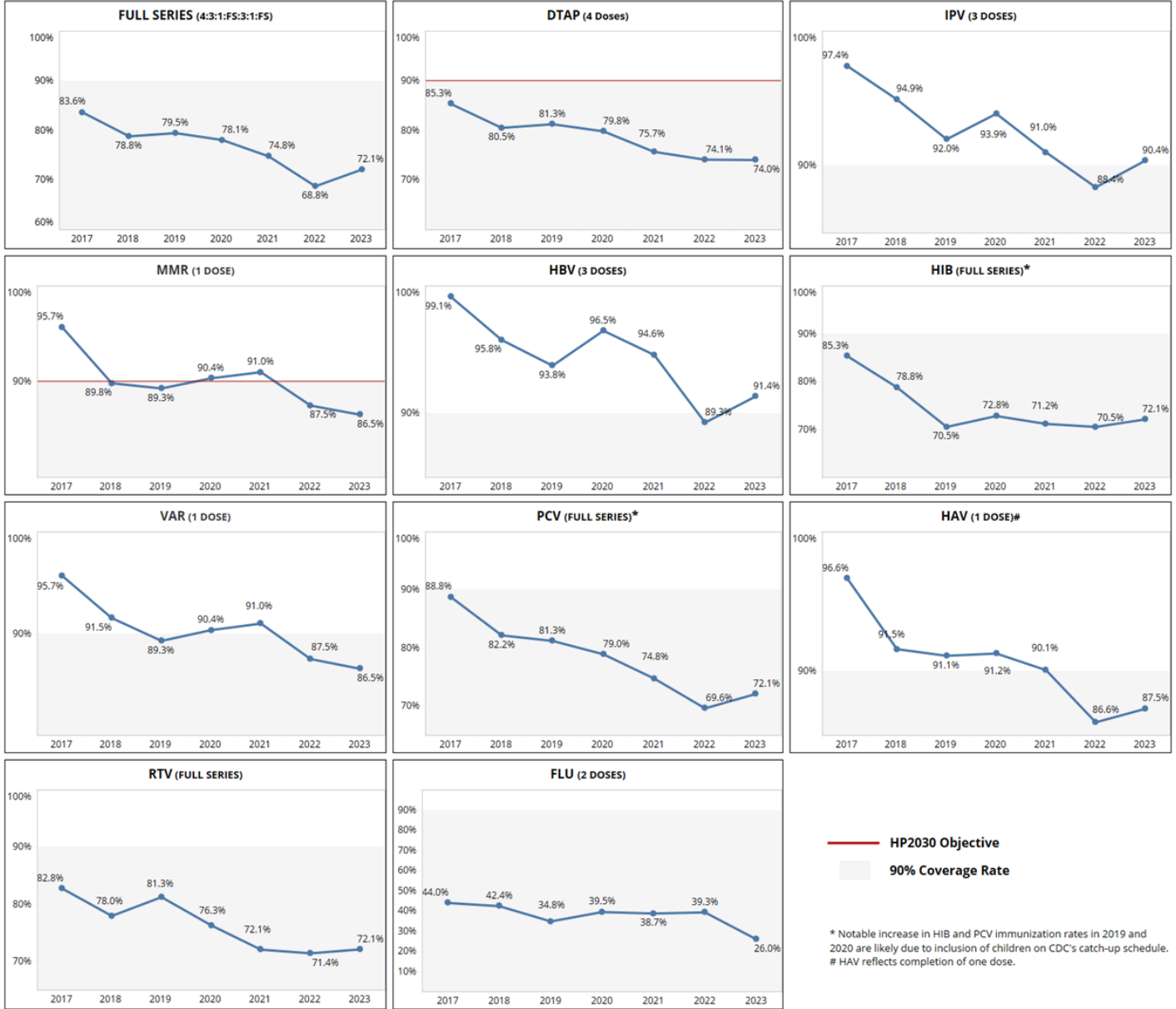
Immunization Administration

Of the 2,415 vaccines doses administered to the WTR children, 2,169 (89.8%) were administered by private providers, 105 (4.3%) were administered by public health providers and 141 (5.8%) were administered by an unknown source.

IMMUNIZATION STATUS SURVEY – 2023

Figure 21-C shows the WTR trend for each individual vaccine series doses over the seven years. The red lines represent HP2030 objectives for each antigen assessed. WTR children have not met the Healthy People objectives for DTaP anytime in the past seven years.

Figure 21-C: Immunization Rates (%) by Series and Vaccine Antigen, WTR, 2017-2023



IMMUNIZATION STATUS SURVEY – 2023

Demographic Information

The demographic breakdown of the WTR sample alongside the UTD immunization rates by demographic groups are shown in Table 10-C and 10-D.

Due to small sample sizes and inherent limitations of the data, significant differences in the UTD rates between the demographic subgroups in 2023 are not reported for WTR.

Table 10-C: Risk Factors and Immunization Rates, WTR, 2023

Group	Subgroup	Demographic		UTD Immunization Rates	
		WTR [¥] (n=104)	State [¥] (n=1414)	WTR n=104 (%)	STATE n=1414 (%)
Race⁺	Black	21 20.2%	234 16.5%	57.1 ± 23.1	65.8 ± 6.1
	White	82 78.8%	1153 81.5%	75.6 ± 9.5	79.9 ± 2.3
	Other	1 1.0%	27 1.9%	sample size is too small to generate estimates	
Ethnicity⁺	Hispanic	4 3.8%	126 8.9%	sample size is too small to generate estimates	
	Non-Hispanic	100 96.2%	1288 91.1%	72.0 ± 9.1	77.2 ± 2.3
Sex⁺	Male	54 51.9%	745 52.7%	70.4 ± 12.6	78.3 ± 3.0
	Female	50 48.1%	669 47.3%	74.0 ± 12.6	77.0 ± 3.2
Siblings⁺	0	37 35.6%	547 38.7%	78.4 ± 13.9	86.5 ± 2.9
	1	32 30.8%	479 33.9%	78.1 ± 15.2	75.4 ± 3.9
	2+	35 33.7%	388 27.4%	60.0 ± 17.1	68.0 ± 4.7
Vaccination Source	Private Medical Provider	79 76.0%	1079 76.3%	76.0 ± 9.6	78.6 ± 2.5
	Health Department	1 1.0%	18 1.3%	sample size is too small to generate estimates	
	Both	18 17.3%	269 19.0%	77.8 ± 21.3	87.0 ± 4.1
	Unknown Source	6 5.8%	48 3.4%	sample size is too small to generate estimates	
Program Enrollment	TennCare Only	20 19.2%	303 21.4%	75.0 ± 20.8	77.6 ± 4.7
	WIC Only	13 12.5%	127 9.0%	69.2 ± 29.0	76.4 ± 7.5
	Both (TennCare + WIC)	27 26.0%	438 31.0%	74.1 ± 17.7	77.4 ± 3.9
	Not Enrolled	44 42.3%	546 38.6%	70.5 ± 14.1	78.2 ± 3.5

¥ Percentages may not add up to 100% due to missing participant information

* Information was collected from birth certificate at time of delivery

+ Does not distinguish between Hispanic whites and non-Hispanic whites

Table 10-D: Parent Demographics and Immunization Rates, WTR, 2023

Group	Subgroup	Demographic		UTD Immunization Rates	
		WTR [¥] (n=104)	State [¥] (n=1414)	WTR n=104 (%)	STATE n=1414 (%)
Mother Age⁺	≤24	33 31.7%	448 31.7%	72.7 ± 16.0	77.7 ± 3.9
	25-34	56 53.8%	771 54.5%	75.0 ± 11.7	76.9 ± 3.0
	≥35	15 14.4%	195 13.8%	60.0 ± 28.1	80.5 ± 5.6
Father Age⁺	≤24	19 18.3%	264 18.7%	78.9 ± 20.2	76.5 ± 5.2
	25-34	49 47.1%	664 47.0%	67.4 ± 13.6	76.7 ± 3.2
	≥35	23 22.1%	319 22.6%	82.6 ± 17.8	82.1 ± 4.2
	Unknown	13 12.5%	167 11.8%	61.5 ± 30.6	74.9 ± 6.7
Mother Education⁺	< High School Diploma/ GED	7 6.7%	184 13.0%	sample size is too small to generate estimates	
	High School Diploma/ GED	36 34.6%	420 29.7%	66.7 ± 16.2	74.8 ± 4.2
	> High School Diploma/ GED	61 58.7%	809 57.2%	75.4 ± 11.1	79.9 ± 2.8
Father Education⁺	< High School Diploma/ GED	15 14.4%	161 11.4%	71.4 ± 45.1	77.6 ± 6.5
	High School Diploma/ GED	7 6.7%	423 29.9%	sample size is too small to generate estimates	
	> High School Diploma/ GED	43 41.3%	639 45.2%	72.1 ± 13.9	80.3 ± 3.1
	Unknown	39 37.5%	191 13.5%	66.7 ± 27.0	77.0 ± 6.0
Marriage Status⁺	Married	51 49.0%	772 54.6%	76.5 ± 12.1	79.4 ± 2.9
	Unmarried	53 51.0%	642 45.4%	67.9 ± 12.9	75.6 ± 3.3

¥ Percentages may not add up to 100% due to missing participant information

* Information was collected from birth certificate at time of delivery

Jackson-Madison County Region

Figure 22-A: Location of Jackson-Madison County Region (JMR)

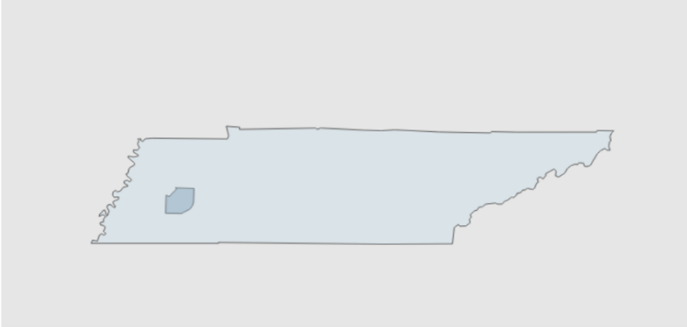


Figure 22-B: Sampling per County, JMR, 2023



Final Sample Determination

The initial 2023 sample for JMR consisted of 121 children born between January and March of 2021 (Table 11-A). After removing children who were determined to be ineligible, declined participation and were unable to be reached, the final sample size for JMR was 110. The response rate was calculated by dividing the number of participants in the final sample by the eligible sample. Compared to the previous year, the sample used for analysis was larger and response rate remained the same in 2023.

Immunization Rates

In JMR, the up-to-date (UTD) immunization rate by 24 months of age was 67.3%, which was lower than the 2022 rate (79.4%) and the state average (77.7%) (Table 11-B). The UTD immunization rate as reported to TennHS was 50.0%, higher than the 2022 rate (40.2%) and higher than the state rate (37.3%).

The vaccine-specific rates demonstrate multiple significant differences when compared to the previous year and to the state overall (Table 11-B). Most notably, RTV and PCV in JMR decreased more than 21% and 13%, respectively in 2023. In Table 11-B, figures in **red** indicate a decrease in all vaccines between 2022 and 2023 rates. **Italicized and bolded** figures indicate a significant difference (p<0.05) in DTaP, PCV, and RTV between 2022 and 2023 rates.

Immunization Administration

Of the 2,503 vaccine doses administered to the JMR children, 2,068 (82.6%) were administered by private providers, 258 (10.3%) were administered by public health providers and 177 (7.1%) were administered by an unknown source.

Table 11-A: 24-Month-Old Survey Sampling, JMR, 2023

	2022	2023	State 2023
Original sample (n)	120	121	1557
Ineligible (n)	4 (3.3%)	5 (4.1%)	71 (4.6%)
Refused Participation (n)	9 (7.5%)	6 (5.0%)	29 (1.9%)
Eligible sample (n)	107	110	1457
Unable to locate [†] (n)	0 (0.0%)	0 (0.0%)	43 (3.0%)
Final sample (n)	107	110	1414
Response Rate (%)[*]	100.0	100.0	97.0

[†] Children are classified as "Unable to Locate" after multiple attempts were unsuccessful in locating and communicating with the child's guardian and/or the child's provider was either unknown or also unable to locate the guardian.

^{*} Response Rate (%) is the number of survey responses from eligible children.

Table 11-B: Immunization Rates by Series and Vaccine Antigen, JMR, 2023

	2022 (n=107) (%)	2023 (n=110) (%)	State 2023 (n=1414) (%)
Up to Date (UTD):			
UTD immunization rate[*] (as reported to TennHS)	40.2 ± 9.4	50.0 ± 9.5 ↑	37.3 ± 2.5
UTD immunization rate[*] (with data collection)	79.4 ± 7.8	67.3 ± 8.9 ↓	77.7 ± 2.2
ACIP Recommended Vaccine Series (By 24 Months of Age)			
DTaP (4 Doses)	82.2 ± 7.4	70.9 ± 8.6 ↓	80.8 ± 2.1
IPV (3 DOSES)	89.7 ± 5.9	88.2 ± 6.1 ↓	91.3 ± 1.5
MMR (1 DOSE)	88.8 ± 6.1	85.5 ± 6.7 ↓	90.5 ± 1.5
HBV (3 DOSES)	90.7 ± 5.6	90.0 ± 5.7 ↓	92.9 ± 1.3
HBV, Birth Dose	79.4 ± 7.8	77.3 ± 8.0 ↓	77.0 ± 2.2
Hib (Full Series)	81.3 ± 7.5	70.9 ± 8.6 ↓	77.5 ± 2.2
VAR (1 DOSE)	88.8 ± 6.1	86.4 ± 6.5 ↓	90.4 ± 1.5
PCV (Full Series)	78.5 ± 7.9	65.5 ± 9.0 ↓	79.1 ± 2.1
Full Series (4:3:1:FS:3:1:FS)	79.4 ± 3.9	67.3 ± 8.9 ↓	77.7 ± 2.2
Additional Vaccines of Interest (By 24 Months of Age)			
HAV (1 DOSE)	88.8 ± 6.1	84.6 ± 6.9 ↓	90.5 ± 1.5
RTV (Full Series)	74.8 ± 8.4	53.6 ± 9.5 ↓	76.1 ± 2.2
FLU (2 Doses)	40.2 ± 9.4	28.2 ± 8.4 ↓	41.2 ± 2.6
COVID (2 Doses)	- ± -	0.0 ± 0.0	5.9 ± 1.2

^{*} Includes children up-to-date by ACIP-recommended catch-up schedule

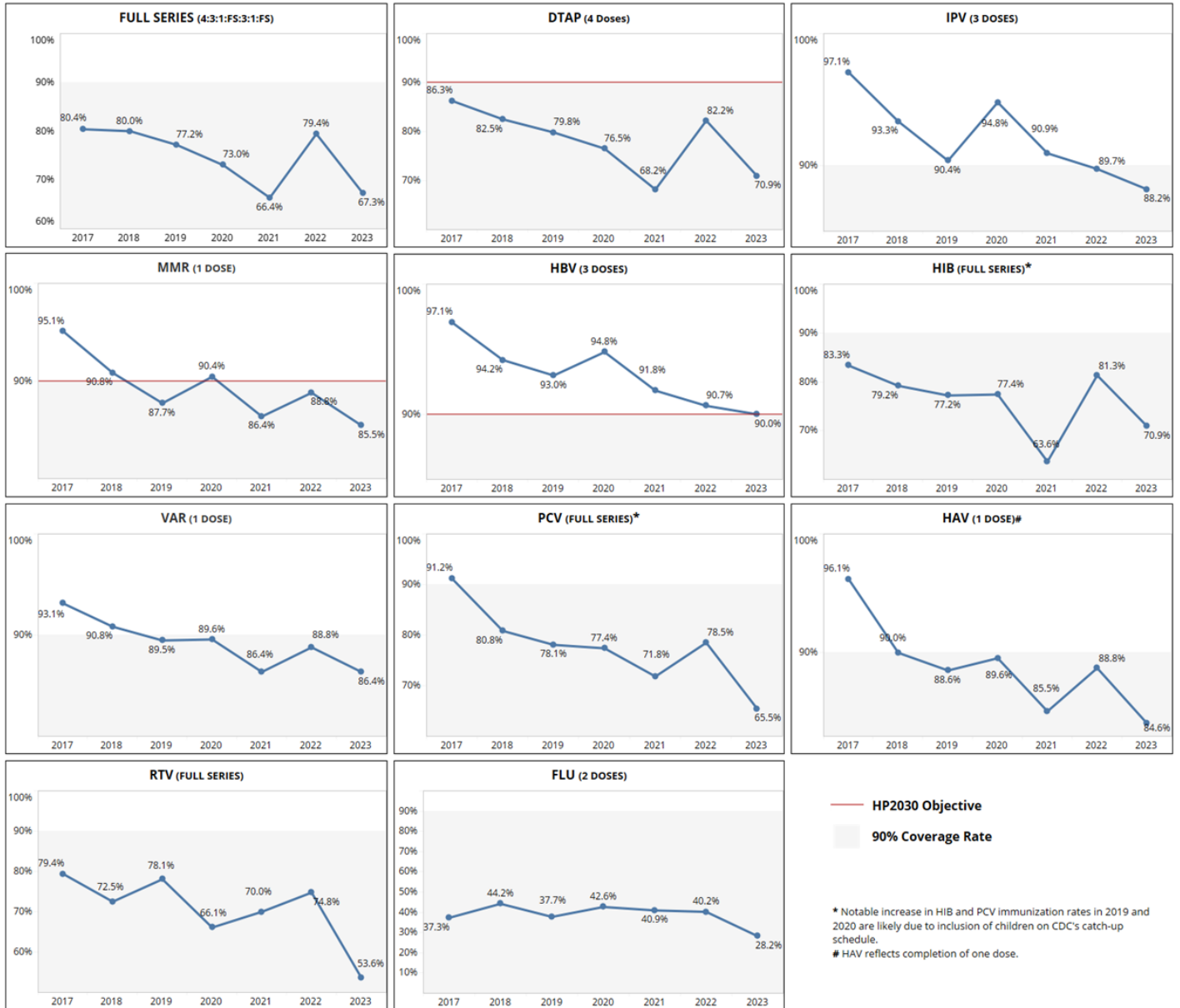
Red font indicates a rate decrease since 2022

Italicized and bolded font indicates a significant difference with 2022 rate

IMMUNIZATION STATUS SURVEY – 2023

Figure 22-C shows the JMR trend for each individual vaccine series over the seven years. The red lines represent HP2030 objectives for each series and vaccine antigen assessed. JMR children have not met the Health People objectives for DTaP anytime in the past seven years.

Figure 22-C: Immunization Rates (%) by Series and Vaccine Antigen, JMR, 2017-2023



IMMUNIZATION STATUS SURVEY – 2023

Demographic Information

The demographic breakdown of the JMR sample alongside the UTD immunization rates by demographic groups are shown in Table 11-C and 11-D.

Due to small sample sizes and inherent limitations of the data, significant differences in the UTD rates between the demographic subgroups in 2023 are not reported for JMR.

Table 11-C: Risk Factors and Immunization Rates, JMR, 2023

Group	Subgroup	Demographic		UTD Immunization Rates	
		JMR [‡] (n=110)	State [‡] (n=1414)	JMR (n=110) (%)	STATE n=1414 (%)
Race**	Black	46 41.8%	234 16.5%	65.2 ± 14.3	65.8 ± 6.1
	White	62 56.4%	1153 81.5%	69.4 ± 11.8	79.9 ± 2.3
	Other	2 1.8%	27 1.9%	sample size is too small to generate estimates	
Ethnicity**	Hispanic	12 10.9%	126 8.9%	66.7 ± 31.3	82.5 ± 6.7
	Non-Hispanic	98 89.1%	1288 91.1%	67.4 ± 9.5	77.2 ± 2.3
Sex*	Male	58 52.7%	745 52.7%	67.2 ± 12.5	78.3 ± 3.0
	Female	52 47.3%	669 47.3%	67.3 ± 13.2	77.0 ± 3.2
Siblings*	0	38 34.5%	547 38.7%	79.0 ± 13.6	86.5 ± 2.9
	1	36 32.7%	479 33.9%	61.1 ± 16.7	75.4 ± 3.9
	2+	36 32.7%	388 27.4%	61.1 ± 16.7	68.0 ± 4.7
Vaccination Source	Private Medical Provider	83 75.5%	1079 76.3%	68.7 ± 10.2	78.6 ± 2.5
	Health Department	6 5.5%	18 1.3%	sample size is too small to generate estimates	
	Both	14 12.7%	269 19.0%	92.7 ± 15.4	87.0 ± 4.1
	Unknown Source	7 6.4%	48 3.4%	sample size is too small to generate estimates	
Program Enrollment	TennCare Only	27 24.5%	303 21.4%	70.4 ± 18.2	77.6 ± 4.7
	WIC Only	5 4.5%	127 9.0%	sample size is too small to generate estimates	
	Both (TennCare + WIC)	46 41.8%	438 31.0%	60.9 ± 14.7	77.4 ± 3.9
	Not Enrolled	32 29.1%	546 38.6%	81.3 ± 14.3	78.2 ± 3.5

[‡] Percentages may not add up to 100% due to missing participant information
 * Information was collected from birth certificate at time of delivery
 + Does not distinguish between Hispanic whites and non-Hispanic whites

Table 11-D: Parent Demographics and Immunization Rates, JMR, 2023

Group	Subgroup	Demographic		UTD Immunization Rates	
		JMR [‡] (n=110)	State [‡] (n=1414)	JMR (n=110) (%)	STATE n=1414 (%)
Mother Age*	≤24	33 30.0%	448 31.7%	54.6 ± 17.9	77.7 ± 3.9
	25-34	62 56.4%	771 54.5%	69.4 ± 11.8	76.9 ± 3.0
	≥35	15 13.6%	195 13.8%	86.7 ± 19.5	80.5 ± 5.6
Father Age*	≤24	21 19.1%	264 18.7%	47.6 ± 23.3	76.5 ± 5.2
	25-34	55 50.0%	664 47.0%	69.1 ± 12.6	76.7 ± 3.2
	≥35	18 16.4%	319 22.6%	83.3 ± 19.1	82.1 ± 4.2
	Unknown	16 14.5%	167 11.8%	68.8 ± 25.5	74.9 ± 6.7
Mother Education*	< High School Diploma/ GED	16 14.5%	184 13.0%	62.5 ± 26.6	74.5 ± 6.4
	High School Diploma/ GED	25 22.7%	420 29.7%	52.0 ± 21.1	74.8 ± 4.2
	> High School Diploma/ GED	69 62.7%	809 57.2%	73.9 ± 10.6	79.9 ± 2.8
Father Education*	< High School Diploma/ GED	10 9.1%	161 11.4%	sample size is too small to generate estimates	
	High School Diploma/ GED	35 31.8%	423 29.9%	62.9 ± 16.8	74.0 ± 4.2
	> High School Diploma/ GED	48 43.6%	639 45.2%	68.8 ± 13.6	80.3 ± 3.1
	Unknown	17 15.5%	191 13.5%	64.7 ± 25.3	77.0 ± 6.0
Marriage Status*	Married	51 46.4%	772 54.6%	74.5 ± 12.4	79.4 ± 2.9
	Unmarried	59 53.6%	642 45.4%	61.0 ± 12.8	75.6 ± 3.3

[‡] Percentages may not add up to 100% due to missing participant information
 * Information was collected from birth certificate at time of delivery

South Central Region

Figure 23-A: Location of South Central Region (SCR)

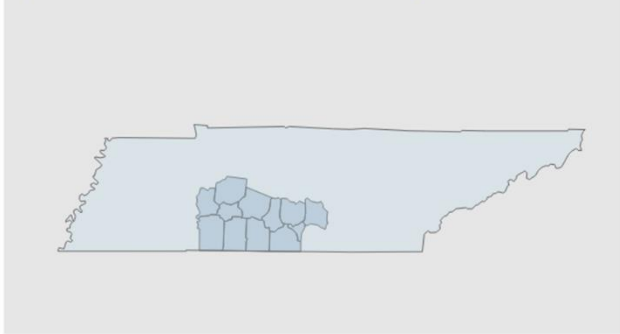
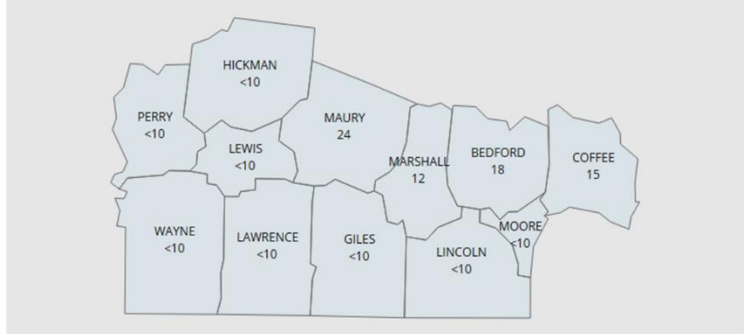


Figure 23-B: Sampling per County, SCR, 2023



Final Sample Determination

The initial 2023 sample for SCR consisted of 120 children born between January and March of 2021 (Table 12-A). After removing children who were determined to be ineligible, declined participation and were unable to be reached, the final sample size for SCR was 105. The response rate was calculated by dividing the number of participants in the final sample by the eligible sample. Compared to the previous year, a larger sample was used for analysis and there was a higher response rate in 2023.

Immunization Rates

In SCR, the up-to-date (UTD) immunization rate by 24 months of age was 75.2%, which was lower than the 2022 rate (77.0%) and lower than the state average (77.7%) (Table 12-B). The UTD immunization rate as reported to TennNIS was 45.6%, lower than the 2022 rate (47.0%) but higher than the state rate (37.3%). Most SCR vaccination rates for 2023 are lower than the 2022 rates.

The vaccine-specific rates demonstrate no significant differences when compared to the previous year and to the state overall (Table 12-B). However, RTV and PCV in SCR decreased more than 8% and 7%, respectively in 2023. In Table 12-B, figures in red indicate a decrease in most vaccines between 2022 and 2023 rates.

Immunization Administration

Of the 2,518 vaccines doses administered to the SCR children, 2,439 (96.9%) were administered by private providers, 72 (2.9%) were administered by public health providers and 7 (0.3%) were administered by an unknown source.

Table 12-A: 24-Month-Old Survey Sampling, SCR, 2023

	2022	2023	State 2023
Original sample (n)	120	120	1557
Ineligible (n)	7 (5.8%)	1 (0.8%)	71 (4.6%)
Refused Participation (n)	4 (3.3%)	12 (10.0%)	29 (1.9%)
Eligible sample (n)	109	107	1457
Unable to locate† (n)	9 (7.5%)	2 (1.9%)	43 (3.0%)
Final sample (n)	100	105	1414
Response Rate (%)*	91.7	98.1	97.0

† Children are classified as "Unable to Locate" after multiple attempts were unsuccessful in locating and communicating with the child's guardian and/or the child's provider was either unknown or also unable to locate the guardian.

* Response Rate (%) is the number of survey responses from eligible children.

Table 12-B: Immunization Rates by Series and Vaccine Antigen, SCR, 2023

	2022 (n=100) (%)	2023 (n=105) (%)	State 2023 (n=1414) (%)
Up to Date (UTD):			
UTD immunization rate* (as reported to TennNIS)	47.0 ± 10.0	45.6 ± 9.7 ↓	37.3 ± 2.5
UTD immunization rate* (with data collection)	77.0 ± 8.4	75.2 ± 8.4 ↓	77.7 ± 2.2
ACIP Recommended Vaccine Series (By 24 Months of Age)			
DTaP (4 Doses)	81.0 ± 7.8	78.1 ± 8.1 ↓	80.8 ± 2.1
IPV (3 DOSES)	95.0 ± 4.4	89.5 ± 6.0 ↓	91.3 ± 1.5
MMR (1 DOSE)	90.0 ± 6.0	89.5 ± 6.0 ↓	90.5 ± 1.5
HBV (3 DOSES)	97.0 ± 3.4	91.4 ± 5.4 ↓	92.9 ± 1.3
HBV, Birth Dose	90.0 ± 6.0	85.7 ± 6.8 ↓	77.0 ± 2.2
Hib (Full Series)	81.0 ± 7.8	83.8 ± 7.2 ↑	77.5 ± 2.2
VAR (1 DOSE)	90.0 ± 6.0	91.4 ± 5.4 ↑	90.4 ± 1.5
PCV (Full Series)	85.0 ± 7.1	77.1 ± 8.2 ↓	79.1 ± 2.1
Full Series (4:3:1:FS:3:1:FS)	77.0 ± 8.4	75.2 ± 8.4 ↓	77.7 ± 2.2
Additional Vaccines of Interest (By 24 Months of Age)			
HAV (1 DOSE)	92.0 ± 5.4	86.7 ± 6.6 ↓	90.5 ± 1.5
RTV (Full Series)	91.0 ± 5.7	82.9 ± 7.3 ↓	76.1 ± 2.2
FLU (2 Doses)	44.0 ± 9.9	36.2 ± 5.7 ↓	41.2 ± 2.6
COVID (2 Doses)	- ± -	0.0 ± 0.0	5.9 ± 1.2

* Includes children up-to-date by ACIP-recommended catch-up schedule

Red font indicates a rate decrease since 2022

Italicized and bold font indicates a significant difference with 2022 rate

IMMUNIZATION STATUS SURVEY – 2023

Figure 23-C shows the SCR trend for each individual vaccine series over the seven years. The red lines represent HP2030 objectives for each series and vaccine antigen assessed. SCR children have not met the Health People objectives for DTaP anytime in the past seven years.

Figure 23-C: Immunization Rates (%) by Series and Vaccine Antigen, SCR, 2017-2023



IMMUNIZATION STATUS SURVEY – 2023

Demographic Information

The demographic breakdown of the SCR sample alongside the UTD immunization rates by demographic groups are shown in Table 12-C and 12-D.

Due to small sample sizes and inherent limitations of the data, significant differences in the UTD rates between the demographic subgroups in 2023 are not reported for SCR.

Table 12-C: Risk Factors and Immunization Rates, SCR, 2023

Group	Subgroup	Demographic		UTD Immunization Rates	
		SCR [¥] (n=105)	State [¥] (n=1414)	SCR (n=105) (%)	STATE n=1414 (%)
Race**	Black	7 6.7%	234 16.9%	sample size is too small to generate estimates	65.8 ± 6.1
	White	97 92.4%	1125 81.2%	76.9 ± 8.6	79.9 ± 2.3
	Other	1 1.0%	26 1.9%	sample size is too small to generate estimates	85.2 ± 14.3
Ethnicity**	Hispanic	95 90.5%	126 9.1%	73.7 ± 9.0	82.5 ± 6.7
	Non-Hispanic	10 9.5%	1259 90.9%	sample size is too small to generate estimates	77.2 ± 2.3
Sex*	Male	52 49.5%	733 52.9%	73.1 ± 12.5	78.3 ± 3.0
	Female	53 50.5%	652 47.1%	77.4 ± 11.7	77.0 ± 3.2
Siblings*	0	38 36.2%	537 29.3%	86.8 ± 11.3	86.5 ± 2.9
	1	36 34.3%	468 33.8%	72.2 ± 15.4	75.4 ± 3.9
	2+	31 29.5%	380 27.4%	64.5 ± 17.8	68.0 ± 4.7
Vaccination Source	Private Medical Provider	95 90.5%	1056 76.2%	73.7 ± 9.0	78.6 ± 2.5
	Health Department	0 0.0%	17 1.2%	sample size is too small to generate estimates	50.0 ± 25.6
	Both	10 9.5%	268 19.4%	sample size is too small to generate estimates	87.0 ± 4.1
	Unknown Source	0 0.0%	44 3.2%	sample size is too small to generate estimates	14.6 ± 10.4
Program Enrollment	TennCare Only	34 32.4%	300 21.7%	76.5 ± 15.0	77.6 ± 4.7
	WIC Only	9 8.6%	122 8.8%	sample size is too small to generate estimates	76.4 ± 7.5
	Both (TennCare + WIC)	39 37.1%	428 30.9%	76.9 ± 13.8	77.4 ± 3.9
	Not Enrolled	23 21.9%	535 38.6%	78.3 ± 18.2	78.2 ± 3.5

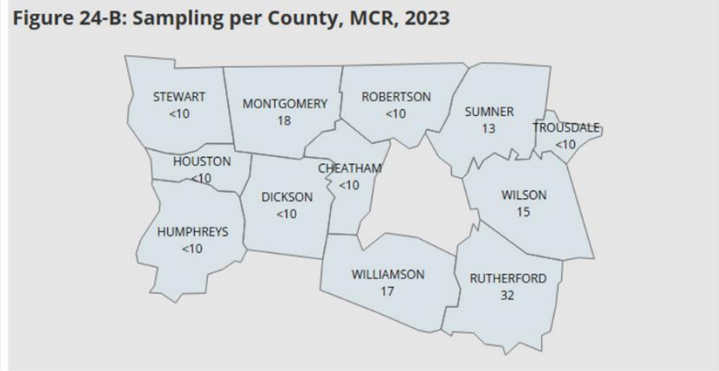
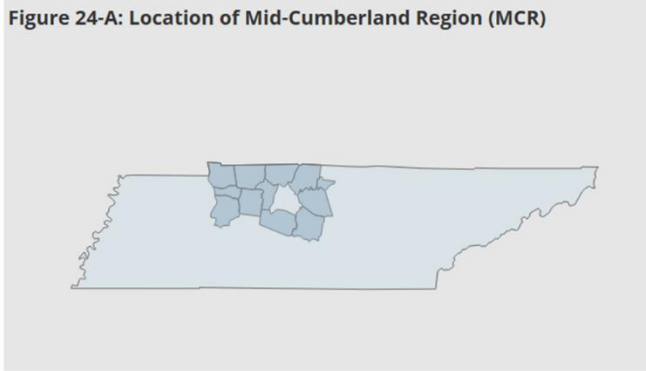
¥ Percentages may not add up to 100% due to missing participant information
 * Information was collected from birth certificate at time of delivery
 + Does not distinguish between Hispanic whites and non-Hispanic whites

Table 12-D: Parent Demographics and Immunization Rates, SCR, 2023

Group	Subgroup	Demographic		UTD Immunization Rates	
		SCR [¥] (n=105)	State [¥] (n=1414)	SCR (n=105) (%)	STATE n=1414 (%)
Mother Age*	≤24	39 37.1%	437 30.9%	76.9 ± 13.8	77.7 ± 3.9
	25-34	54 51.4%	756 53.5%	72.2 ± 12.3	76.9 ± 3.0
	≥35	12 11.4%	192 13.6%	83.3 ± 24.7	80.5 ± 5.6
Father Age*	≤24	30 28.6%	257 18.2%	80.0 ± 15.2	76.5 ± 5.2
	25-34	40 38.1%	653 46.2%	70.0 ± 14.8	76.7 ± 3.2
	≥35	24 22.9%	311 22.0%	87.5 ± 14.3	82.1 ± 4.2
	Unknown	11 10.5%	164 11.6%	54.6 ± 35.1	74.9 ± 6.7
Mother Education*	< High School Diploma/ GED	13 12.4%	182 12.9%	69.2 ± 29.0	74.5 ± 6.4
	High School Diploma/ GED	38 36.2%	412 29.1%	76.3 ± 14.2	74.8 ± 4.2
	> High School Diploma/ GED	54 51.4%	790 55.9%	75.9 ± 11.8	79.9 ± 2.8
Father Education*	< High School Diploma/ GED	14 13.3%	160 11.3%	78.6 ± 24.6	77.6 ± 6.5
	High School Diploma/ GED	42 40.0%	410 29.0%	71.4 ± 14.3	74.0 ± 4.2
	> High School Diploma/ GED	35 33.3%	627 44.3%	82.9 ± 13.1	80.3 ± 3.1
	Unknown	14 13.3%	188 13.3%	64.3 ± 28.7	77.0 ± 6.0
Marriage Status*	Married	53 50.5%	759 53.7%	73.6 ± 12.3	79.4 ± 2.9
	Unmarried	52 49.5%	626 44.3%	76.9 ± 11.8	75.6 ± 3.3

¥ Percentages may not add up to 100% due to missing participant information
 * Information was collected from birth certificate at time of delivery

Mid-Cumberland Region



Final Sample Determination

The initial 2023 sample for MCR consisted of 119 children born between January and March of 2021 (Table 13-A). After removing children who were determined to be ineligible, declined participation and were unable to be reached, the final sample size for MCR was 107. The response rate was calculated by dividing the number of participants in the final sample by the eligible sample. Compared to the previous year, a larger sample was used for analysis and there was a higher response rate in 2023.

Immunization Rates

In MCR, the up-to-date (UTD) immunization rate by 24 months of age was 69.2%, which was lower than the 2022 rate (83.5%) and the state average (77.7%) (Table 13-B). The UTD immunization rate as reported to TennIS was 23.4%, lower than the 2022 rate (26.2%) and state rate (37.3%). All MCR vaccination rates for 2023 are lower than the 2022 rates except for COVID.

The vaccine-specific rates demonstrate multiple significant differences when compared to the previous year and to the state overall (Table 13-B). Most notably Hib and DTaP in MCR decreased more than 23% and 15%, respectively in 2023. In Table 13-B, figures in **red** indicate a decrease between 2022 and 2023 rates and **italicized and bolded** figures indicate a significant difference ($p < 0.05$) in DTaP, IPV, Full Series (4:3:1:FS:3:1:4), RTV, and Flu between 2022 and 2023 rates.

Immunization Administration

Of the 2,548 vaccines doses administered to the MCR children, 2,410 (94.6%) were administered by private providers, 8 (0.3%) were administered by public health providers and 130 (5.1%) were administered by an unknown source.

Table 13-A: 24-Month-Old Survey Sampling, MCR, 2023

	2022	2023	State 2023
Original sample (n)	122	119	1557
Ineligible (n)	5 (4.1%)	4 (3.4%)	71 (4.6%)
Refused Participation (n)	0 (0.0%)	1 (0.8%)	29 (1.9%)
Eligible sample (n)	117	114	1457
Unable to locate [†] (n)	14 (12.0%)	7 (6.0%)	43 (3.0%)
Final sample (n)	103	107	1414
Response Rate (%)[*]	88.0	93.9	97.0

[†] Children are classified as "Unable to Locate" after multiple attempts were unsuccessful in locating and communicating with the child's guardian and/or the child's provider was either unknown or also unable to locate the guardian.

^{*} Response Rate (%) is the number of survey responses from eligible children

Table 13-B: Immunization Rates by Series and Vaccine Antigen, MCR, 2023

	2022 (n=103) (%)	2023 (n=107) (%)	State 2023 (n=1414) (%)
Up to Date (UTD):			
UTD immunization rate[*] (as reported to TennIS)	26.2 ± 8.6	23.4 ± 8.1 ↓	37.3 ± 2.5
UTD immunization rate[*] (with data collection)	83.5 ± 7.3	69.2 ± 8.9 ↓	77.7 ± 2.2
ACIP Recommended Vaccine Series (By 24 Months of Age)			
DTaP (4 Doses)	87.4 ± 6.5	71.9 ± 8.7 ↓	80.8 ± 2.1
IPV (3 DOSES)	97.1 ± 3.3	85.9 ± 6.7 ↓	91.3 ± 1.5
MMR (1 DOSE)	91.3 ± 5.5	89.7 ± 5.9 ↓	90.5 ± 1.5
HBV (3 DOSES)	98.1 ± 2.7	87.9 ± 6.3 ↓	92.9 ± 1.3
HBV, Birth Dose	79.6 ± 7.9	73.8 ± 8.5 ↓	77.0 ± 2.2
Hib (Full Series)	84.5 ± 7.1	60.8 ± 9.4 ↓	77.5 ± 2.2
VAR (1 DOSE)	92.2 ± 5.3	87.9 ± 6.3 ↓	90.4 ± 1.5
PCV (Full Series)	86.4 ± 6.7	76.6 ± 8.2 ↓	79.1 ± 2.1
Full SERIES 431:FS:314	83.5 ± 7.3	69.2 ± 8.9 ↓	77.7 ± 2.2
Additional Vaccines of Interest (By 24 Months of Age)			
HAV (1 DOSE)	92.2 ± 5.3	91.6 ± 5.4 ↓	90.5 ± 1.5
RTV (Full Series)	87.4 ± 6.5	70.1 ± 8.8 ↓	76.1 ± 2.2
FLU (2 Doses)	63.1 ± 9.5	48.6 ± 9.6 ↓	41.2 ± 2.6
COVID (2 Doses)	- ± -	26.2 ± 8.5	5.9 ± 1.2

^{*} Includes children up-to-date by ACIP-recommended catch-up schedule

Red font indicates a rate decrease since 2022

Italicized and bolded font indicates a significant difference with 2022 rate

IMMUNIZATION STATUS SURVEY – 2023

Figure 24-C shows the MCR trend for each individual vaccine series over the seven years. The red lines represent HP2030 objectives for each series and vaccine antigen assessed. MCR children have not met the Healthy People objective for DTaP anytime in the past seven years.

Figure 24-C: Immunization Rates (%) by Series and Vaccine Antigen, MCR, 2017-2023



IMMUNIZATION STATUS SURVEY – 2023

Demographic Information

The demographic breakdown of the MCR sample alongside the UTD immunization rates by demographic groups are shown in Table 13-C and 13-D.

Due to small sample sizes and inherent limitations of the data, significant differences in the UTD rates between the demographic subgroups in 2023 are not reported for MCR.

Table 13-C: Risk Factors and Immunization Rates, MCR, 2023

Group	Subgroup	Demographic		UTD Immunization Rates	
		MCR [‡] (n=107)	State [‡] (n=1414)	MCR n=107 (%)	STATE n=1414 (%)
Race^{*,+}					
	Black	14 13.1%	234 16.5%	64.3 ± 28.7	65.8 ± 6.1
	White	90 84.1%	1153 81.5%	63.3 ± 10.2	79.9 ± 2.3
	Other	3 2.8%	27 1.9%	sample size is too small to generate estimates	85.2 ± 14.3
Ethnicity^{*,+}					
	Hispanic	13 12.1%	126 8.9%	61.5 ± 3.1	82.5 ± 6.7
	Non-Hispanic	94 87.9%	1288 91.1%	63.8 ± 10.0	77.2 ± 2.3
Sex[*]					
	Male	56 52.3%	745 52.7%	69.6 ± 12.4	78.3 ± 3.0
	Female	51 47.7%	669 47.3%	56.7 ± 14.1	77.0 ± 3.2
Siblings[*]					
	0	42 39.3%	547 38.7%	71.4 ± 14.3	86.5 ± 2.9
	1	33 30.8%	479 33.9%	57.6 ± 17.8	75.4 ± 3.9
	2+	32 29.9%	388 27.4%	59.4 ± 18.0	68.0 ± 4.7
Vaccination Source					
	Private Medical Provider	56 52.3%	1079 76.3%	67.9 ± 12.6	78.6 ± 2.5
	Health Department	1 0.9%	18 1.3%	sample size is too small to generate estimates	50.0 ± 25.6
	Both	47 43.9%	269 19.0%	76.6 ± 12.6	87.0 ± 4.1
	Unknown Source	3 2.8%	48 3.4%	sample size is too small to generate estimates	14.6 ± 10.4
Program Enrollment					
	TennCare Only	18 16.8%	303 21.4%	72.2 ± 22.9	77.6 ± 4.7
	WIC Only	11 10.3%	127 9.0%	90.9 ± 20.3	76.4 ± 7.5
	Both (TennCare + WIC)	16 15.0%	438 31.0%	81.3 ± 21.5	77.4 ± 3.9
	Not Enrolled	62 57.9%	546 38.6%	61.3 ± 12.2	78.2 ± 3.5

[‡] Percentages may not add up to 100% due to missing participant information

* Information was collected from birth certificate at time of delivery

+ Does not distinguish between Hispanic whites and non-Hispanic whites

Table 13-D: Parent Demographics and Immunization Rates, MCR, 2023

Group	Subgroup	Demographic		UTD Immunization Rates	
		MCR [‡] (n=107)	State [‡] (n=1414)	MCR n=107 (%)	STATE n=1414 (%)
Mother Age[*]					
	≤24	27 25.2%	448 31.7%	70.4 ± 18.4	77.7 ± 3.9
	25-34	61 57.0%	771 54.5%	65.5 ± 12.3	76.9 ± 3.0
	≥35	19 17.8%	195 13.8%	47.4 ± 24.7	80.5 ± 5.6
Father Age[*]					
	≤24	14 13.1%	264 18.7%	64.3 ± 15.2	76.5 ± 5.2
	25-34	55 51.4%	664 47.0%	67.3 ± 11.5	76.7 ± 3.2
	≥35	26 24.3%	319 22.6%	57.7 ± 14.9	82.1 ± 4.2
	Unknown	12 11.2%	167 11.8%	58.3 ± 27.2	74.9 ± 6.7
Mother Education[*]					
	< High School Diploma/ GED	12 11.2%	184 13.0%	41.7 ± 32.7	74.5 ± 6.4
	High School Diploma/ GED	22 20.6%	420 29.7%	81.8 ± 17.5	74.8 ± 4.2
	> High School Diploma/ GED	72 67.3%	809 57.2%	61.1 ± 11.5	79.9 ± 2.8
Father Education[*]		0.0%			
	< High School Diploma/ GED	14 13.1%	161 11.4%	57.1 ± 29.7	77.6 ± 6.5
	High School Diploma/ GED	15 14.0%	423 29.9%	60.0 ± 28.1	74.0 ± 4.2
	> High School Diploma/ GED	20 18.7%	639 45.2%	70.0 ± 22.0	80.3 ± 3.1
	Unknown	58 54.2%	191 13.5%	63.8 ± 12.7	77.0 ± 6.0
Marriage Status[*]					
	Married	69 64.5%	772 54.6%	69.6 ± 11.1	79.4 ± 2.9
	Unmarried	38 35.5%	642 45.4%	68.4 ± 15.5	75.6 ± 3.3

[‡] Percentages may not add up to 100% due to missing participant information

* Information was collected from birth certificate at time of delivery

Nashville-Davidson County Region

Figure 25-A: Location of Nashville-Davidson County Region (NDR)

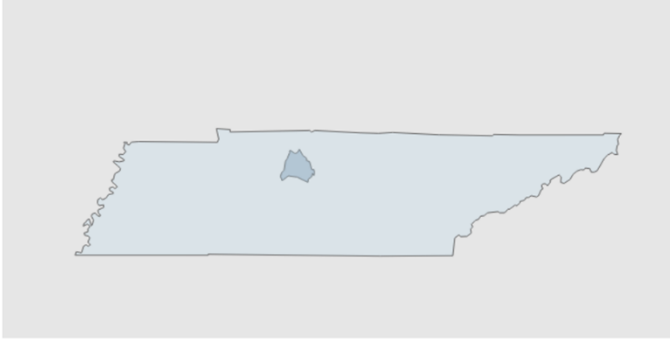
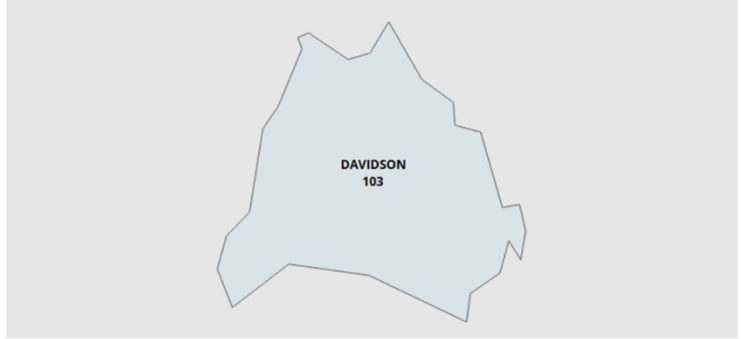


Figure 25-B: Sampling per County, NDR, 2023



Final Sample Determination

The initial 2023 sample for MCR consisted of 119 children born between January and March of 2021 (Table 14-A). After removing children who were determined to be ineligible, declined participation and were unable to be reached, the final sample size for NDR was 103. The response rate was calculated by dividing the number of participants in the final sample by the eligible sample. Compared to the previous year, a larger sample was used for analysis and the response rate was higher in 2023.

Immunization Rates

In NDR, the up-to-date (UTD) immunization rate by 24 months of age was 81.6%, which was lower than the 2022 rate (85.2%) but higher the state average (77.7%) (Table 14-B). The UTD immunization rate as reported to TennIS was 57.3%, higher than the 2022 rate (48.5%) and state rate (37.3%). All NDR vaccination rates for 2023 are lower than the 2022 rates except for COVID.

The vaccine-specific rates demonstrate multiple significant differences when compared to the previous year and to the state overall (Table 14-B). Most notably RTV and IPV in NDR decreased more than 11% and 9%, respectively in 2023. In Table 14-B, figures in **red** indicate a decrease between 2022 and 2023 rates and **italicized and bolded** figures indicate a significant difference ($p < 0.05$) in IPV, MMR, VAR, PCV, and RTV between 2022 and 2023 rates.

Immunization Administration

Of the 2,574 vaccines doses administered to the NDR children, 2,313 (89.9%) were administered by private providers, 7 (0.3%) were administered by public health providers and 245 (9.9%) were administered by an unknown source.

Table 14-A: 24-Month-Old Survey Sampling, NDR, 2023

	2022	2023	State 2023
Original sample (n)	121	119	1557
Ineligible (n)	7 (5.8%)	7 (5.8%)	71 (4.6%)
Refused Participation (n)	0 (0.0%)	0 (0.0%)	29 (1.9%)
Eligible sample (n)	114	112	1457
Unable to locate [†] (n)	13 (11.4%)	9 (11.4%)	43 (3.0%)
Final sample (n)	101	103	1414
Response Rate (%)	88.6	92.0	97.0

[†] Children are classified as "Unable to Locate" after multiple attempts were unsuccessful in locating and communicating with the child's guardian and/or the child's provider was either unknown or also unable to locate the guardian.

* Response Rate (%) is the number of survey responses from eligible children

Table 14-B: Immunization Rates by Series and Vaccine Antigen, NDR, 2023

	2022 (n=101) (%)	2023 (n=103) (%)	State 2023 (n=1414) (%)
Up to Date (UTD):			
UTD immunization rate* (as reported to TennIS)	48.5 ± 9.9	57.3 ± 9.7 ↑	37.3 ± 2.5
UTD immunization rate* (with data collection)	85.2 ± 7.1	81.6 ± 7.6 ↓	77.7 ± 2.2
ACIP Recommended Vaccine Series (By 24 Months of Age)			
DTaP (4 Doses)	90.1 ± 5.9	86.4 ± 6.7 ↓	80.8 ± 2.1
IPV (3 DOSES)	99.0 ± 2.0	89.3 ± 6.1 ↓	91.3 ± 1.5
MMR (1 DOSE)	98.0 ± 2.8	90.3 ± 5.8 ↓	90.5 ± 1.5
HBV (3 DOSES)	97.0 ± 3.4	92.2 ± 5.3 ↓	92.9 ± 1.3
HBV, Birth Dose	86.1 ± 6.9	84.5 ± 7.1 ↓	77.0 ± 2.2
Hib (Full Series)	89.1 ± 6.2	81.6 ± 7.6 ↓	77.5 ± 2.2
VAR (1 DOSE)	97.0 ± 3.4	89.3 ± 6.1 ↓	90.4 ± 1.5
PCV (Full Series)	93.1 ± 5.0	83.5 ± 7.3 ↓	79.1 ± 2.1
Full Series (4:3:1:FS:3:1:FS)	85.2 ± 7.1	81.6 ± 7.6 ↓	77.7 ± 2.2
Additional Vaccines of Interest (By 24 Months of Age)			
HAV (1 DOSE)	95.1 ± 4.3	90.3 ± 5.8 ↓	90.5 ± 1.5
RTV (Full Series)	86.1 ± 6.9	74.8 ± 6.9 ↓	76.1 ± 2.2
FLU (2 Doses)	80.2 ± 7.9	73.8 ± 8.6 ↓	41.2 ± 2.6
COVID (2 Doses)	- ± -	7.8 ± 5.3	5.9 ± 1.2

* Includes children up-to-date by ACIP-recommended catch-up schedule

Red font indicates a rate decrease since 2022

Italicized and bolded font indicates a significant difference with 2022 rate

IMMUNIZATION STATUS SURVEY – 2023

Figure 25-C shows the NDR trend for each individual vaccine series over the seven years. The red lines represent HP2030 objectives for each series and vaccine antigen assessed. NDR children have met the Healthy People objectives for DTaP and MMR multiple times in the past seven years.

Figure 25-C: Immunization Rates (%) by Series and Vaccine Antigen, NDR, 2017-2023



IMMUNIZATION STATUS SURVEY – 2023

Demographic Information

The demographic breakdown of the NDR sample alongside the UTD immunization rates by demographic groups are shown in Table 14-C and 14-D.

Due to small sample sizes and inherent limitations of the data, significant differences in the UTD rates between the demographic subgroups in 2023 are not reported for NDR.

Table 14-C: Risk Factors and Immunization Rates, NDR, 2023

Group	Subgroup	Demographic Breakdown		UTD Immunization Rates	
		NDR [‡] (n=103)	State [‡] (n=1414)	NDR n=103 (%)	STATE n=1414 (%)
Race**					
	Black	26 25.2%	234 16.5%	65.4 ± 19.6	65.8 ± 6.1
	White	74 71.8%	1153 81.5%	86.5 ± 8.0	79.9 ± 2.3
	Other	3 2.9%	27 1.9%	sample size is too small to generate estimates	85.2 ± 14.3
Ethnicity**					
	Hispanic	21 20.4%	126 8.9%	85.7 ± 16.3	82.5 ± 6.7
	Non-Hispanic	82 79.6%	1288 91.1%	80.5 ± 8.8	77.2 ± 2.3
Sex*					
	Male	61 59.2%	745 52.7%	80.3 ± 10.3	78.3 ± 3.0
	Female	42 40.8%	669 47.3%	83.3 ± 11.8	77.0 ± 3.2
Siblings*					
	0	41 39.8%	547 38.7%	85.4 ± 11.3	86.5 ± 2.9
	1	35 34.0%	479 33.9%	77.1 ± 14.6	75.4 ± 3.9
	2+	27 26.2%	388 27.4%	81.5 ± 15.7	68.0 ± 4.7
Vaccination Source					
	Private Medical Provider	69 67.0%	1079 76.3%	82.6 ± 9.2	78.6 ± 2.5
	Health Department	0 0.0%	18 1.3%	sample size is too small to generate estimates	50.0 ± 25.6
	Both	25 24.3%	269 19.0%	92.0 ± 11.4	87.0 ± 4.1
	Unknown Source	9 8.7%	48 3.4%	sample size is too small to generate estimates	14.6 ± 10.4
Program Enrollment					
	TennCare Only	18 17.5%	303 21.4%	89.0 ± 16.2	77.6 ± 4.7
	WIC Only	12 11.7%	127 9.0%	83.3 ± 24.7	76.4 ± 7.5
	Both (TennCare + WIC)	14 13.6%	438 31.0%	85.7 ± 21.0	77.4 ± 3.9
	Not Enrolled	59 57.3%	546 38.6%	86.5 ± 7.0	78.2 ± 3.5

‡ Percentages may not add up to 100% due to missing participant information
 * Information was collected from birth certificate at time of delivery
 + Does not distinguish between Hispanic whites and non-Hispanic whites

Table 14-D: Parent Demographics and Immunization Rates, NDR, 2023

Group	Subgroup	Demographic Breakdown		UTD Immunization Rates	
		NDR [‡] (n=103)	State [‡] (n=1414)	NDR n=103 (%)	STATE n=1414 (%)
Mother Age*					
	≤24	22 21.4%	448 31.7%	72.7 ± 20.2	77.7 ± 3.9
	25-34	62 60.2%	771 54.5%	80.7 ± 10.1	76.9 ± 3.0
	≥35	19 18.4%	195 13.8%	94.7 ± 11.1	80.5 ± 5.6
Father Age*					
	≤24	13 12.6%	264 18.7%	76.9 ± 26.5	76.5 ± 5.2
	25-34	50 48.5%	664 47.0%	82.9 ± 11.0	76.7 ± 3.2
	≥35	31 30.1%	319 22.6%	87.1 ± 12.5	82.1 ± 4.2
	Unknown	9 8.7%	167 11.8%	sample size is too small to generate estimates	74.9 ± 6.7
Mother Education*					
	< High School Diploma/ GED	17 16.5%	184 13.0%	82.4 ± 20.2	74.5 ± 6.4
	High School Diploma/ GED	27 26.2%	420 29.7%	77.8 ± 16.8	74.8 ± 4.2
	> High School Diploma/ GED	59 57.3%	809 57.2%	83.1 ± 9.9	79.9 ± 2.8
Father Education*					
	< High School Diploma/ GED	11 10.7%	161 11.4%	72.7 ± 31.4	77.6 ± 6.5
	High School Diploma/ GED	21 20.4%	423 29.9%	85.7 ± 85.7	74.0 ± 4.2
	> High School Diploma/ GED	12 11.7%	639 45.2%	83.3 ± 24.7	80.3 ± 3.1
	Unknown	59 57.3%	191 13.5%	81.4 ± 10.2	77.0 ± 6.0
Marriage Status*					
	Married	61 59.2%	772 54.6%	76.2 ± 13.4	79.4 ± 2.9
	Unmarried	42 40.8%	642 45.4%	85.3 ± 9.2	75.6 ± 3.3

‡ Percentages may not add up to 100% due to missing participant information
 * Information was collected from birth certificate at time of delivery

Upper-Cumberland Region

Figure 26-A: Location of Upper-Cumberland Region (UCR)

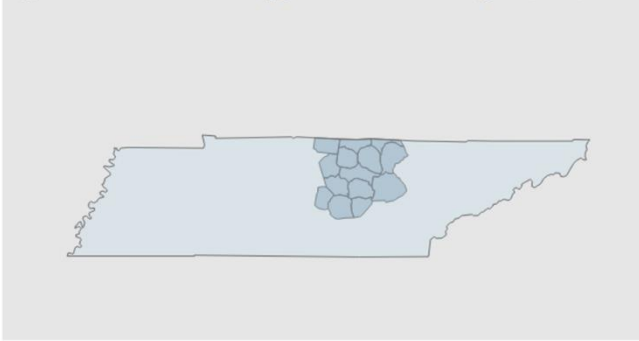
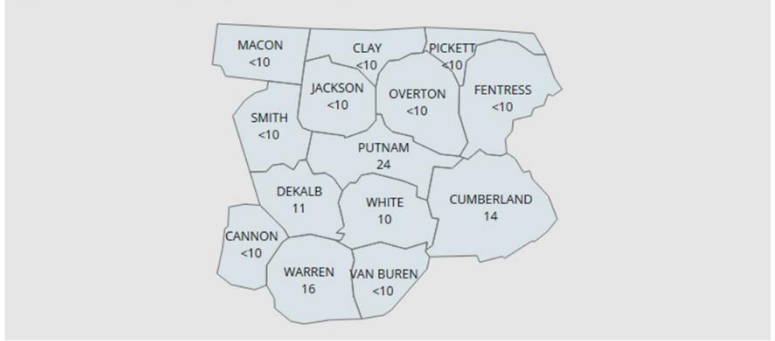


Figure 26-B: Sampling per County, UCR, 2023



Final Sample Determination

The initial 2023 sample for UCR consisted of 120 children born between January and March of 2021 (Table 15-A). After removing children who were determined to be ineligible, declined participation and were unable to be reached, the final sample size for UCR was 113. The response rate was calculated by dividing the number of participants in the final sample by the eligible sample. Compared to the previous year, a larger sample was used for analysis and there was a higher response rate in 2023.

Immunization Rates

In UCR, the up-to-date (UTD) immunization rate by 24 months of age was 77.9%, which was higher than the 2022 rate (64.3%) and the state average (77.7%) (Table 15-B). The UTD immunization rate as reported to TennHIS was 37.2%, higher than the 2022 rate (34.8%) but lower than the state rate (37.3%).

The vaccine-specific rates demonstrate one significant difference and multiple increases when compared to the previous year and to the state overall (Table 15-B). Most notably, Full Series (4:3:1:FS:3:1:FS) increased more than 13% in 2023. In Table 15-B, **italicized and bolded** figures indicate a significant difference ($p < 0.05$) in Full Series (4:3:1:FS:3:1:FS) between 2022 and 2023 rates.

Immunization Administration

Of the 2,525 vaccines doses administered to the UCR children, 2,305 (91.3%) were administered by private providers, 91 (3.6%) were administered by public health providers and 129 (5.1%) were administered by an unknown source.

Table 15-A: 24-Month-Old Survey Sampling, UCR, 2023

	2022	2023	State 2023
Original sample (n)	121	120	1557
Ineligible (n)	3 (2.5%)	5 (4.2%)	71 (4.6%)
Refused Participation (n)	0 (0.0%)	1 (0.8%)	29 (1.9%)
Eligible sample (n)	118	114	1457
Unable to locate [†] (n)	6 (5.1%)	1 (0.9%)	43 (3.0%)
Final sample (n)	112	113	1414
Response Rate (%)[*]	94.9	99.1	97.0

[†] Children are classified as "Unable to Locate" after multiple attempts were unsuccessful in locating and communicating with the child's guardian and/or the child's provider was either unknown or also unable to locate the guardian.

* Response Rate (%) is the number of survey responses from eligible children

Table 15-B: Immunization Rates by Series and Vaccine Antigen, UCR, 2023

	2022 (n=112) (%)	2023 (n=113) (%)	State 2023 (n=1414) (%)
Up to Date (UTD):			
UTD immunization rate[*] (as reported to TennHIS)	34.8 ± 9.0	37.2 ± 9.1 ↑	37.3 ± 2.5
UTD immunization rate[*] (with data collection)	64.3 ± 9.0	77.9 ± 7.8 ↑	77.7 ± 2.2
ACIP Recommended Vaccine Series (By 24 Months of Age)			
DTaP (4 Doses)	71.4 ± 8.5	81.4 ± 7.3 ↑	80.8 ± 2.1
IPV (3 DOSES)	91.1 ± 5.4	92.0 ± 5.1 ↑	91.3 ± 1.5
MMR (1 DOSE)	87.5 ± 6.2	91.2 ± 5.3 ↑	90.5 ± 1.5
HBV (3 DOSES)	89.3 ± 5.8	92.0 ± 5.1 ↑	92.9 ± 1.3
HBV, Birth Dose	75.9 ± 8.0	83.2 ± 7.0 ↑	77.0 ± 2.2
Hib (Full Series)	75.0 ± 8.1	70.8 ± 8.5 ↑	77.5 ± 2.2
VAR (1 DOSE)	82.1 ± 7.2	90.3 ± 5.6 ↑	90.4 ± 1.5
PCV (Full Series)	75.0 ± 8.1	77.9 ± 7.9 ↑	79.1 ± 2.1
Full Series (4:3:1:FS:3:1:FS)	64.3 ± 9.0	77.9 ± 7.8 ↑	77.7 ± 2.2
Additional Vaccines of Interest (By 24 Months of Age)			
HAV (1 DOSE)	85.7 ± 6.6	90.3 ± 5.6 ↑	90.5 ± 1.5
RTV (Full Series)	75.9 ± 8.0	75.2 ± 8.1 ↑	76.1 ± 2.2
FLU (2 Doses)	41.1 ± 9.3	32.7 ± 8.8 ↑	41.2 ± 2.6
COVID (2 Doses)	- ± -	0.0 ± 0.0	5.9 ± 1.2

^{*} Includes children up-to-date by ACIP-recommended catch-up schedule

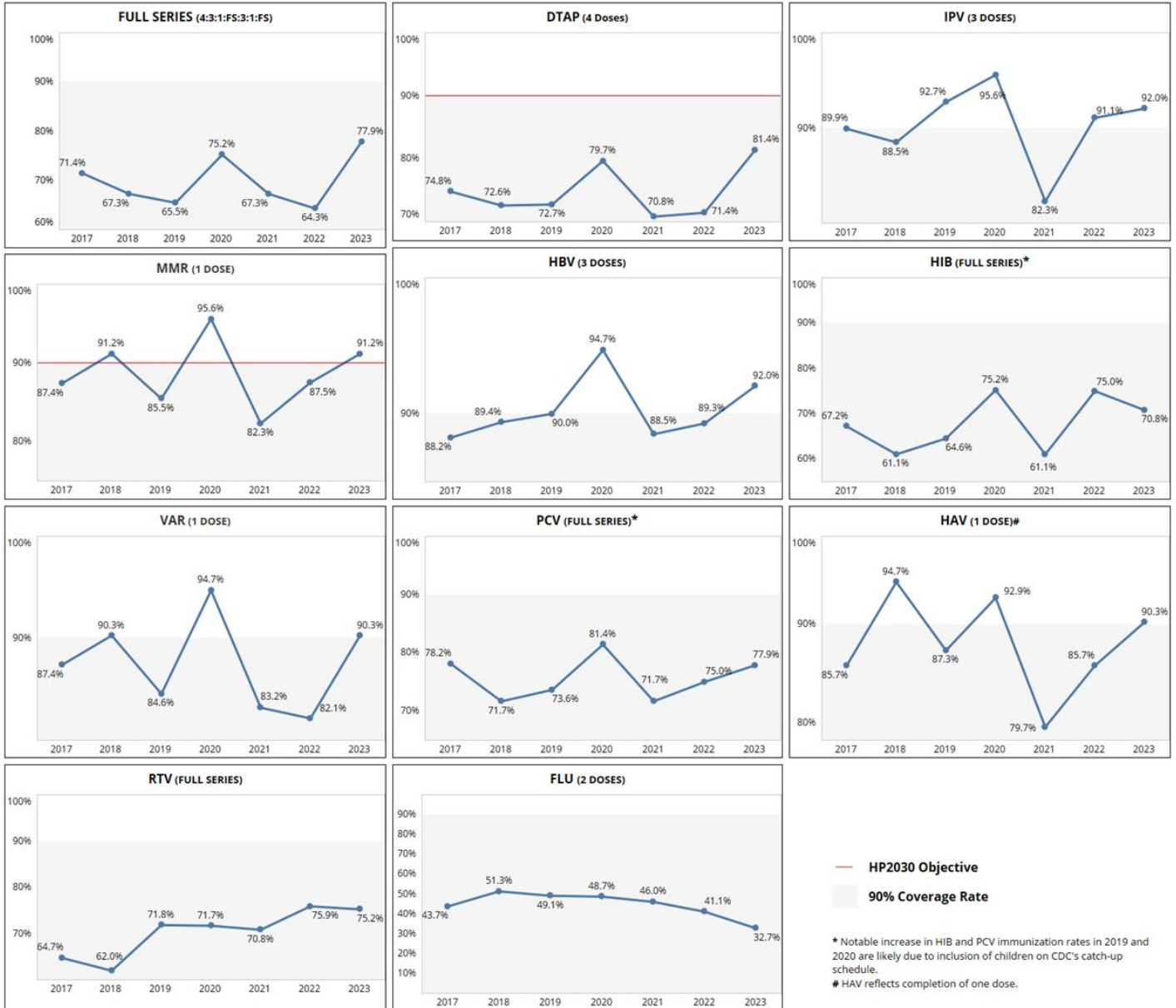
Red font indicates a rate decrease since 2022

Italicized and bolded font indicates a significant difference with 2022 rate

IMMUNIZATION STATUS SURVEY – 2023

Figure 26-C shows the UCR trend for each individual vaccine series over the seven years. The red lines represent HP2030 objectives for each series and vaccine antigen assessed. UCR children have not met the Healthy People objective for DTaP anytime in the past seven years.

Figure 26-C: Immunization Rates (%) by Series and Vaccine Antigen, UCR, 2017-2023



IMMUNIZATION STATUS SURVEY – 2023

Demographic Information

The demographic breakdown of the UCR sample alongside the UTD immunization rates by demographic groups are shown in Table 15-C and 15-D.

Due to small sample sizes and inherent limitations of the data, significant differences in the UTD rates between the demographic subgroups in 2023 are not reported for UCR.

Table 15-C: Risk Factors and Immunization Rates, UCR, 2023

Group	Subgroup	Demographic		UTD Immunization Rates	
		UCR [¥] (n=113)	State [¥] (n=1414)	UCR n=113 (%)	STATE n=1414 (%)
Race⁺					
	Black	2 1.8%	234 16.5%	sample size is too small to generate estimates	65.8 ± 6.1
	White	110 97.3%	1153 81.5%	78.2 ± 7.8	79.9 ± 2.3
	Other	1 0.9%	27 1.9%	sample size is too small to generate estimates	85.2 ± 14.3
Ethnicity⁺					
	Hispanic	8 7.1%	126 8.9%	sample size is too small to generate estimates	82.5 ± 6.7
	Non-Hispanic	105 92.9%	1288 91.1%	78.1 ± 8.1	77.2 ± 2.3
Sex[*]					
	Male	61 54.0%	745 52.7%	78.7 ± 10.6	78.3 ± 3.0
	Female	52 46.0%	669 47.3%	76.9 ± 11.8	77.0 ± 3.2
Siblings[*]					
	0	36 31.9%	547 38.7%	91.7 ± 9.5	86.5 ± 2.9
	1	44 38.9%	479 33.9%	68.2 ± 14.3	75.4 ± 3.9
	2+	33 29.2%	388 27.4%	75.8 ± 15.4	68.0 ± 4.7
Vaccination Source					
	Private Medical Provider	100 88.5%	1079 76.3%	81.0 ± 7.8	78.6 ± 2.5
	Health Department	4 3.5%	18 1.3%	sample size is too small to generate estimates	50.0 ± 25.6
	Both	5 4.4%	269 19.0%	sample size is too small to generate estimates	87.0 ± 4.1
	Unknown Source	4 3.5%	48 3.4%	sample size is too small to generate estimates	14.6 ± 10.4
Program Enrollment					
	TennCare Only	20 17.7%	303 21.4%	85.0 ± 17.2	77.6 ± 4.7
	WIC Only	25 22.1%	127 9.0%	84.0 ± 15.4	76.4 ± 7.5
	Both (TennCare + WIC)	26 23.0%	438 31.0%	73.1 ± 18.3	77.4 ± 3.9
	Not Enrolled	42 37.2%	546 38.6%	73.8 ± 13.9	78.2 ± 3.5

¥ Percentages may not add up to 100% due to missing participant information
 * Information was collected from birth certificate at time of delivery
 + Does not distinguish between Hispanic whites and non-Hispanic whites

Table 15-D: Parent Demographics and Immunization Rates, UCR, 2023

Group	Subgroup	Demographic		UTD Immunization Rates	
		UCR [¥] (n=113)	State [¥] (n=1414)	UCR n=113 (%)	STATE n=1414 (%)
Mother Age⁺					
	≤24	49 43.4%	448 31.7%	75.5 ± 12.5	77.7 ± 3.9
	25-34	52 46.0%	771 54.5%	80.8 ± 11.1	76.9 ± 3.0
	≥35	12 10.6%	195 13.8%	75.0 ± 28.7	80.5 ± 5.6
Father Age⁺					
	≤24	26 23.0%	264 18.7%	76.9 ± 17.4	76.5 ± 5.2
	25-34	50 44.2%	664 47.0%	76.0 ± 12.3	76.7 ± 3.2
	≥35	23 20.4%	319 22.6%	73.9 ± 19.4	82.1 ± 4.2
	Unknown	14 12.4%	167 11.8%	92.9 ± 15.4	74.9 ± 6.7
Mother Education⁺					
	< High School Diploma/ GED	15 13.3%	184 13.0%	46.7 ± 29.7	74.5 ± 6.4
	High School Diploma/ GED	43 38.1%	420 29.7%	76.7 ± 13.2	74.8 ± 4.2
	> High School Diploma/ GED	55 48.7%	809 57.2%	87.3 ± 9.1	79.9 ± 2.8
Father Education⁺					
	< High School Diploma/ GED	14 12.4%	161 11.4%	57.1 ± 29.7	77.6 ± 6.5
	High School Diploma/ GED	45 39.8%	423 29.9%	71.1 ± 13.8	74.0 ± 4.2
	> High School Diploma/ GED	37 32.7%	639 45.2%	86.5 ± 11.6	80.3 ± 3.1
	Unknown	17 15.0%	191 13.5%	94.1 ± 12.5	77.0 ± 6.0
Marriage Status⁺					
	Married	61 54.0%	772 54.6%	78.7 ± 10.5	79.4 ± 2.9
	Unmarried	52 46.0%	642 45.4%	76.9 ± 11.8	75.6 ± 3.3

¥ Percentages may not add up to 100% due to missing participant information
 * Information was collected from birth certificate at time of delivery

Southeast Region

Figure 27-A: Location of Southeast Region (SER)

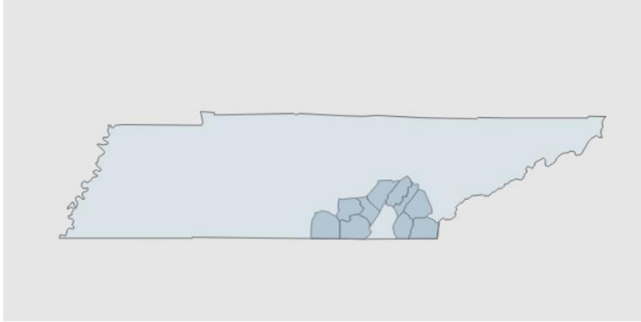
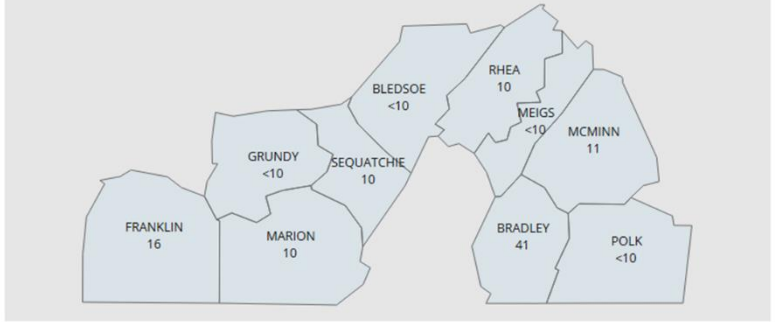


Figure 27-B: Sampling per County, SER, 2023



Final Sample Determination

The initial 2023 sample for SER consisted of 120 children born between January and March of 2021 (Table 16-A). After removing children who were determined to be ineligible, declined participation and were unable to be reached, the final sample size for SER was 110. The response rate was calculated by dividing the number of participants in the final sample by the eligible sample. Compared to the previous year, a larger sample was used for analysis and there was a higher response rate in 2023.

Immunization Rates

In SER, the up-to-date (UTD) immunization rate by 24 months of age was 81.8%, which was higher than the 2022 rate (71.7%) and the state average (77.7%) (Table 16-B). The UTD immunization rate as reported to TennIS was 49.1%, higher than the 2022 rate (47.2%) and the state rate (37.3%).

The vaccine-specific rates demonstrate one significant differences and multiple increases when compared to the previous year and to the state overall (Table 16-B). Most notably, DTaP in SER increased more than 11% in 2023. In Table 16-B, figures in **red** indicate a decrease between 2022 and 2023 rates and **italicized and bolded** figures indicate a significant difference ($p < 0.05$) in DTaP between 2022 and 2023 rates.

Immunization Administration

Of the 2,659 vaccines doses administered to the SER children, 2,546 (95.8%) were administered by private providers, 67 (2.5%) were administered by public health providers and 46 (1.7%) were administered by an unknown source.

Table 16-A: 24-Month-Old Survey Sampling, SER, 2023

	2022	2023	State 2023
Original sample (n)	121	120	1557
Ineligible (n)	10 (8.3%)	9 (7.5%)	71 (4.6%)
Refused Participation (n)	1 (0.8%)	1 (0.8%)	29 (1.9%)
Eligible sample (n)	110	110	1457
Unable to locate [†] (n)	4 (3.6%)	0 (0.0%)	43 (3.0%)
Final sample (n)	106	110	1414
Response Rate (%)[*]	96.4	100.0	97.0

[†] Children are classified as "Unable to Locate" after multiple attempts were unsuccessful in locating and communicating with the child's guardian and/or the child's provider was either unknown or also unable to locate the guardian.

^{*} Response Rate (%) is the number of survey responses from eligible children

Table 16-B: Immunization Rates by Series and Vaccine Antigen, SER, 2023

	2022 (n=106) (%)	2023 (n=110) (%)	State 2023 (n=1414) (%)
Up-to-Date (UTD):			
UTD immunization rate[*] (as reported to TennIS)	47.2 ± 9.7	49.1 ± 9.5 ↑	37.3 ± 2.5
UTD immunization rate[*] (with data collection)	71.7 ± 8.7	81.8 ± 7.3 ↑	77.7 ± 2.2
ACIP Recommended Vaccine Series (By 24 Months of Age)			
DTaP (4 Doses)	74.5 ± 8.4	86.4 ± 6.5 ↑	80.8 ± 2.1
IPV (3 DOSES)	94.3 ± 4.5	90.0 ± 5.5 ↓	91.3 ± 1.5
MMR (1 DOSE)	93.4 ± 4.8	93.6 ± 4.6 ↑	90.5 ± 1.5
HBV (3 DOSES)	96.2 ± 3.7	94.6 ± 4.3 ↓	92.9 ± 1.3
HBV, Birth Dose	91.5 ± 5.4	92.7 ± 4.9 ↑	77.0 ± 2.2
Hib (Full Series)	80.2 ± 7.7	82.7 ± 7.2 ↑	77.5 ± 2.2
VAR (1 DOSE)	91.5 ± 5.4	92.7 ± 4.9 ↑	90.4 ± 1.5
PCV (Full Series)	79.3 ± 7.9	85.5 ± 6.7 ↑	79.1 ± 2.1
Full Series (4:3:1:FS:3:1:FS)	71.7 ± 8.7	81.8 ± 7.3 ↑	77.7 ± 2.2
Additional Vaccines of Interest (By 24 Months of Age)			
HAV (1 DOSE)	91.5 ± 5.4	93.6 ± 4.6 ↑	90.5 ± 1.5
RTV (Full Series)	70.8 ± 8.8	80.9 ± 7.5 ↑	76.1 ± 2.2
FLU (2 Doses)	23.6 ± 8.2	32.7 ± 8.9 ↑	41.2 ± 2.6
COVID (2 Doses)	- ± -	0.0 ± 0.0	5.9 ± 1.2

^{*} Includes children up-to-date by ACIP-recommended catch-up schedule

Red font indicates a rate decrease since 2022

Italicized and bolded font indicates a significant difference with 2022 rate

IMMUNIZATION STATUS SURVEY – 2023

Figure 27-C shows the SER trend for each individual vaccine series over the seven years. The red lines represent HP2030 objectives for each series and vaccine antigen assessed. SER children have met the Healthy People objectives DTaP and MMR multiple times in the past seven years.

Figure 27-C: Immunization Rates (%) by Series and Vaccine Antigen, SER, 2017-2023



IMMUNIZATION STATUS SURVEY – 2023

Demographic Information

The demographic breakdown of the SER sample alongside the UTD immunization rates by demographic groups are shown in Table 16-C and 16-D.

Due to small sample sizes and inherent limitations of the data, significant differences in the UTD rates between the demographic subgroups in 2023 are not reported for SER

Table 16-C: Risk Factors and Immunization Rates, SER, 2023

Group	Subgroup	Demographic		UTD Immunization Rates	
		SER [¥] (n=110)	State [¥] (n=1414)	SER n=110 (%)	STATE n=1414 (%)
Race**					
	Black	3 2.7%	234 16.5%	sample size is too small to generate estimates	65.8 ± 6.1
	White	106 96.4%	1153 81.5%	82.1 ± 7.4	79.9 ± 2.3
	Other	1 0.9%	27 1.9%	sample size is too small to generate estimates	85.2 ± 14.3
Ethnicity**					
	Hispanic	4 3.6%	126 8.9%	sample size is too small to generate estimates	82.5 ± 6.7
	Non-Hispanic	106 96.4%	1288 91.1%	82.1 ± 7.4	77.2 ± 2.3
Sex*					
	Male	45 40.9%	745 52.7%	84.6 ± 9.0	78.3 ± 3.0
	Female	65 59.1%	669 47.3%	77.8 ± 12.6	77.0 ± 3.2
Siblings*					
	0	37 33.6%	547 38.7%	94.6 ± 7.6	86.5 ± 2.9
	1	45 40.9%	479 33.9%	75.6 ± 13.1	75.4 ± 3.9
	2+	28 25.5%	388 27.4%	75.0 ± 17.1	68.0 ± 4.7
Vaccination Source					
	Private Medical Provider	97 88.2%	1079 76.3%	87.6 ± 6.7	78.6 ± 2.5
	Health Department	0 0.0%	18 1.3%	sample size is too small to generate estimates	50.0 ± 25.6
	Both	7 6.4%	269 19.0%	sample size is too small to generate estimates	87.0 ± 4.1
	Unknown Source	5 4.5%	48 3.4%	sample size is too small to generate estimates	14.6 ± 10.4
Program Enrollment					
	TennCare Only	8 7.3%	303 21.4%	sample size is too small to generate estimates	77.6 ± 4.7
	WIC Only	22 20.0%	127 9.0%	86.4 ± 15.6	76.4 ± 7.5
	Both (TennCare + WIC)	30 27.3%	438 31.0%	83.3 ± 14.2	77.4 ± 3.9
	Not Enrolled	50 45.5%	546 38.6%	82.0 ± 11.0	78.2 ± 3.5

¥ Percentages may not add up to 100% due to missing participant information
 * Information was collected from birth certificate at time of delivery
 + Does not distinguish between Hispanic whites and non-Hispanic whites

Table 16-D: Parent Demographics and Immunization Rates, SER, 2022

Group	Subgroup	Demographic		UTD Immunization Rates	
		SER [¥] (n=110)	State [¥] (n=1414)	SER n=110 (%)	STATE n=1414 (%)
Mother Age*					
	≤24	42 38.2%	448 31.7%	92.9 ± 8.1	77.7 ± 3.9
	25-34	56 50.9%	771 54.5%	76.8 ± 11.4	76.9 ± 3.0
	≥35	12 10.9%	195 13.8%	66.7 ± 31.3	80.5 ± 5.6
Father Age*					
	≤24	26 23.6%	264 18.7%	88.5 ± 13.2	76.5 ± 5.2
	25-34	48 43.6%	664 47.0%	79.2 ± 11.9	76.7 ± 3.2
	≥35	20 18.2%	319 22.6%	75.0 ± 20.8	82.1 ± 4.2
	Unknown	16 14.5%	167 11.8%	87.5 ± 18.2	74.9 ± 6.7
Mother Education*					
	< High School Diploma/ GED	14 12.7%	184 13.0%	87.6 ± 18.2	74.5 ± 6.4
	High School Diploma/ GED	47 42.7%	420 29.7%	83.0 ± 11.2	74.8 ± 4.2
	> High School Diploma/ GED	47 42.7%	809 57.2%	78.7 ± 12.1	79.9 ± 2.8
Father Education*					
	< High School Diploma/ GED	11 10.0%	161 11.4%	81.8 ± 27.2	77.6 ± 6.5
	High School Diploma/ GED	39 35.5%	423 29.9%	82.1 ± 12.6	74.0 ± 4.2
	> High School Diploma/ GED	43 39.1%	639 45.2%	79.1 ± 12.7	80.3 ± 3.1
	Unknown	17 15.5%	191 13.5%	88.1 ± 17.1	77.0 ± 6.0
Marriage Status*					
	Married	63 57.3%	772 54.6%	74.6 ± 8.3	79.4 ± 2.9
	Unmarried	47 42.7%	642 45.4%	91.5 ± 11.1	75.6 ± 3.3

¥ Percentages may not add up to 100% due to missing participant information
 * Information was collected from birth certificate at time of delivery

Chattanooga-Hamilton County Region

Figure 28-A: Location of Chattanooga-Hamilton County Region (CHR)

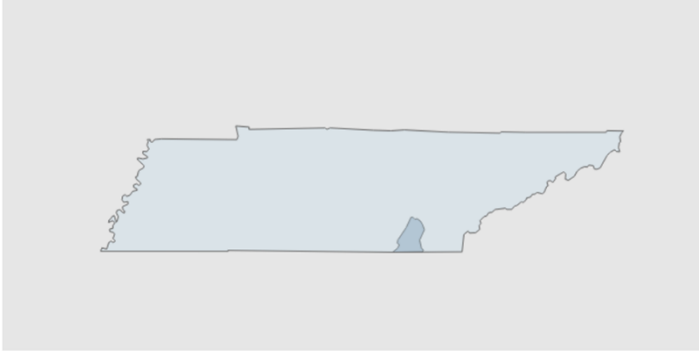
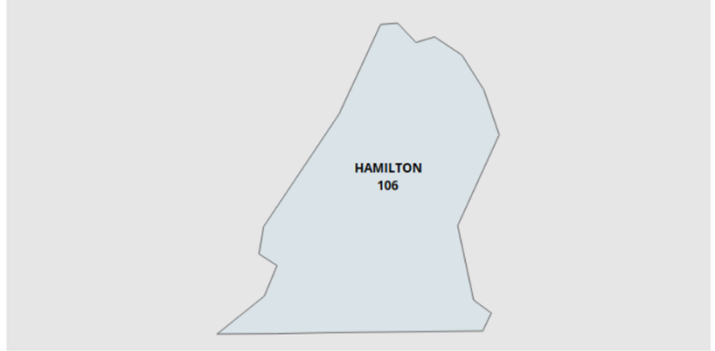


Figure 28-B: Sampling per County, CHR, 2023



Final Sample Determination

The initial 2023 sample for CHR consisted of 120 children born between January and March of 2021 (Table 17-A). After removing children who were determined to be ineligible, declined participation and were unable to be reached, the final sample size for CHR was 106. The response rate was calculated by dividing the number of participants in the final sample by the eligible sample. Compared to the previous year, the same size sample was used for analysis and the response rate remained the same in 2023.

Immunization Rates

In CHR, the up-to-date (UTD) immunization rate by 24 months of age was 81.1%, which was higher than the 2022 rate (72.6%) and state average (75.3%) (Table 17-B). The UTD immunization rate as reported to TennIS was 42.5%, higher than the 2022 rate (35.9%) and the state rate (37.3%).

The vaccine-specific rates demonstrate no significant differences when compared to the previous year and to the state overall (Table 17-B). However, Flu decreased more than 20% and RTV increased more than 9% in CHR in 2023. In Table 17-B, figures in **red** indicate a decrease between 2022 and 2023 rates.

Immunization Administration

Of the 2,571 vaccines doses administered to the CHR children, 2,569 (99.9%) were administered by private providers and 2 (0.1%) were administered by public health providers.

Table 17-A: 24-Month-Old Survey Sampling, CHR, 2023

	2022	2023	State 2023
Original sample (n)	121	120	1557
Ineligible (n)	11 (9.1%)	12 (10.0%)	71 (4.6%)
Refused Participation (n)	4 (3.3%)	2 (1.7%)	29 (1.9%)
Eligible sample (n)	106	106	1457
Unable to locate [†] (n)	0 (0.0%)	0 (0.0%)	43 (3.0%)
Final sample (n)	106	106	1414
Response Rate (%)[*]	100.0	100.0	97.0

[†] Children are classified as "Unable to Locate" if every conceivable effort was made to locate and communicate with the child's guardian and/or the child's provider was either unknown or also

^{*} Response Rate (%) is the number of survey responses from eligible children.

Table 17-B: Immunization Rates by Series and Vaccine Antigen, CHR, 2023

	2022 (n=106) (%)	2023 (n=106) (%)	State 2023 (n=1414) (%)
Up-to-Date (UTD):			
UTD immunization rate[*] (as reported to TennIS)	35.9 ± 9.3	42.5 ± 9.6 ↑	37.3 ± 2.5
UTD immunization rate[*] (with data collection)	72.6 ± 8.6	81.1 ± 7.6 ↑	77.7 ± 2.2
ACIP Recommended Vaccine Series (By 24 Months of Age)			
DTaP (4 Doses)	78.3 ± 8.0	83.0 ± 7.3 ↑	80.8 ± 2.1
IPV (3 DOSES)	89.6 ± 5.9	91.5 ± 5.4 ↑	91.3 ± 1.5
MMR (1 DOSE)	86.8 ± 6.6	91.5 ± 5.4 ↑	90.5 ± 1.5
HBV (3 DOSES)	90.6 ± 5.7	93.4 ± 4.8 ↑	92.9 ± 1.3
HBV, Birth Dose	79.3 ± 7.9	74.5 ± 8.4 ↓	77.0 ± 2.2
Hib (Full Series)	78.3 ± 8.0	82.0 ± 7.4 ↑	77.5 ± 2.2
VAR (1 DOSE)	87.7 ± 6.3	91.5 ± 5.4 ↑	90.4 ± 1.5
PCV (Full Series)	77.4 ± 8.1	83.0 ± 7.3 ↑	79.1 ± 2.1
Full Series (4:3:1:FS:3:1:FS)	72.6 ± 8.6	81.1 ± 7.6 ↑	77.7 ± 2.2
Additional Vaccines of Interest (By 24 Months of Age)			
HAV (1 DOSE)	87.7 ± 6.3	89.6 ± 5.9 ↑	90.5 ± 1.5
RTV (Full Series)	69.8 ± 8.9	79.3 ± 7.9 ↑	76.1 ± 2.2
FLU (2 Doses)	50.0 ± 9.7	36.8 ± 9.3 ↓	41.2 ± 2.6
COVID (2 Doses)	- ± -	1.9 ± 2.6	5.9 ± 1.2

^{*} Includes children up-to-date by ACIP-recommended catch-up schedule

Red font indicates a rate decrease since 2022

Italicized and bolded font indicates a significant difference with 2022 rate

IMMUNIZATION STATUS SURVEY – 2023

Figure 28-C shows the CHR trend for each individual vaccine series over the seven years. The red lines represent HP2030 objectives for each series and vaccine antigen assessed. CHR children have not met the Healthy People objectives for DTaP anytime in the past seven years.

Figure 28-C: Immunization Rates (%) by Series and Vaccine Antigen, CHR, 2017-2023



Demographic Information

The demographic breakdown of the CHR sample alongside the UTD immunization rates by demographic groups are shown in Table 17-C and 17-D

Due to small sample sizes and inherent limitations of the data, significant differences in the UTD rates between the demographic subgroups in 2023 are not reported for CHR.

Table 17-C: Risk Factors and Immunization Rates, CHR, 2023

Group	Subgroup	Demographic Breakdown		UTD Immunization Rates	
		CHR [¥] (n=106)	State [¥] (n=1414)	CHR n=106 (%)	STATE n=1414 (%)
Race^{*†}					
	Black	24 22.6%	234 16.5%	75.0 ± 18.7	65.8 ± 6.1
	White	78 73.6%	1153 81.5%	82.1 ± 8.7	79.9 ± 2.3
	Other	4 3.8%	27 1.9%	sample size is too small to generate estimates	85.2 ± 14.3
Ethnicity[*]					
	Hispanic	15 14.2%	126 8.9%	93.3 ± 14.3	82.5 ± 6.7
	Non-Hispanic	91 85.8%	1288 91.1%	79.1 ± 8.5	77.2 ± 2.3
Sex[*]					
	Male	47 44.3%	745 52.7%	83.0 ± 11.2	78.3 ± 3.0
	Female	59 55.7%	669 47.3%	79.7 ± 10.6	77.0 ± 3.2
Siblings[*]					
	0	50 47.2%	547 38.7%	88.0 ± 9.3	86.5 ± 2.9
	1	32 30.2%	479 33.9%	75.0 ± 15.9	75.4 ± 3.9
	2+	24 22.6%	388 27.4%	75.0 ± 18.7	68.0 ± 4.7
Vaccination Source					
	Private Medical Provider	93 87.7%	1079 76.3%	81.7 ± 8.0	78.6 ± 2.5
	Health Department	0 0.0%	18 1.3%	sample size is too small to generate estimates	50.0 ± 25.6
	Both	10 9.4%	269 19.0%	sample size is too small to generate estimates	87.0 ± 4.1
	Unknown Source	3 2.8%	48 3.4%	sample size is too small to generate estimates	14.6 ± 10.4
Program Enrollment					
	TennCare Only	33 31.1%	303 21.4%	81.8 ± 13.9	77.6 ± 4.7
	WIC Only	4 3.8%	127 9.0%	sample size is too small to generate estimates	76.4 ± 7.5
	Both (TennCare + WIC)	24 22.6%	438 31.0%	79.2 ± 17.5	77.4 ± 3.9
	Not Enrolled	45 41.5%	546 38.6%	82.2 ± 11.6	78.2 ± 3.5

¥ Percentages may not add up to 100% due to missing participant information
 * Information was collected from birth certificate at time of delivery
 † Does not distinguish between Hispanic whites and non-Hispanic whites
 # Sample size is too small to generate estimates

Table 17-D: Parent Demographics and Immunization Rates, CHR, 2023

Group	Subgroup	Demographic Breakdown		UTD Immunization Rates	
		CHR [¥] (n=106)	State [¥] (n=1414)	CHR n=106 (%)	STATE n=1414 (%)
Mother Age[*]					
	≤24	24 22.6%	448 31.7%	87.5 ± 14.3	77.7 ± 3.9
	25-34	65 61.3%	771 54.5%	76.9 ± 10.5	76.9 ± 3.0
	≥35	17 16.0%	195 13.8%	88.2 ± 17.1	80.5 ± 5.6
Father Age[*]					
	≤24	15 14.2%	264 18.7%	80.0 ± 22.9	76.5 ± 5.2
	25-34	53 50.0%	664 47.0%	79.3 ± 11.3	76.7 ± 3.2
	≥35	30 28.3%	319 22.6%	80.0 ± 15.2	82.1 ± 4.2
	Unknown	8 7.5%	167 11.8%	sample size is too small to generate estimates	74.9 ± 6.7
Mother Education[*]					
	< High School Diploma/ GED	17 16.0%	184 13.0%	88.2 ± 17.1	74.5 ± 6.4
	High School Diploma/ GED	21 19.8%	420 29.7%	81.0 ± 18.3	74.8 ± 4.2
	> High School Diploma/ GED	68 64.2%	809 57.2%	79.4 ± 9.9	79.9 ± 2.8
Father Education[*]					
	< High School Diploma/ GED	14 13.2%	161 11.4%	85.7 ± 21.0	77.6 ± 6.5
	High School Diploma/ GED	18 17.0%	423 29.9%	72.2 ± 22.9	74.0 ± 4.2
	> High School Diploma/ GED	65 61.3%	639 45.2%	80.0 ± 10.0	80.3 ± 3.1
	Unknown	9 8.5%	191 13.5%	sample size is too small to generate estimates	77.0 ± 6.0
Marriage Status[*]					
	Married	66 62.3%	772 54.6%	80.3 ± 9.9	79.4 ± 2.9
	Unmarried	40 37.7%	642 45.4%	82.5 ± 12.3	75.6 ± 3.3

¥ Percentages may not add up to 100% due to missing participant information
 * Information was collected from birth certificate at time of delivery

East Tennessee Region

Figure 29-A: Location of East Tennessee Region (ETR)

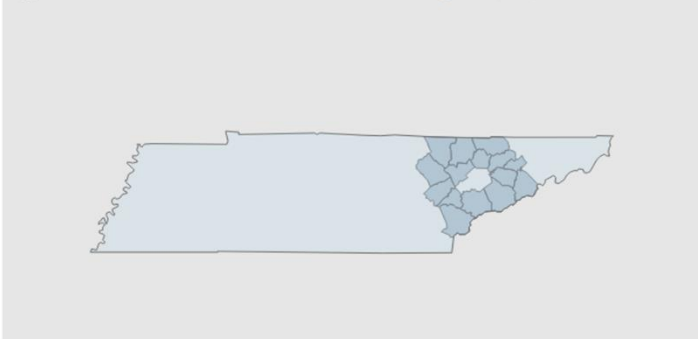
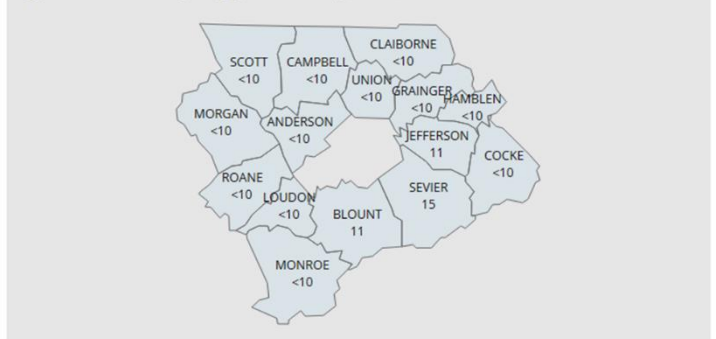


Figure 29-B: Sampling per County, ETR, 2023



Final Sample Determination

The initial 2023 sample for ETR consisted of 119 children born between January and March of 2021 (Table 18-A). After removing children who were determined to be ineligible, declined participation and were unable to be reached, the final sample size for ETR was 111. The response rate was calculated by dividing the number of participants in the final sample by the eligible sample. Compared to the previous year, a larger sample was used for analysis and there was a higher response rate in 2023.

Immunization Rates

In ETR, the up-to-date (UTD) immunization rate by 24 months of age was 79.3%, which was lower than the 2023 rate (83.3%) but higher than the state average (77.7%) (Table 18-B). The UTD immunization rate as reported to TennIS was 31.5%, lower than the 2022 rate (40.7%) and the state rate (37.3%).

The vaccine-specific rates demonstrate no significant differences when compared to the previous year and to the state overall (Table 18-B). Although not a significant decrease, Hib and Flu in ETR decreased more than 6% and 5%, respectively, in 2023. In Table 18-B, figures in **red** indicate a decrease in DTaP, HBV, Hib, PCV, Full Series (4:3:1:FS:3:1:FS), RTV, and Flu between 2022 and 2023 rates.

Immunization Administration

Of the 2,602 vaccine doses administered to the CHR children, 2,486 (95.5%) were administered by private providers, 66 (2.5%) were administered by public health providers, and 50 (1.9%) were administered by an unknown source.

Table 18-A: 24-Month-Old Survey Sampling, ETR, 2023

	2022	2023	State 2023
Original sample (n)	121	119	1557
Ineligible (n)	4 (3.3%)	5 (4.2%)	71 (4.6%)
Refused Participation (n)	0 (0.0%)	0 (0.0%)	29 (1.9%)
Eligible sample (n)	117	114	1457
Unable to locate [†] (n)	9 (7.7%)	3 (2.6%)	43 (3.0%)
Final sample (n)	108	111	1414
Response Rate (%)[*]	92.3	97.4	97.0

[†] Children are classified as "Unable to Locate" after multiple attempts were unsuccessful in locating and communicating with the child's guardian and/or the child's provider was either unknown or also unable to locate the guardian.

^{*} Response Rate (%) is the number of survey responses from eligible children

Table 18-B: Immunization Rates by Series and Vaccine Antigen, ETR, 2023

	2022 (n=108) (%)	2023 (n=111) (%)	State 2023 (n=1414) (%)
Up-to-Date (UTD):			
UTD immunization rate[*] (as reported to TennIS)	40.7 ± 9.4	31.5 ± 8.8 ↓	37.3 ± 2.5
UTD immunization rate[*] (with data collection)	83.3 ± 7.6	79.3 ± 7.2 ↓	77.7 ± 2.2
ACIP Recommended Vaccine Series (By 24 Months of Age)			
DTaP (4 Doses)	83.3 ± 7.1	82.0 ± 7.3 ↓	80.8 ± 2.1
IPV (3 DOSES)	89.8 ± 5.8	91.9 ± 5.2 ↑	91.3 ± 1.5
MMR (1 DOSE)	88.9 ± 6.0	86.5 ± 6.5 ↑	90.5 ± 1.5
HBV (3 DOSES)	91.7 ± 5.3	92.8 ± 4.9 ↑	92.9 ± 1.3
HBV, Birth Dose	82.4 ± 7.3	80.2 ± 7.5 ↓	77.0 ± 2.2
Hib (Full Series)	81.5 ± 7.4	74.8 ± 8.2 ↓	77.5 ± 2.2
VAR (1 DOSE)	88.0 ± 6.2	88.3 ± 6.1 ↑	90.4 ± 1.5
PCV (Full Series)	83.3 ± 7.6	79.3 ± 7.2 ↓	79.1 ± 2.1
Full Series (4:3:1:FS:3:1:FS)	83.3 ± 7.6	79.3 ± 7.2 ↓	77.7 ± 2.2
Additional Vaccines of Interest (By 24 Months of Age)			
HAV (1 DOSE)	88.0 ± 6.2	89.2 ± 5.9 ↑	90.5 ± 1.5
RTV (Full Series)	80.6 ± 7.6	76.6 ± 8.0 ↓	76.1 ± 2.2
FLU (2 Doses)	48.2 ± 9.6	42.3 ± 9.3 ↓	41.2 ± 2.6
COVID (2 Doses)	- ± -	2.7 ± 3.1	5.9 ± 1.2

^{*} Includes children up-to-date by ACIP-recommended catch-up schedule

Red font indicates a rate decrease since 2022

Italicized and bolded font indicates a significant difference with 2022 rate

IMMUNIZATION STATUS SURVEY – 2023

Figure 29-C shows the ETR trend for each individual vaccine series over the seven years. The red lines represent HP2030 objectives for each series and vaccine antigen assessed. ETR children have not met the Healthy People objectives for DTaP anytime in the past seven years.

Figure 29-C: Immunization Rates (%) by Series and Vaccine Antigen, ETR, 2017-2023



IMMUNIZATION STATUS SURVEY – 2023

Demographic Information

The demographic breakdown of the ETR sample alongside the UTD immunization rates by demographic groups are shown in Table 18-C and 18-D.

Due to small sample sizes and inherent limitations of the data, significant differences in the UTD rates between the demographic subgroups in 2023 are not reported for ETR.

Table 18-C: Risk Factors and Immunization Rates, ETR, 2023

Group	Subgroup	Demographic		UTD Immunization Rates	
		ETR [‡] (n=111)	State [‡] (n=1414)	ETR n=111 (%)	STATE n=1414 (%)
Race**					
	Black	2 1.8%	234 16.5%	sample size is too small to generate estimates	65.8 ± 6.1
	White	108 97.3%	1153 81.5%	79.6 ± 7.7	79.9 ± 2.3
	Other	1 0.9%	27 1.9%	sample size is too small to generate estimates	85.2 ± 14.3
Ethnicity**					
	Hispanic	4 3.6%	126 8.9%	sample size is too small to generate estimates	82.5 ± 6.7
	Non-Hispanic	108 97.3%	1288 91.1%	78.6 ± 8.1	77.2 ± 2.3
Sex*					
	Male	46 41.4%	745 52.7%	80.4 ± 11.9	78.3 ± 3.0
	Female	65 58.6%	669 47.3%	78.5 ± 10.3	77.0 ± 3.2
Siblings*					
	0	46 41.4%	547 38.7%	87.0 ± 10.1	86.5 ± 2.9
	1	41 36.9%	479 33.9%	75.6 ± 13.7	75.4 ± 3.9
	2+	24 21.6%	388 27.4%	70.8 ± 19.6	68.0 ± 4.7
Vaccination Source					
	Private Medical Provider	97 87.4%	1079 76.3%	81.4 ± 7.9	78.6 ± 2.5
	Health Department	2 1.8%	18 1.3%	sample size is too small to generate estimates	50.0 ± 25.6
	Both	8 7.2%	269 19.0%	sample size is too small to generate estimates	87.0 ± 4.1
	Unknown Source	4 3.6%	48 3.4%	sample size is too small to generate estimates	14.6 ± 10.4
Program Enrollment					
	TennCare Only	20 18.0%	303 21.4%	80.0 ± 19.2	77.6 ± 4.7
	WIC Only	8 7.2%	127 9.0%	sample size is too small to generate estimates	76.4 ± 7.5
	Both (TennCare + WIC)	54 48.6%	438 31.0%	83.3 ± 10.3	77.4 ± 3.9
	Not Enrolled	29 26.1%	546 38.6%	79.3 ± 15.7	78.2 ± 3.5

‡ Percentages may not add up to 100% due to missing participant information
 * Information was collected from birth certificate at time of delivery
 + Does not distinguish between Hispanic whites and non-Hispanic whites

Table 18-D: Parent Demographics and Immunization Rates, ETR, 2023

Group	Subgroup	Demographic		UTD Immunization Rates	
		ETR [‡] (n=111)	State [‡] (n=1414)	ETR n=111 (%)	STATE n=1414 (%)
Mother Age*					
	≤24	49 44.1%	448 31.7%	79.6 ± 11.7	77.7 ± 3.9
	25-34	50 45.0%	771 54.5%	76.0 ± 12.3	76.9 ± 3.0
	≥35	12 10.8%	195 13.8%	91.7 ± 18.3	80.5 ± 5.6
Father Age*					
	≤24	22 19.8%	264 18.7%	77.3 ± 19.0	76.5 ± 5.2
	25-34	50 45.0%	664 47.0%	82.0 ± 11.0	76.7 ± 3.2
	≥35	25 22.5%	319 22.6%	72.0 ± 18.9	82.1 ± 4.2
	Unknown	14 12.6%	167 11.8%	85.7 ± 21.0	74.9 ± 6.7
Mother Education*					
	< High School Diploma/ GED	16 14.4%	184 13.0%	81.3 ± 21.5	74.5 ± 6.4
	High School Diploma/ GED	36 32.4%	420 29.7%	80.6 ± 13.6	74.8 ± 4.2
	> High School Diploma/ GED	59 53.2%	809 57.2%	78.0 ± 10.9	79.9 ± 2.8
Father Education*					
	< High School Diploma/ GED	10 9.0%	161 11.4%	sample size is too small to generate estimates	77.6 ± 6.5
	High School Diploma/ GED	44 39.6%	423 29.9%	77.3 ± 12.9	74.0 ± 4.2
	> High School Diploma/ GED	42 37.8%	639 45.2%	78.6 ± 12.9	80.3 ± 3.1
	Unknown	15 13.5%	191 13.5%	86.7 ± 19.5	77.0 ± 6.0
Marriage Status*					
	Married	59 53.2%	772 54.6%	84.8 ± 9.5	79.4 ± 2.9
	Unmarried	52 46.8%	642 45.4%	73.1 ± 12.5	75.6 ± 3.3

‡ Percentages may not add up to 100% due to missing participant information
 * Information was collected from birth certificate at time of delivery

Knoxville-Knox County Region

Figure 30-A: Location of Knoxville-Knox County Region (KKR)

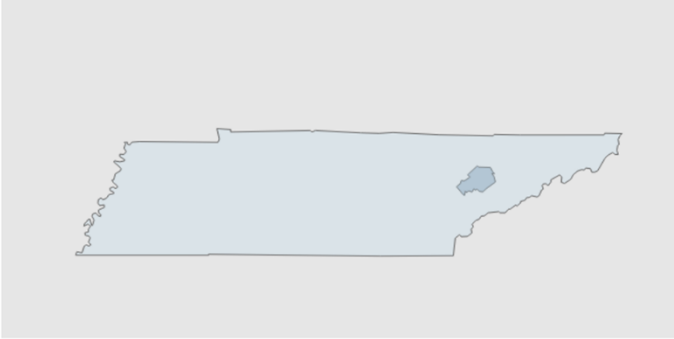
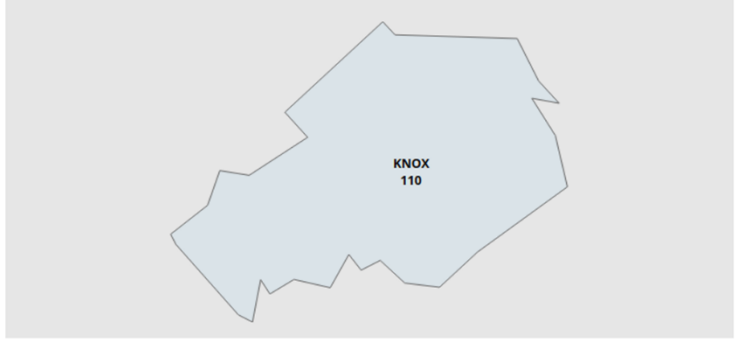


Figure 30-B: Sampling per County, KKR, 2023



Final Sample Determination

The initial 2023 sample for KKR consisted of 121 children born between January and March of 2021 (Table 18-A). After removing children who were determined to be ineligible, declined participation and were unable to be reached, the final sample size for KKR was 110. The response rate was calculated by dividing the number of participants in the final sample by the eligible sample. Compared to the previous year, a larger sample was used for analysis and there was a higher response rate in 2023.

Immunization Rates

In KKR, the up-to-date (UTD) immunization rate by 24 months of age was 86.4%, which was lower than the 2022 rate (92.3%) but higher than the state average (77.7%) (Table 18-B). The UTD immunization rate as reported to TennNIS was 14.6%, lower than the 2022 rate (15.4%) and the state rate (37.3%).

The vaccine-specific rates demonstrate one significant difference when compared to the previous year and to the state overall (Table 18-B). Although not a significant decrease, DTaP and Full Series (4:3:1:FS:3:1FS) both decreased more than 5% in 2023. In Table 18-B, figures in red indicate a decrease in DTaP, IPV, HBV, birth dose, Hib, PCV, HAV and Full Series (4:3:1:FS:3:1FS), HAV, RTV, and Flu between 2022 and 2023 rates.

Immunization Administration

Of the 2,771 vaccines doses administered to the CHR children, 2,682 (96.8%) were administered by private providers, 88 (3.2%) were administered by public health providers and 1 (0.0%) were administered by an unknown source.

Table 19-A: 24-Month-Old Survey Sampling, KKR, 2023

	2022	2023	State 2023
Original sample (n)	122	121	1557
Ineligible (n)	7 (5.7%)	2 (1.7%)	71 (4.6%)
Refused Participation (n)	2 (1.6%)	0 (0.0%)	29 (1.9%)
Eligible sample (n)	113	119	1457
Unable to locate [†] (n)	9 (8.0%)	9 (7.6%)	43 (3.0%)
Final sample (n)	104	110	1414
Response Rate (%)[*]	92.0	92.4	97.0

[†] Children are classified as "Unable to Locate" after multiple attempts were unsuccessful in locating and communicating with the child's guardian and/or the child's provider was either unknown or also unable to locate the guardian.

^{*} Response Rate (%) is the number of survey responses from eligible children

Table 19-B: Immunization Rates by Series and Vaccine Antigen, KKR, 2023

	2022 (n=104) (%)	2023 (n=110) (%)	State 2023 (n=1414) (%)
Up-to-Date (UTD):			
UTD immunization rate[*] (based on TennNIS alone)	15.4 ± 7.1	14.6 ± 7.9 ↓	37.3 ± 2.5
UTD immunization rate[*] (by end of data collection)	92.3 ± 5.2	86.4 ± 6.5 ↓	77.7 ± 2.2
ACIP Recommended Vaccine Series (By 24 Months of Age)			
DTaP (4 Doses)	95.2 ± 4.2	90.0 ± 5.7 ↓	80.8 ± 2.1
IPV (3 DOSES)	98.1 ± 2.7	98.2 ± 2.5 ↓	91.3 ± 1.5
MMR (1 DOSE)	95.2 ± 4.2	95.5 ± 4.0 ↑	90.5 ± 1.5
HBV (3 DOSES)	98.1 ± 2.7	98.2 ± 2.5 ↑	92.9 ± 1.3
HBV, Birth Dose	86.5 ± 6.7	83.6 ± 7.0 ↓	77.0 ± 2.2
Hib (Full Series)	94.2 ± 4.6	91.8 ± 5.2 ↓	77.5 ± 2.2
VAR (1 DOSE)	95.2 ± 4.2	96.4 ± 3.6 ↑	90.4 ± 1.5
PCV (Full Series)	95.2 ± 4.2	90.9 ± 5.5 ↓	79.1 ± 2.1
Full Series (4:3:1:FS:3:1FS)	92.3 ± 5.2	86.4 ± 6.5 ↓	77.7 ± 2.2
Additional Vaccines of Interest (By 24 Months of Age)			
HAV (1 DOSE)	96.2 ± 3.8	95.5 ± 4.0 ↓	90.5 ± 1.5
RTV (Full Series)	91.4 ± 5.5	87.3 ± 6.3 ↓	76.1 ± 2.2
FLU (2 Doses)	64.4 ± 9.4	60.0 ± 9.3 ↓	41.2 ± 2.6
COVID (2 Doses)	- ± -	3.6 ± 3.6	5.9 ± 1.2

^{*} Includes children up-to-date by ACIP-recommended catch-up schedule

Red font indicates a rate decrease since 2022

Italicized and bolded font indicates a significant difference (p < 0.05) with 2022 rate

IMMUNIZATION STATUS SURVEY – 2023

Figure 30-C shows the KKR trend for each individual vaccine series over the seven years. The red lines represent HP2030 objectives for each series and vaccine antigen assessed. KKR children have met the Healthy People objectives for DTaP and MMR multiple times in the past seven years.

Figure 30-C: Immunization Rates (%) by Series and Vaccine Antigen, KKR, 2017-2023



Demographic Information

The demographic breakdown of the KKR sample alongside the UTD immunization rates by demographic groups are shown in Table 19-C and 19-D.

Due to small sample sizes and inherent limitations of the data, significant differences in the UTD rates between the demographic subgroups in 2023 are not reported for KKR.

Table 19-C: Risk Factors and Immunization Rates, KKR, 2023

Group	Subgroup	Demographic		UTD Immunization Rates	
		KKR [¥] (n=110)	State [¥] (n=1414)	KKR n=110 (%)	STATE n=1414 (%)
Race**	Black	14 12.7%	234 16.5%	92.9 ± 15.4	65.8 ± 6.1
	White	93 84.5%	1153 81.5%	85.0 ± 7.4	79.9 ± 2.3
	Other	3 2.7%	27 1.9%	sample size is too small to generate estimates	85.2 ± 14.3
Ethnicity**	Hispanic	7 6.4%	126 8.9%	sample size is too small to generate estimates	82.5 ± 6.7
	Non-Hispanic	103 93.6%	1288 91.1%	86.4 ± 6.7	77.2 ± 2.3
Sex*	Male	54 49.1%	745 52.7%	83.3 ± 10.3	78.3 ± 3.0
	Female	56 50.9%	669 47.3%	89.3 ± 8.4	77.0 ± 3.2
Siblings*	0	49 44.5%	547 38.7%	93.9 ± 7.0	86.5 ± 2.9
	1	28 25.5%	479 33.9%	96.4 ± 7.3	75.4 ± 3.9
	2+	33 30.0%	388 27.4%	66.7 ± 17.0	68.0 ± 4.7
Vaccination Source	Private Medical Provider	91 82.7%	1079 76.3%	87.9 ± 6.8	78.6 ± 2.5
	Health Department	1 0.9%	18 1.3%	sample size is too small to generate estimates	50.0 ± 25.6
	Both	17 15.5%	269 19.0%	82.4 ± 20.2	87.0 ± 4.1
	Unknown Source	1 0.9%	48 3.4%	sample size is too small to generate estimates	14.6 ± 10.4
Program Enrollment	TennCare Only	23 20.9%	303 21.4%	82.6 ± 16.8	77.6 ± 4.7
	WIC Only	3 2.7%	127 9.0%	sample size is too small to generate estimates	76.4 ± 7.5
	Both (TennCare + WIC)	37 33.6%	438 31.0%	81.1 ± 13.2	77.4 ± 3.9
	Not Enrolled	47 42.7%	546 38.6%	91.5 ± 8.3	78.2 ± 3.5

¥ Percentages may not add up to 100% due to missing participant information
 * Information was collected from birth certificate at time of delivery
 + Does not distinguish between Hispanic whites and non-Hispanic whites

Table 19-D: Parent Demographics and Immunization Rates, KKR, 2023

Group	Subgroup	Demographic		UTD Immunization Rates	
		KKR [¥] (n=110)	State [¥] (n=1414)	KKR n=110 (%)	STATE n=1414 (%)
Mother Age*	≤24	27 24.5%	448 31.7%	96.3 ± 7.6	77.7 ± 3.9
	25-34	63 57.3%	771 54.5%	84.1 ± 9.3	76.9 ± 3.0
	≥35	20 18.2%	195 13.8%	80.0 ± 19.2	80.5 ± 5.6
Father Age*	≤24	17 15.5%	264 18.7%	94.1 ± 12.5	76.5 ± 5.2
	25-34	54 49.1%	664 47.0%	79.6 ± 11.1	76.7 ± 3.2
	≥35	30 27.3%	319 22.6%	93.3 ± 9.5	82.1 ± 4.2
	Unknown	9 8.2%	167 11.8%	sample size is too small to generate estimates	74.9 ± 6.7
Mother Education*	< High School Diploma/ GED	12 10.9%	184 13.0%	83.3 ± 24.7	74.5 ± 6.4
	High School Diploma/ GED	30 27.3%	420 29.7%	83.3 ± 14.2	74.8 ± 4.2
	> High School Diploma/ GED	68 61.8%	809 57.2%	88.2 ± 7.9	79.9 ± 2.8
Father Education*	< High School Diploma/ GED	12 10.9%	161 11.4%	91.7 ± 18.3	77.6 ± 6.5
	High School Diploma/ GED	32 29.1%	423 29.9%	81.3 ± 14.3	74.0 ± 4.2
	> High School Diploma/ GED	56 50.9%	639 45.2%	87.5 ± 8.9	80.3 ± 3.1
	Unknown	10 9.1%	191 13.5%	sample size is too small to generate estimates	77.0 ± 6.0
Marriage Status*	Married	65 59.1%	772 54.6%	87.7 ± 8.2	79.4 ± 2.9
	Unmarried	45 40.9%	642 45.4%	84.4 ± 11.0	75.6 ± 3.3

¥ Percentages may not add up to 100% due to missing participant information
 * Information was collected from birth certificate at time of delivery

Northeast Region

Figure 31-A: Location of Northeast Region (NER)

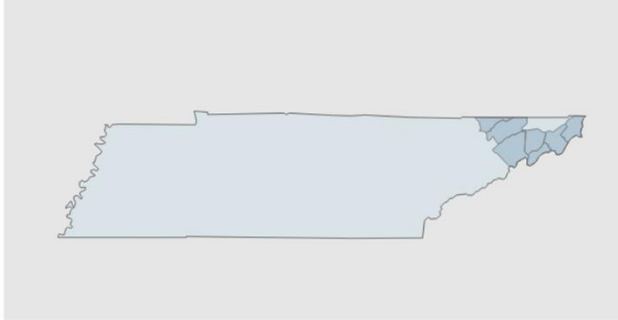
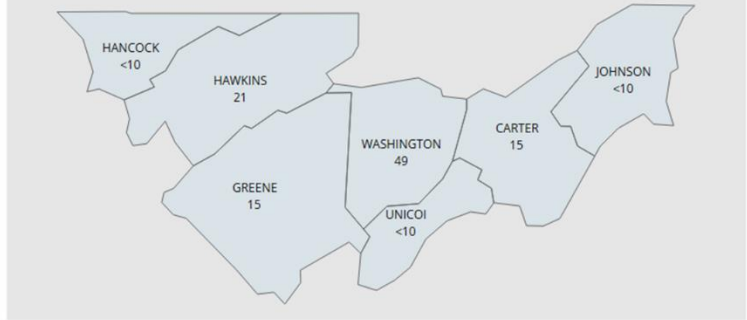


Figure 31-B: Sampling per County, NER, 2023



Final Sample Determination

The initial 2023 sample for NER consisted of 119 children born between January and March of 2021 (Table 20-A). After removing children who were determined to be ineligible, declined participation and were unable to be reached, the final sample size for NER was 111. The response rate was calculated by dividing the number of participants in the final sample by the eligible sample. Compared to the previous year, the same sample size was used for analysis but there was a higher response rate in 2023.

Table 20-A: 24-Month-Old Survey Sampling, NER, 2023

	2022	2023	State 2023
Original sample (n)	121	119	1557
Ineligible (n)	6 (5.0%)	6 (5.0%)	71 (4.6%)
Refused Participation (n)	2 (1.7%)	2 (1.7%)	29 (1.9%)
Eligible sample (n)	113	111	1457
Unable to locate† (n)	2 (1.8%)	0 (0.0%)	43 (3.0%)
Final sample (n)	111	111	1414
Response Rate (%)*	98.2	100.0	97.0

† Children are classified as "Unable to Locate" after multiple attempts were unsuccessful in locating and communicating with the child's guardian and/or the child's provider was either unknown or also unable to locate the guardian.

* Response Rate (%) is the number of survey responses from eligible children

Immunization Rates

In NER, the up-to-date (UTD) immunization rate by 24 months of age was 91.0%, which was higher than the 2022 rate (77.5%) and the state average (77.7%) (Table 20-B). The UTD immunization rate as reported to TennIS was 54.1%, higher than the 2022 rate (19.8%) and the state rate (37.3%).

Table 20-B: Immunization Rates by Series and Vaccine Antigen, NER, 2023

	2022 (n=111) (%)	2023 (n=111) (%)	State 2023 (n=1414) (%)
Up-to-Date (UTD):			
UTD immunization rate* (as reported to TennIS)	19.8 ± 7.5	54.1 ± 9.4 ↑	37.3 ± 2.5
UTD immunization rate* (with data collection)	77.5 ± 7.9	91.0 ± 5.4 ↑	77.7 ± 2.2
ACIP Recommended Vaccine Series (By 24 Months of Age)			
DTaP (4 Doses)	82.9 ± 7.1	91.0 ± 5.4 ↑	80.8 ± 2.1
IPV (3 Doses)	94.6 ± 4.3	94.6 ± 4.3 -	91.3 ± 1.5
MMR (1 Dose)	94.6 ± 4.3	93.7 ± 4.6 ↓	90.5 ± 1.5
HBV (3 Doses)	97.3 ± 3.1	94.6 ± 4.3 ↓	92.9 ± 1.3
HBV, Birth Dose	76.6 ± 8.0	79.3 ± 7.7 ↑	77.0 ± 2.2
Hib (Full Series)	81.1 ± 7.4	91.0 ± 5.4 ↑	77.5 ± 2.2
VAR (1 Dose)	94.6 ± 4.3	94.6 ± 4.3 -	90.4 ± 1.5
PCV (Full Series)	82.9 ± 7.1	91.9 ± 5.2 ↑	79.1 ± 2.1
Full Series (4:3:1:FS:3:1:FS)	77.5 ± 7.9	91.0 ± 5.4 ↑	77.7 ± 2.2
Additional Vaccines of Interest (By 24 Months of Age)			
HAV (1 Dose)	93.7 ± 4.6	94.6 ± 4.3 ↑	90.5 ± 1.5
RTV (Full Series)	79.3 ± 7.7	86.5 ± 6.5 ↑	76.1 ± 2.2
FLU (2 Doses)	43.2 ± 9.4	46.0 ± 9.4 ↑	41.2 ± 2.6
COVID (2 Doses)	- ± -	2.7 ± 3.1	5.9 ± 1.2

* Includes children up-to-date by ACIP-recommended catch-up schedule
 Red font indicates a rate decrease since 2022
 Italicized and bolded font indicates a significant difference (p < 0.05) with 2022 rate

The vaccine-specific rates demonstrate one significant difference when compared to the previous year and to the state overall (Table 20-B). Most notably Full Series (4:3:1:FS:3:1FS) in NER increased by more than 13% in 2023. In Table 20-B, figures in red indicate a decrease in MMR and HBV and **italicized and bolded** figures indicate a significant difference (p<0.05) in Full Series (4:3:1:FS:3:1FS) between 2022 and 2023 rates.

Immunization Administration

Of the 2,697 vaccines doses administered to the NER children, 2,640 (97.9%) were administered by private providers, 50 (1.9%) were administered by public health providers, and 7 (0.3%) were administered by an unknown source.

IMMUNIZATION STATUS SURVEY – 2023

Figure 31-C shows the NER trend for each individual vaccine series over the seven years. The red lines represent HP2030 objectives for each series and vaccine antigen assessed. NER children have met the Healthy People objective for DTaP and MMR multiple time over the past seven years.

Figure 31-C: Immunization Rates (%) by Series and Vaccine Antigen, NER, 2017-2023



IMMUNIZATION STATUS SURVEY – 2023

Demographic Information

The demographic breakdown of the NER sample alongside the UTD immunization rates by demographic groups are shown in Table 20-C and 20-D.

Due to small sample sizes and inherent limitations of the data, significant differences in the UTD rates between the demographic subgroups in 2023 are not reported for NER.

Table 20-C: Risk Factors and Immunization Rates, NER, 2023

Group	Subgroup	Demographic		UTD Immunization Rates	
		NER [‡] (n=111)	State [‡] (n=1414)	NER n=111 (%)	STATE n=1414 (%)
Race^{‡‡}					
	Black	3 2.7%	234 16.5%	sample size is too small to generate estimates	65.8 ± 6.1
	White	106 95.5%	1153 81.5%	91.5 ± 5.4	79.9 ± 2.3
	Other	2 1.8%	27 1.9%	sample size is too small to generate estimates	85.2 ± 14.3
Ethnicity^{‡‡}					
	Hispanic	5 4.5%	126 8.9%	sample size is too small to generate estimates	82.5 ± 6.7
	Non-Hispanic	106 95.5%	1288 91.1%	90.6 ± 5.7	77.2 ± 2.3
Sex[‡]					
	Male	63 56.8%	745 52.7%	88.9 ± 8.0	78.3 ± 3.0
	Female	48 43.2%	669 47.3%	93.8 ± 7.1	77.0 ± 3.2
Siblings[‡]					
	0	51 45.9%	547 38.7%	94.1 ± 6.7	86.5 ± 2.9
	1	36 32.4%	479 33.9%	88.9 ± 10.8	75.4 ± 3.9
	2+	24 21.6%	388 27.4%	87.5 ± 14.3	68.0 ± 4.7
Vaccination Source					
	Private Medical Provider	100 90.1%	1079 76.3%	93.0 ± 5.1	78.6 ± 2.5
	Health Department	1 0.9%	18 1.3%	sample size is too small to generate estimates	50.0 ± 25.6
	Both	7 6.3%	269 19.0%	sample size is too small to generate estimates	87.0 ± 4.1
	Unknown Source	3 2.7%	48 3.4%	sample size is too small to generate estimates	14.6 ± 10.4
Program Enrollment					
	TennCare Only	16 14.4%	303 21.4%	87.5 ± 18.2	77.6 ± 4.7
	WIC Only	4 3.6%	127 9.0%	sample size is too small to generate estimates	76.4 ± 7.5
	Both (TennCare + WIC)	45 40.5%	438 31.0%	93.3 ± 7.6	77.4 ± 3.9
	Not Enrolled	46 41.4%	546 38.6%	89.1 ± 9.3	78.2 ± 3.5

[‡] Percentages may not add up to 100% due to missing participant information
[‡] Information was collected from birth certificate at time of delivery
^{‡‡} Does not distinguish between Hispanic whites and non-Hispanic whites

Table 210D: Parent Demographics and Immunization Rates, NER, 2023

Group	Subgroup	Demographic		UTD Immunization Rates	
		NER [‡] (n=111)	State [‡] (n=1414)	NER n=111 (%)	STATE n=1414 (%)
Mother Age[‡]					
	≤24	31 27.9%	448 31.7%	90.3 ± 11.0	77.7 ± 3.9
	25-34	63 56.8%	771 54.5%	90.5 ± 7.5	76.9 ± 3.0
	≥35	17 15.3%	195 13.8%	94.1 ± 12.5	80.5 ± 5.6
Father Age[‡]					
	≤24	18 16.2%	264 18.7%	94.4 ± 11.7	76.5 ± 5.2
	25-34	57 51.4%	664 47.0%	87.7 ± 8.8	76.7 ± 3.2
	≥35	25 22.5%	319 22.6%	96.0 ± 8.3	82.1 ± 4.2
	Unknown	11 9.9%	167 11.8%	90.9 ± 20.3	74.9 ± 6.7
Mother Education[‡]					
	< High School Diploma/ GED	9 8.1%	184 13.0%	sample size is too small to generate estimates	74.5 ± 6.4
	High School Diploma/ GED	29 26.1%	420 29.7%	86.2 ± 13.4	74.8 ± 4.2
	> High School Diploma/ GED	73 65.8%	809 57.2%	93.2 ± 5.9	79.9 ± 2.8
Father Education[‡]					
	< High School Diploma/ GED	3 2.7%	161 11.4%	sample size is too small to generate estimates	77.6 ± 6.5
	High School Diploma/ GED	33 29.7%	423 29.9%	84.9 ± 12.9	74.0 ± 4.2
	> High School Diploma/ GED	58 52.3%	639 45.2%	93.1 ± 6.7	80.3 ± 3.1
	Unknown	17 15.3%	191 13.5%	94.1 ± 12.5	77.0 ± 6.0
Marriage Status[‡]					
	Married	69 62.2%	772 54.6%	91.3 ± 6.8	79.4 ± 2.9
	Unmarried	42 37.8%	642 45.4%	90.5 ± 9.3	75.6 ± 3.3

[‡] Percentages may not add up to 100% due to missing participant information
[‡] Information was collected from birth certificate at time of delivery

Sullivan County Region

Figure 32-A: Location of Sullivan County Region (SUL)

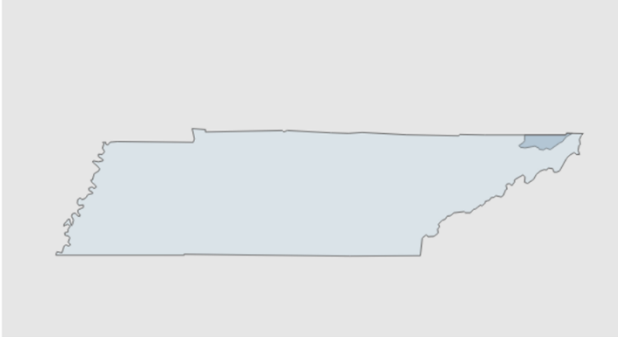
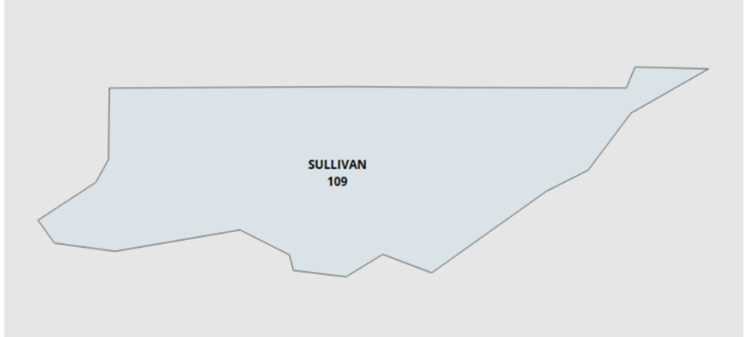


Figure 32-B: Sampling per County, SUL, 2023



Final Sample Determination

The initial 2023 sample for SUL consisted of 120 children born between January and March of 2021 (Table 21-A). After removing children who were determined to be ineligible, declined participation and were unable to be reached, the final sample size for SUL was 109. The response rate was calculated by dividing the number of participants in the final sample by the eligible sample. Compared to the previous year, a smaller sample was used for analysis and there was a lower response rate in 2023.

Immunization Rates

In SUL, the up-to-date (UTD) immunization rate by 24 months of age was 80.7%, which was higher than the 2022 rate (75.7%) and the state average (77.7%) (Table 21-B). The UTD immunization rate as reported to TennHS was 23.9%, higher than the 2022 rate (16.5%) but lower than the state rate (37.3%).

The vaccine-specific rates demonstrate multiple significant differences when compared to the previous year and to the state overall (Table 21-B). Most notably, DTaP and HBV, birth dose, in SUL increased more than 6% and 17%, respectively, in 2023. In Table 21-B, figures in **red** indicate a rate decrease in vaccines between 2022 and 2023 and **italicized and bolded** figures indicate a significant difference (p<0.05) in RTV rates between 2022 and 2023.

Immunization Administration

Of the 2,708 vaccine doses administered to the SUL children, 2,672 (98.7%) were administered by private providers, 29 (1.1%) were administered by public health providers, and 7 (0.3%) were administered by an unknown source

Table 21-A: 24-Month-Old Survey Sampling, SUL, 2023

	2022	2023	State 2023
Original sample (n)	122	120	1557
Ineligible (n)	5 (4.1%)	7 (5.8%)	71 (4.6%)
Refused Participation (n)	0 (0.0%)	0 (0.0%)	29 (1.9%)
Eligible sample (n)	117	113	1457
Unable to locate [†] (n)	2 (1.7%)	4 (3.5%)	43 (3.0%)
Final sample (n)	115	109	1414
Response Rate (%)*	98.3	96.5	97.0

[†] Children are classified as "Unable to Locate" after multiple attempts were unsuccessful in locating and communicating with the child's guardian and/or the child's provider was either unknown or also unable to locate the guardian.

* Response Rate (%) is the number of survey responses from eligible children

Table 21-B: Immunization Rates by Series and Vaccine Antigen, SUL, 2023

	2022 (n=115) (%)	2023 (n=109) (%)	State 2023 (n=1414) (%)
Up-to-Date (UTD):			
UTD immunization rate* (as reported to TennHS)	16.5 ± 6.9	23.9 ± 8.1 ↑	37.3 ± 2.5
UTD immunization rate* (with data collection)	75.7 ± 8.0	80.7 ± 7.5 ↑	77.7 ± 2.2
ACIP Recommended Vaccine Series (By 24 Months of Age)			
DTaP (4 Doses)	80.9 ± 7.3	87.2 ± 6.4 ↑	80.8 ± 2.1
IPV (3 Doses)	93.0 ± 4.7	93.6 ± 4.7 ↑	91.3 ± 1.5
MMR (1 Dose)	93.0 ± 4.7	93.6 ± 4.7 ↑	90.5 ± 1.5
HBV (3 Dose)	95.7 ± 3.8	97.3 ± 3.1 ↑	92.9 ± 1.3
HBV, Birth Dose	75.7 ± 8.0	81.7 ± 7.4 ↑	77.0 ± 2.2
Hib (Full Series)	81.7 ± 7.2	85.3 ± 6.8 ↑	77.5 ± 2.2
VAR (1 Dose)	92.2 ± 5.0	90.8 ± 5.5 ↓	90.4 ± 1.5
PCV (Full Series)	87.0 ± 6.3	84.4 ± 6.9 ↓	79.1 ± 2.1
Full Series 4:3:1:FS:3:1:FS	75.7 ± 8.0	80.7 ± 7.5 ↑	77.7 ± 2.2
Additional Vaccines of Interest (By 24 Months of Age)			
HAV (1 Dose)	93.9 ± 4.4	92.7 ± 5.0 ↓	90.5 ± 1.5
RTV (Full Series)	66.1 ± 8.8	83.5 ± 7.1 ↑	76.1 ± 2.2
FLU (2 Doses)	52.2 ± 9.3	47.7 ± 9.5 ↓	41.2 ± 2.6
COVID (2 Doses)	- ± -	17.4 ± 7.2	5.9 ± 1.2

* Includes children up-to-date by ACIP-recommended catch-up schedule

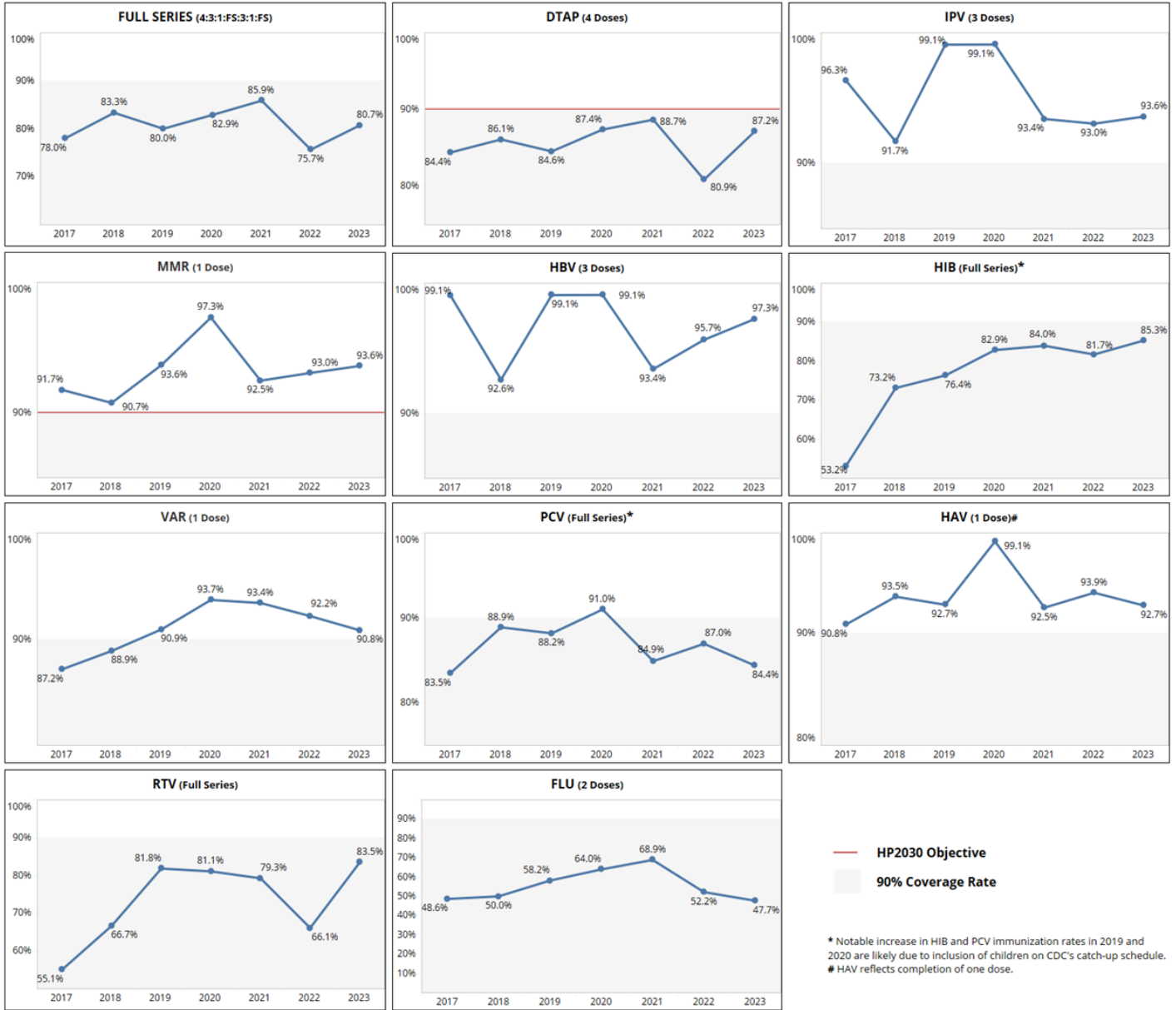
Red font indicates a rate decrease since 2022

Italicized and bolded font indicates a significant difference with 2022 rate

IMMUNIZATION STATUS SURVEY – 2023

Figure 32-C shows the SUL trend for each individual vaccine series over the seven years. The red lines represent HP2030 objectives for each series and vaccine antigen assessed. SUL children have not met the Healthy People objective for DTaP anytime in the past seven years.

Figure 32-C: Immunization Rates (%) by Series and Vaccine Antigen, SUL, 2017-2023



Demographic Information

The demographic breakdown of the SUL sample alongside the UTD immunization rates by demographic groups are shown in Table 21-C and 21-D.

Due to small sample sizes and inherent limitations of the data, significant differences in the UTD rates between the demographic subgroups in 2023 are not reported for SUL.

Table 21-C: Risk Factors and Immunization Rates, SUL, 2023

Group	Subgroup	Demographic		UTD Immunization Rates	
		SUL [¥] (n=109)	State [¥] (n=1414)	SUL n=109 (%)	STATE n=1414 (%)
Race**	Black	3 2.8%	234 16.5%	sample size is too small to generate estimates	65.8 ± 6.1
	White	105 96.3%	1153 81.5%	80.0 ± 7.8	79.9 ± 2.3
	Other	1 0.9%	27 1.9%	sample size is too small to generate estimates	85.2 ± 14.3
Ethnicity**	Hispanic	5 4.6%	126 8.9%	sample size is too small to generate estimates	82.5 ± 6.7
	Non-Hispanic	104 95.4%	1288 91.1%	80.8 ± 7.7	77.2 ± 2.3
Sex*	Male	57 52.3%	745 52.7%	84.2 ± 9.8	78.3 ± 3.0
	Female	52 47.7%	669 47.3%	76.9 ± 11.8	77.0 ± 3.2
Siblings*	0	37 33.9%	547 38.7%	91.9 ± 9.2	86.5 ± 2.9
	1	41 37.6%	479 33.9%	82.9 ± 12.0	75.4 ± 3.9
	2+	31 28.4%	388 27.4%	64.5 ± 17.8	68.0 ± 4.7
Vaccination Source	Private Medical Provider	47 43.1%	1079 76.3%	68.1 ± 13.8	78.6 ± 2.5
	Health Department	1 0.9%	18 1.3%	sample size is too small to generate estimates	50.0 ± 25.6
	Both	61 56.0%	269 19.0%	91.8 ± 7.1	87.0 ± 4.1
	Unknown Source	0 0.0%	48 3.4%	sample size is too small to generate estimates	14.6 ± 10.4
Program Enrollment	TennCare Only	24 22.0%	303 21.4%	83.3 ± 16.1	77.6 ± 4.7
	WIC Only	8 7.3%	127 9.0%	sample size is too small to generate estimates	76.4 ± 7.5
	Both (TennCare + WIC)	43 39.4%	438 31.0%	83.7 ± 11.5	77.4 ± 3.9
	Not Enrolled	34 31.2%	546 38.6%	76.5 ± 15.0	78.2 ± 3.5

¥ Percentages may not add up to 100% due to missing participant information
 * Information was collected from birth certificate at time of delivery
 + Does not distinguish between Hispanic whites and non-Hispanic whites

Table 21-D: Parent Demographics and Immunization Rates, SUL, 2023

Group	Subgroup	Demographic		UTD Immunization Rates	
		SUL [¥] (n=109)	State [¥] (n=1414)	SUL n=109 (%)	STATE n=1414 (%)
Mother Age*	≤24	32 29.4%	448 31.7%	81.3 ± 14.3	77.7 ± 3.9
	25-34	65 59.6%	771 54.5%	81.5 ± 9.7	76.9 ± 3.0
	≥35	12 11.0%	195 13.8%	75.0 ± 28.7	80.5 ± 5.6
Father Age*	≤24	19 17.4%	264 18.7%	79.0 ± 20.2	76.5 ± 5.2
	25-34	55 50.5%	664 47.0%	83.6 ± 10.1	76.7 ± 3.2
	≥35	21 19.3%	319 22.6%	81.0 ± 18.3	82.1 ± 4.2
	Unknown	14 12.8%	167 11.8%	71.4 ± 27.1	74.9 ± 6.7
Mother Education*	< High School Diploma/ GED	14 12.8%	184 13.0%	92.9 ± 15.4	74.5 ± 6.4
	High School Diploma/ GED	34 31.2%	420 29.7%	76.5 ± 15.0	74.8 ± 4.2
	> High School Diploma/ GED	61 56.0%	809 57.2%	80.3 ± 10.3	79.9 ± 2.8
Father Education*	< High School Diploma/ GED	10 9.2%	161 11.4%	sample size is too small to generate estimates	77.6 ± 6.5
	High School Diploma/ GED	30 27.5%	423 29.9%	80.0 ± 30.2	74.0 ± 4.2
	> High School Diploma/ GED	54 49.5%	639 45.2%	86.7 ± 12.9	80.3 ± 3.1
	Unknown	15 13.8%	191 13.5%	79.6 ± 11.1	77.0 ± 6.0
Marriage Status*	Married	60 55.0%	772 54.6%	78.3 ± 10.7	79.4 ± 2.9
	Unmarried	49 45.0%	642 45.4%	83.7 ± 10.7	75.6 ± 3.3

¥ Percentages may not add up to 100% due to missing participant information
 * Information was collected from birth certificate at time of delivery

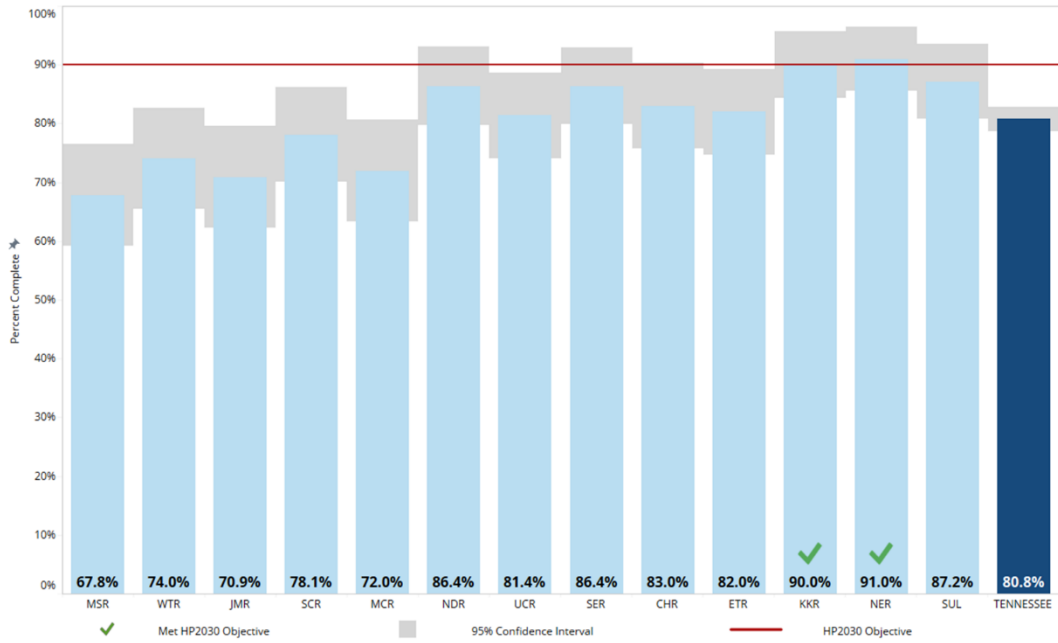
Appendix I

Regional Antigen Specific Results

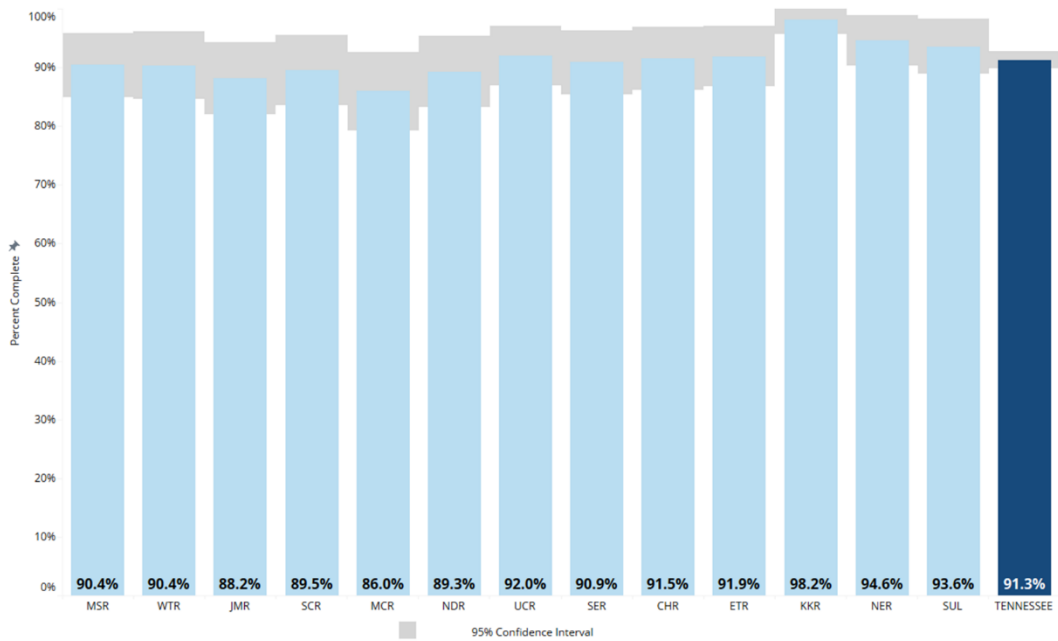
	Page
DTaP & Polio	83
MMR & <i>Haemophilus influenzae</i> type b	84
Hepatitis B (3-dose coverage) & Hepatitis B (birth dose)	85
Varicella & Pneumococcus	86
4:3:1:FS:3:1:FS series & Hepatitis A	87
Rotavirus & Influenza (2-dose coverage)	88

IMMUNIZATION STATUS SURVEY – 2023

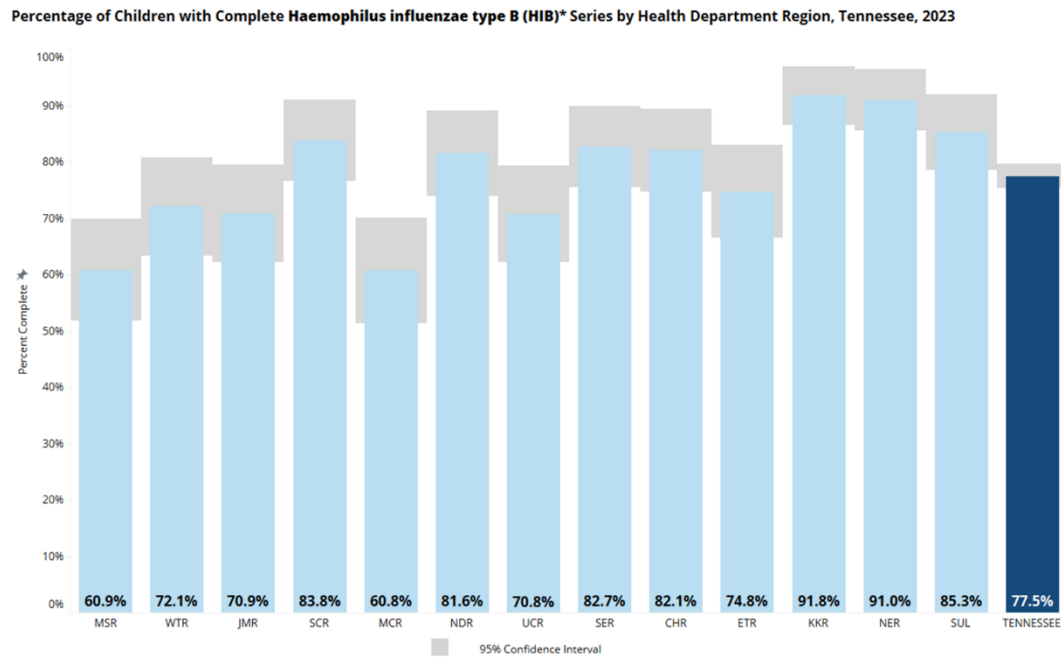
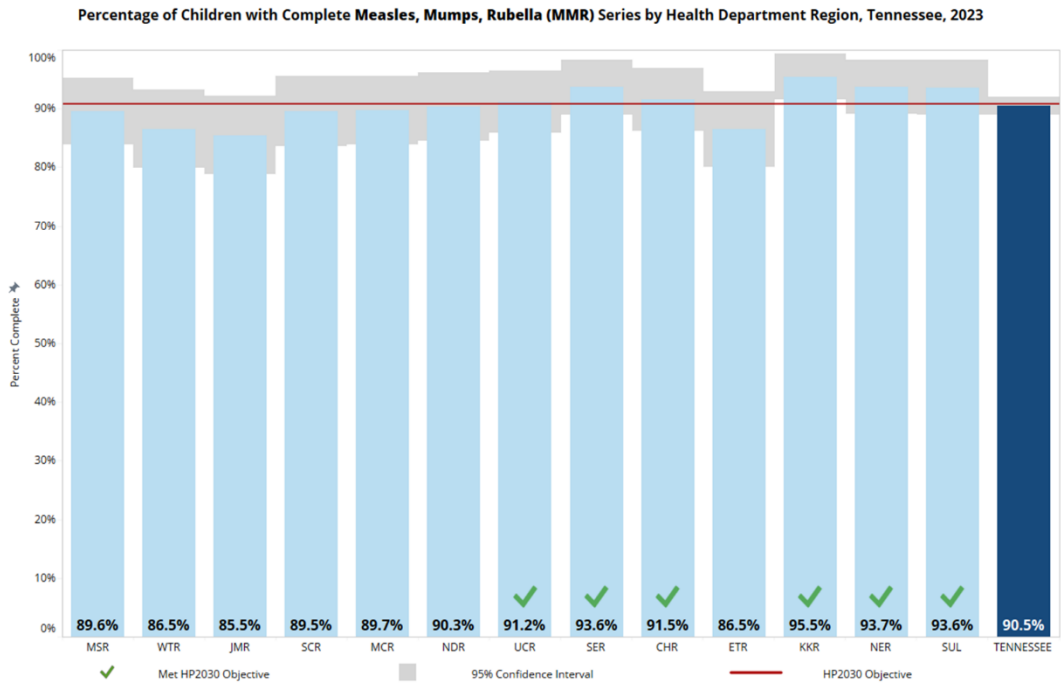
Percentage of Children with Complete Diphtheria, Tetanus, Pertussis (DTaP) Series by Health Department Region, Tennessee, 2023



Percentage of Children with Complete Polio (IPV) Series by Health Department Region, Tennessee, 2023



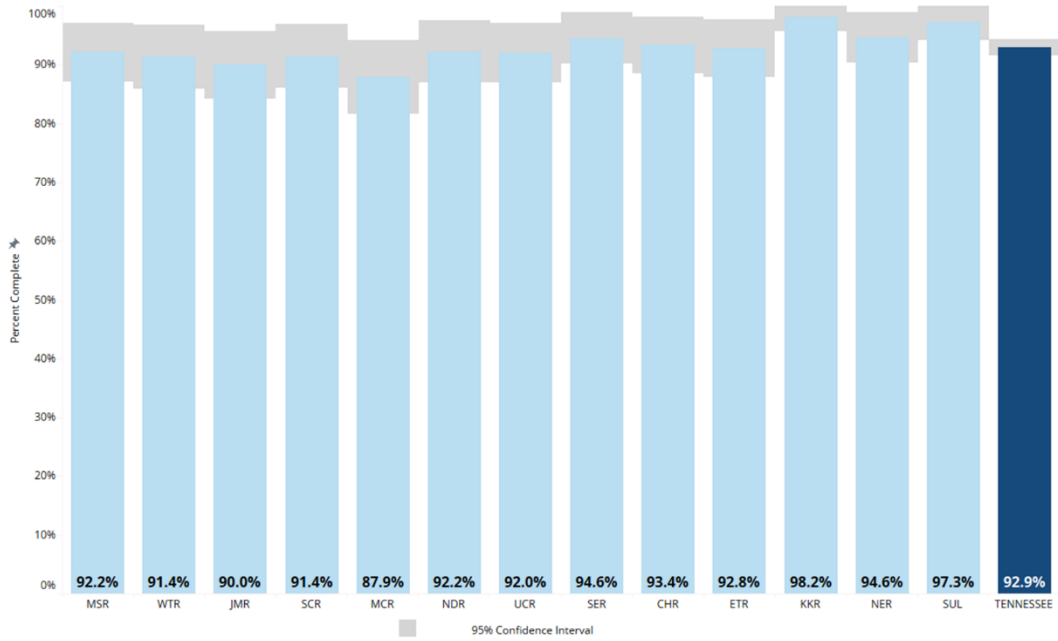
IMMUNIZATION STATUS SURVEY – 2023



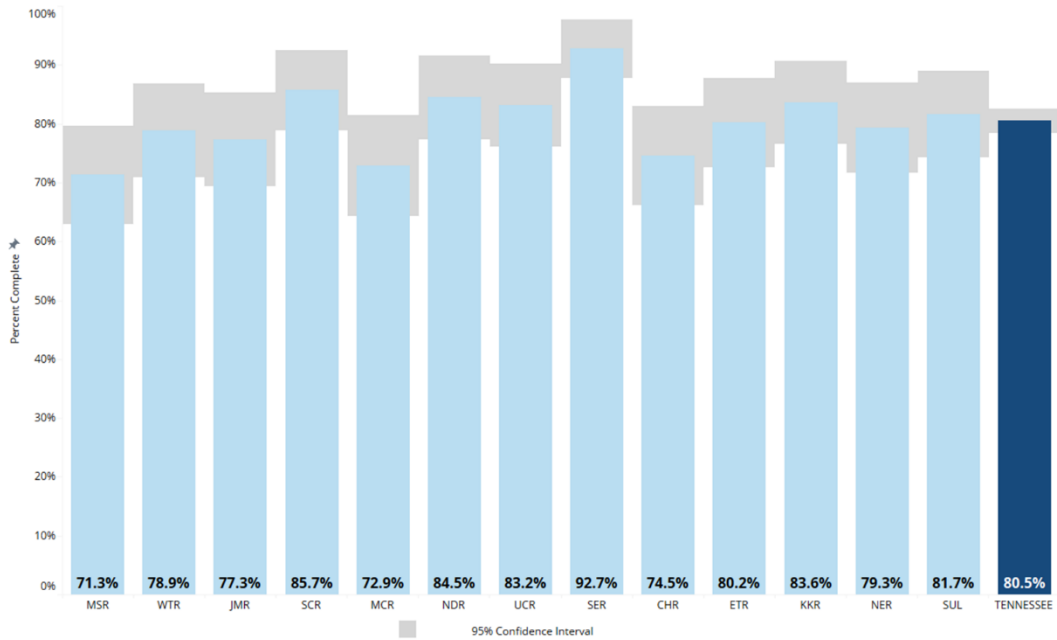
* Includes children on CDC catch-up schedule

IMMUNIZATION STATUS SURVEY – 2023

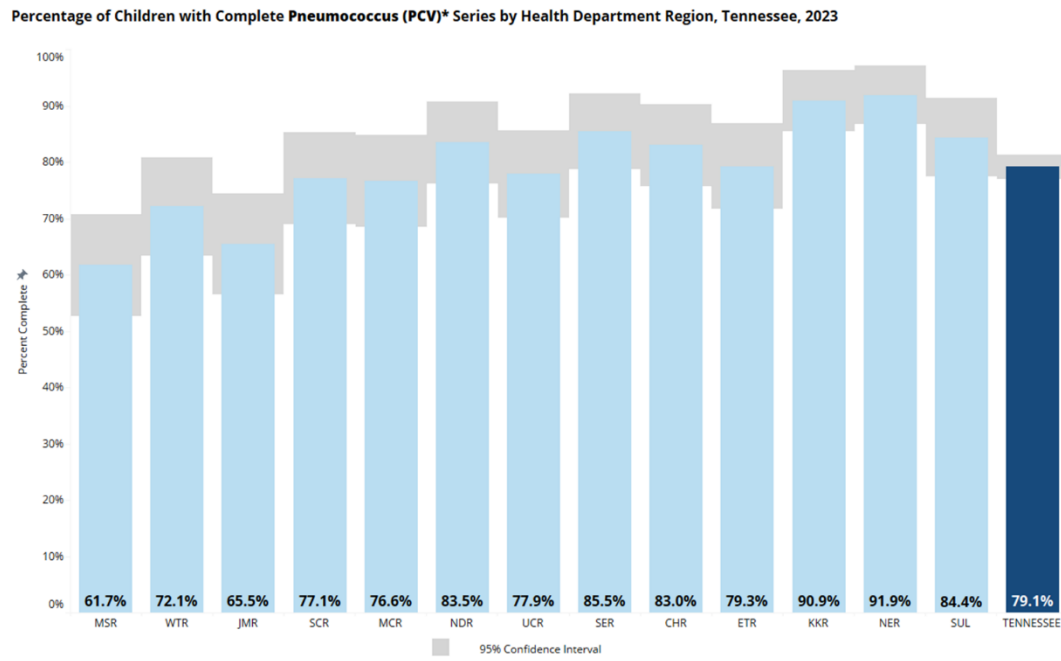
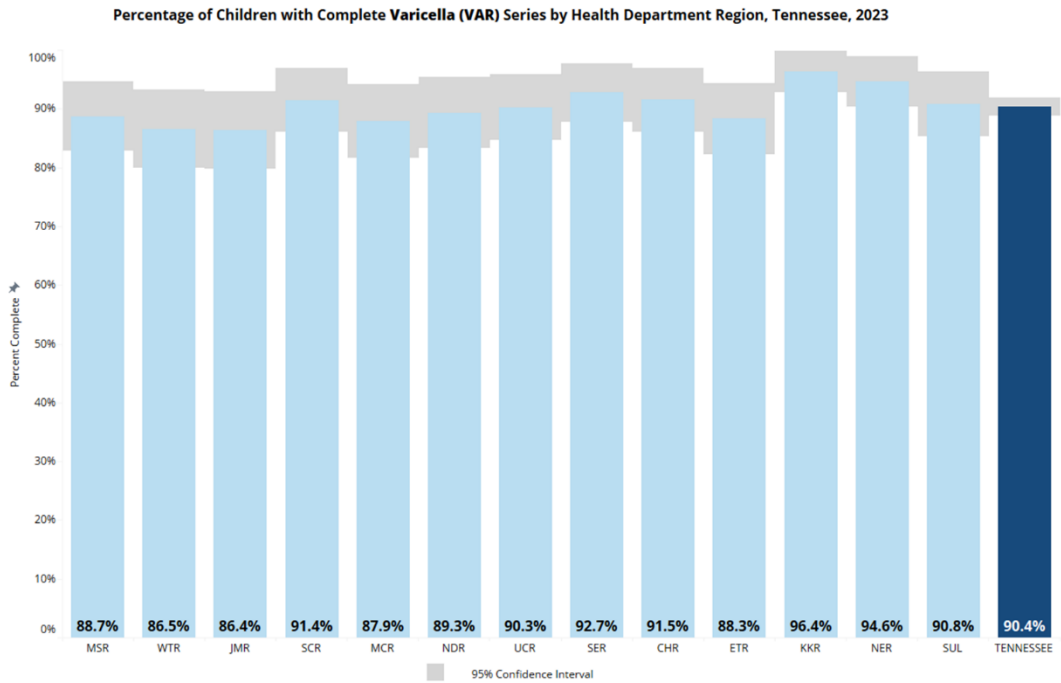
Percentage of Children with Complete Hepatitis B (HBV) Series by Health Department Region, Tennessee, 2023



Percentage of Children with Complete Birth Dose Hepatitis B (bHBV) Series by Health Department Region, Tennessee, 2023

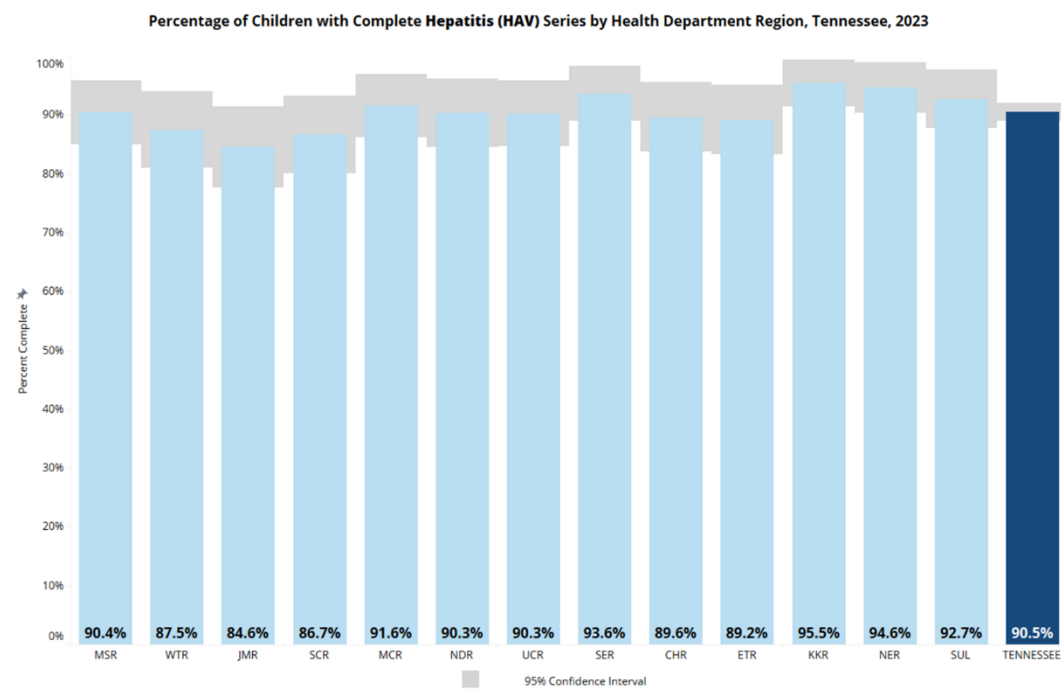
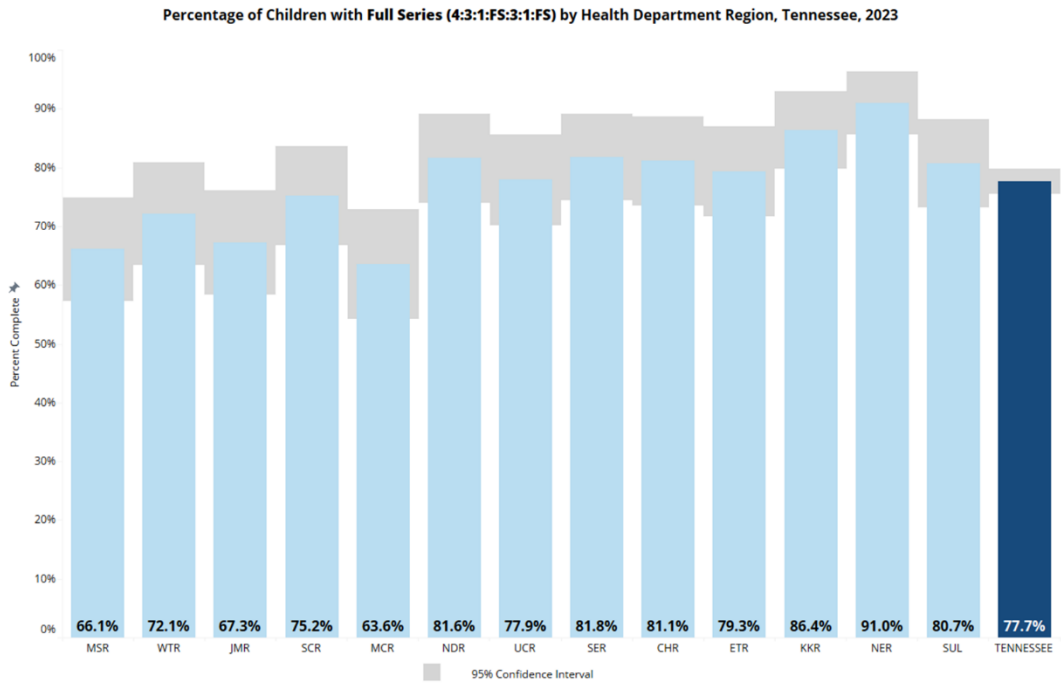


IMMUNIZATION STATUS SURVEY – 2023

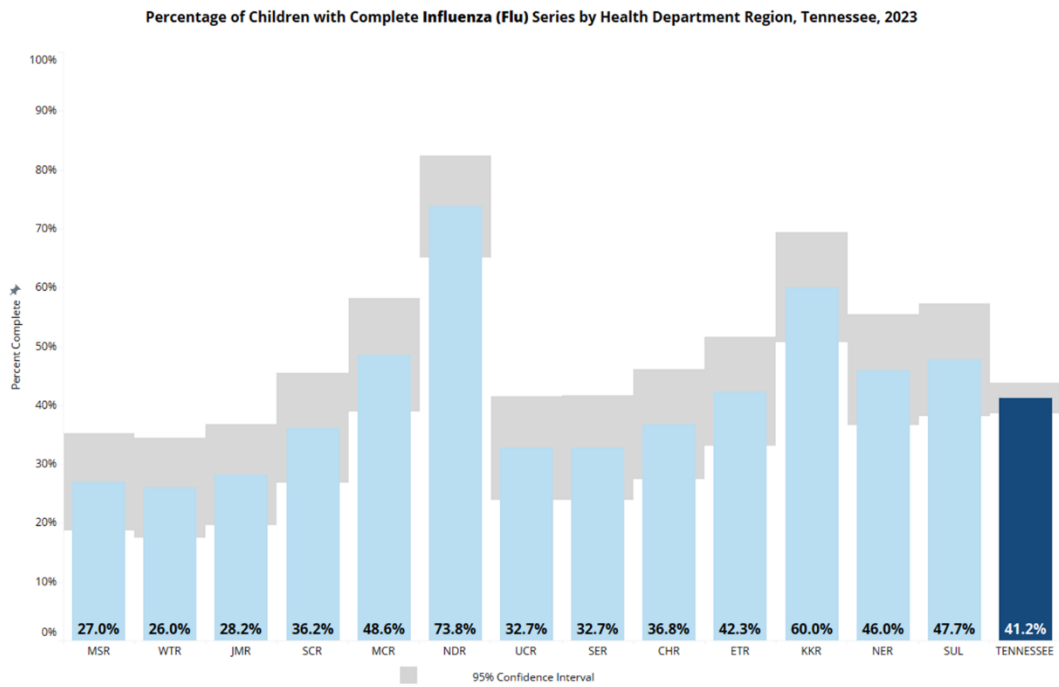
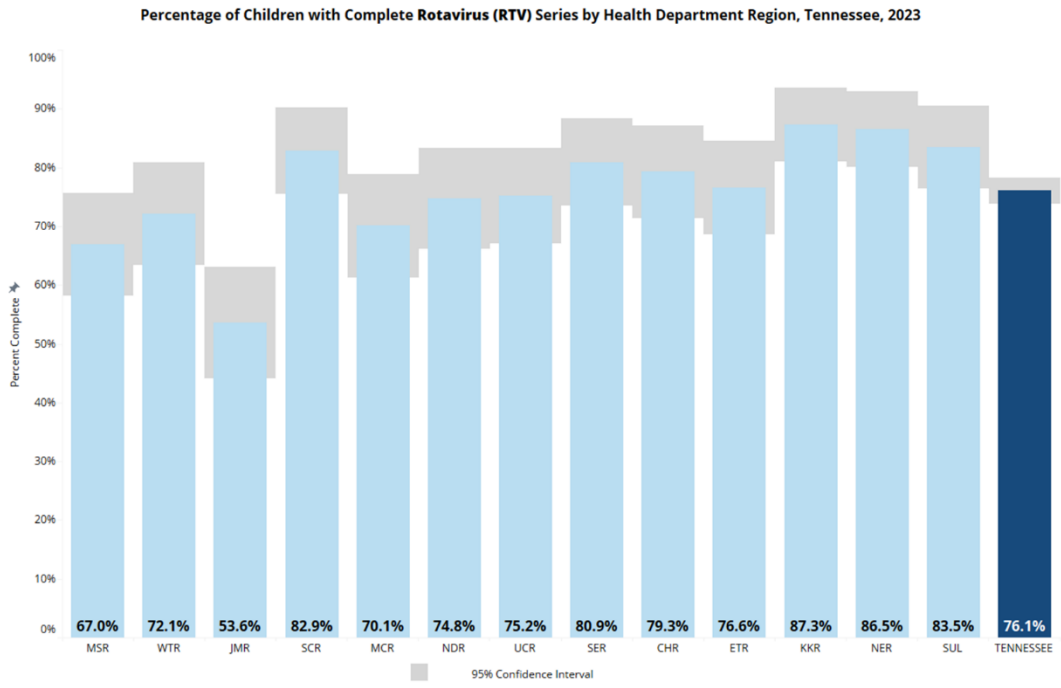


* Includes children on CDC catch-up schedule

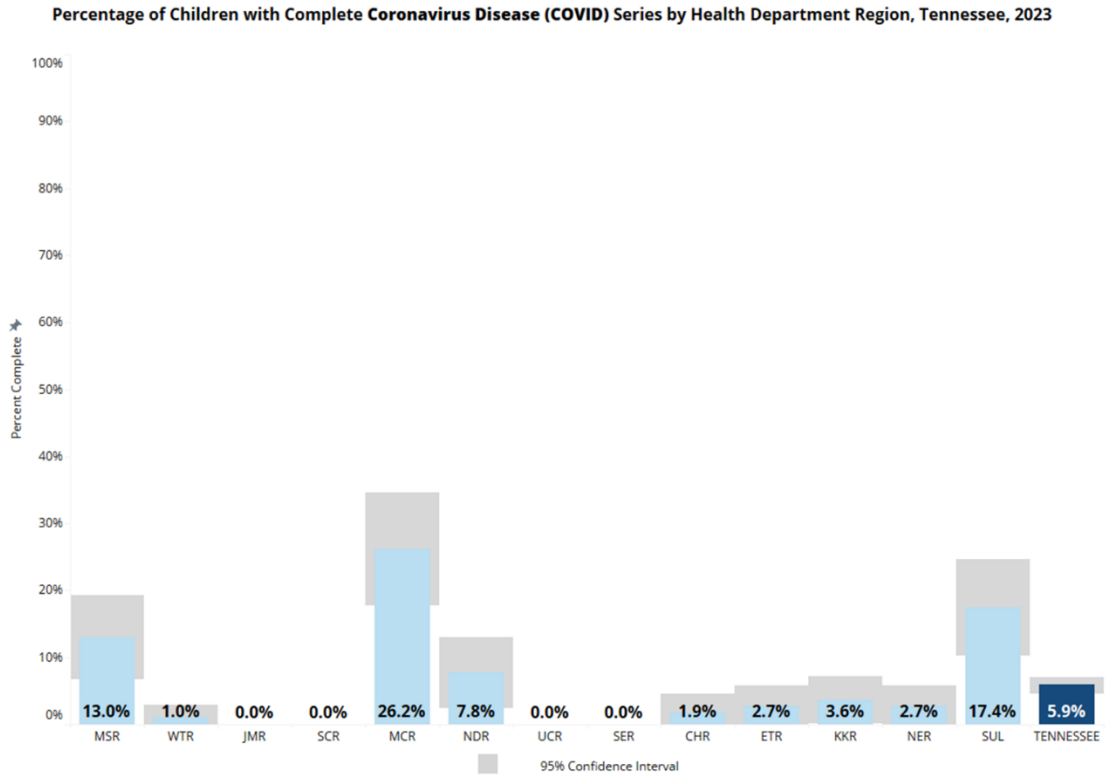
IMMUNIZATION STATUS SURVEY – 2023



IMMUNIZATION STATUS SURVEY – 2023



IMMUNIZATION STATUS SURVEY – 2023



Appendix II

Data Tables for Selected Analyses

	Page
Series Complete (4:3:1:FS:3:1:FS)	91
Series Complete (4:3:1:FS:3:1:FS) by Immunization Source	91
Series Complete (4:3:1:FS:3:1:FS) by Race	92
Series Complete (4:3:1:FS:3:1:FS) by Number of Older Siblings	92
Series Complete (4:3:1:FS:3:1:FS) by TennCare Enrollment	93
Series Complete (4:3:1:FS:3:1:FS) by WIC Enrollment	93

2023 UTD Status by Region

Region	Complete	%
Memphis-Shelby County Region	76/115	66.1
West Tennessee Region	75/104	72.1
Jackson-Madison County Region	74/110	67.3
South Central Region	79/105	75.2
Mid-Cumberland Region	74/107	69.2
Nashville-Davidson County Region	84/103	81.6
Upper Cumberland Region	88/113	77.9
Southeast Region	90/110	81.8
Chattanooga-Hamilton County Region	86/106	81.1
East Tennessee Region	88/111	79.3
Knoxville-Knox County Region	95/110	86.4
Northeast Region	101/111	91.0
Sullivan County Region	88/109	80.7
Tennessee	1098/1414	77.7

Indicates value is above 90%

2023 UTD Status by Immunization Source

Region	Health Department		Private Provider		Both Sources Complete		Unknown Source	
	Only	%	Only	%	Complete	%	Source	%
Memphis-Shelby County	-	-	40/72	55.6	34/40	87.5	1/3	33.3%
West Tennessee Region	0/1	0.0	60/79	76.0	14/18	77.8	1/6	16.7
Jackson-Madison County	3/6	50.0	57/83	68.7	13/14	92.9	1/7	14.3
South Central Region	-	-	70/95	73.7	9/10	90.0	-	-
Mid-Cumberland Region	-	-	38/56	67.9	-	-	-	-
Nashville-Davidson County	-	-	57/69	82.6	23/25	92.0	4/9	44.4
Upper Cumberland Region	2/4	50.0	81/100	81.0	5/5	100.0	0/4	0.0
Southeast Region	-	-	85/97	87.6	4/7	57.1	0/5	0.0
Chattanooga-Hamilton County	-	-	76/93	81.7	10/10	100.0	0/3	0.0
East Tennessee Region	1/2	50.0	79/97	81.4	8/8	100.0	0/4	0.0
Knoxville-Knox County	-	-	80/91	87.9	14/17	82.4	0/1	0.0
Northeast Region	1/1	100.0	57/69	82.6	7/7	100.0	0/3	0.0
Sullivan County Region	-	-	32/47	68.1	56/61	91.8	-	-
Tennessee	9/18	50.0	848/1079	78.6	234/269	87.0	7/48	14.6

Indicates value is above 90%

2023 UTD Status by Race

Region	White		Black		Other	
	Complete	%	Complete	%	Complete	%
Memphis-Shelby County	32/42	76.2	18/24	58.0	4/4	100.0
West Tennessee Region	62/82	75.6	12/21	57.1	1/1	100.0
Jackson-Madison County	43/62	69.4	30/46	65.2	½	50.0
South Central Region	74/97	76.3	4/7	57.1	1/1	100.0
Mid-Cumberland Region	63/90	70.0	9/14	64.3	2/3	66.7
Nashville-Davidson County	64/74	86.5	17/26	65.4	3/3	100.0
Upper Cumberland Region	86/110	78.2	1/2	50.0	1/1	100.0
Southeast Region	87/106	82.1	2/3	66.7	1/1	100.0
Chattanooga-Hamilton County	64/78	82.1	18/24	75.0	4/4	100.0
East Tennessee Region	86/108	79.6	2/2	100.0	0/1	0.0
Knoxville-Knox County	79/93	85.0	13/14	92.9	3/3	100.0
Northeast Region	97/106	91.5	3/3	100.0	½	50.0
Sullivan County Region	84/105	80.0	3/3	100.0	1/1	100.0
Tennessee	921/1153	79.9	154/234	65.8	23/27	85.2

Indicates value is above 90%


2023 UTD Status by Number of Siblings

Region	0 Siblings		1 Sibling		2+ Siblings	
	Complete	%	Complete	%	Complete	%
Memphis-Shelby County	33/45	73.3	28/40	70.0	15/30	50.0
West Tennessee Region	29/37	78.4	25/32	78.1	21/35	60.0
Jackson-Madison County	30/38	79.0	22/36	61.1	22/36	61.1
South Central Region	33/38	86.8	26/36	72.2	20/31	64.5
Mid-Cumberland Region	33/42	78.6	21/33	63.6	20/32	62.5
Nashville-Davidson County	35/41	85.4	27/35	77.1	22/27	81.5
Upper Cumberland Region	33/36	91.7	30/44	68.2	25/33	75.8
Southeast Region	35/37	94.6	34/45	75.6	21/28	75.0
Chattanooga-Hamilton County	44/50	88.0	24/32	75.0	18/24	75.0
East Tennessee Region	40/46	87.0	31/41	75.6	17/24	70.8
Knoxville-Knox County	46/49	93.9	27/28	96.4	22/33	66.7
Northeast Region	48/51	94.1	32/36	88.9	21/24	87.5
Sullivan County	34/37	91.9	34/41	82.9	20/31	64.5
Tennessee	473/547	86.5	361/479	75.4	264/388	68.0

Indicates value is above 90%


2023 UTD Status by TennCare Enrollment Only

Region	Enrolled Complete	%
Memphis-Shelby County Region	28/42	66.7
West Tennessee Region	15/20	70.5
Jackson-Madison County Region	19/27	70.4
South Central Region	26/34	76.5
Mid-Cumberland Region	13/18	72.2
Nashville-Davidson County Region	16/18	88.9
Upper Cumberland Region	17/20	85.0
Southeast Region	5/8	62.5
Chattanooga-Hamilton County Region	27/33	81.8
East Tennessee Region	16/20	80.0
Knoxville-Knox County Region	19/23	82.6
Northeast Region	14/16	87.5
Sullivan County Region	20/24	83.3
Tennessee	235/303	77.6

 Indicates value is above 90%

2023 UTD Status by WIC Enrollment Only

Region	Enrolled Complete	%
Memphis-Shelby County Region	2/3	66.7
West Tennessee Region	9/13	69.2
Jackson-Madison County Region	1/5	20.0
South Central Region	5/9	55.6
Mid-Cumberland Region	10/11	90.9
Nashville-Davidson County Region	10/12	83.3
Upper Cumberland Region	21/25	84.0
Southeast Region	19/22	86.4
Chattanooga-Hamilton County Region	3/4	75.0
East Tennessee Region	4/8	50.0
Knoxville-Knox County Region	16/20	80.0
Northeast Region	4/4	100.0
Sullivan County Region	6/8	75.0
Tennessee	97/127	76.4

 Indicates value is above 90%

Appendix III

Regional One Page Summaries

	Page
Memphis- Shelby County Region	95
West Tennessee Region	96
Jackson-Madison County Region	97
South Central Region	98
Mid-Cumberland Region	99
Nashville-Davidson County Region	100
Upper Cumberland Region	101
Southeast Region	102
Chattanooga- Hamilton County Region	103
East Tennessee Region	104
Knoxville-Knox County Region	105
Northeast Region	106
Sullivan County Region	107



Memphis-Shelby County Region
24-Month-Old Immunization Status Survey, 2023

Figure A. Comparison of MSR and Tennessee UTD Rate by Vaccine Antigen, 2023

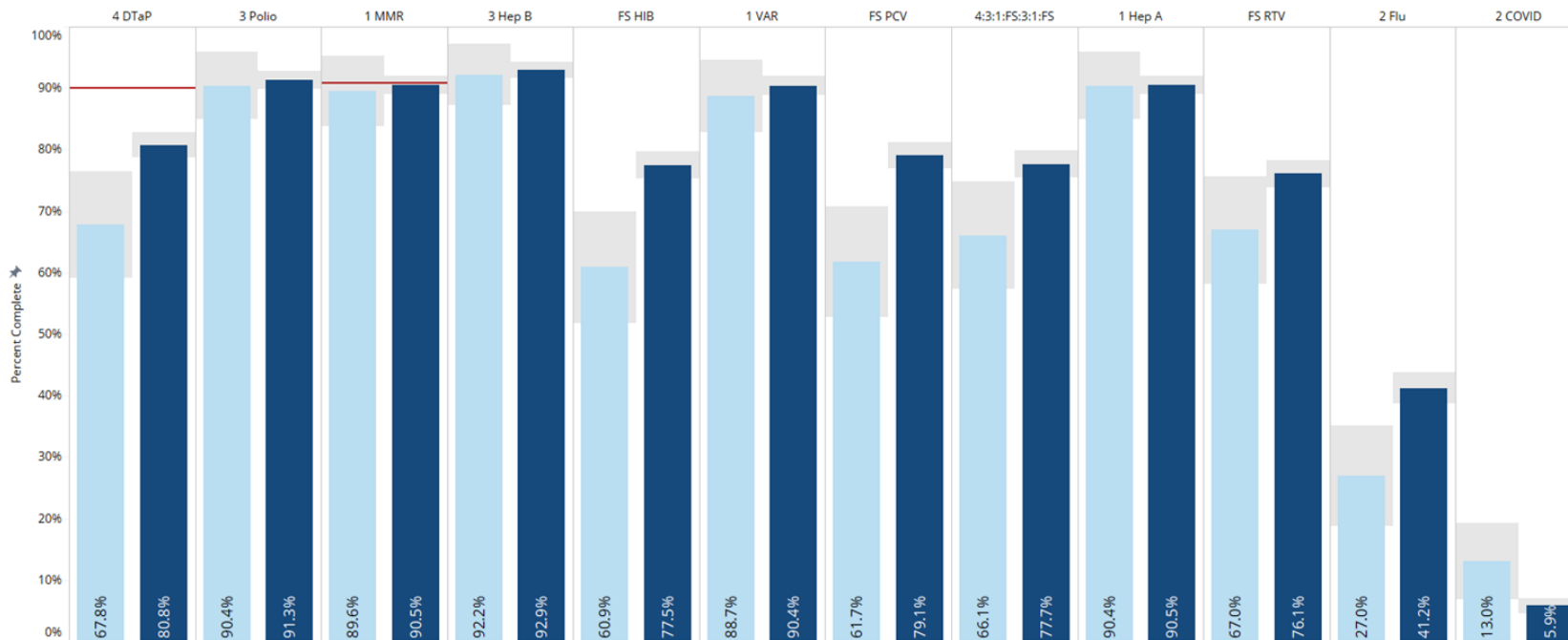


Figure B. MSR Survey Results, by Vaccine Antigen, 2023

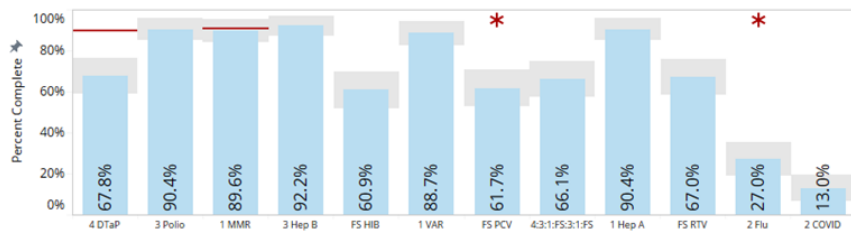
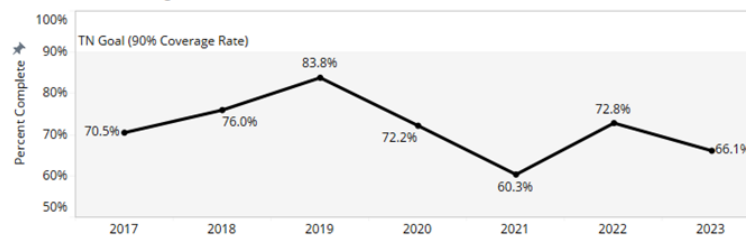


Figure C. UTD Immunization Rate Trend, MSR, 2017-2023



Legend			
■	Region Rate	■	Met Healthy People 2030 Objective
■	Tennessee Rate	■	95% Confidence Interval
★	Significantly Higher than Previous Year	★	Significantly Lower than Previous Year

Notes	
Up-to-Date (UTD) status is defined as the completion of all immunizations and subsequent doses that comprise the Full Series (4:3:1:FS:3:1:FS); 4 DTaP, 3 Polio, 1 MMR, FS (3/4) Hib, 3 Hepatitis B, 1 Varicella, and FS (3/4) PCV administered before or after 24 months of age. Immunization status is based on the childhood immunization and catch-up schedules recommended by the ACIP.	



West Tennessee Region
24-Month-Old Immunization Status Survey, 2023

Figure A. Comparison of WTR and Tennessee UTD Rate by Vaccine Antigen, 2023

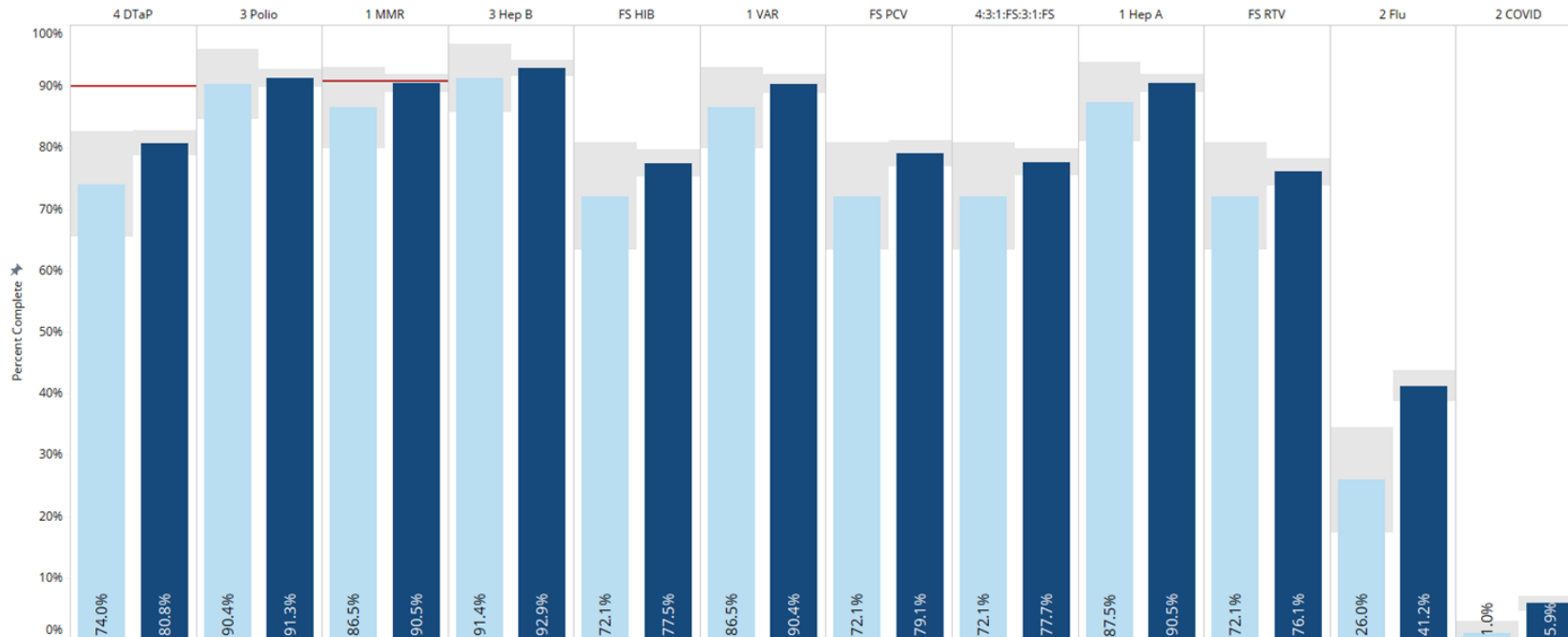


Figure B. WTR Survey Results, by Vaccine Antigen, 2023

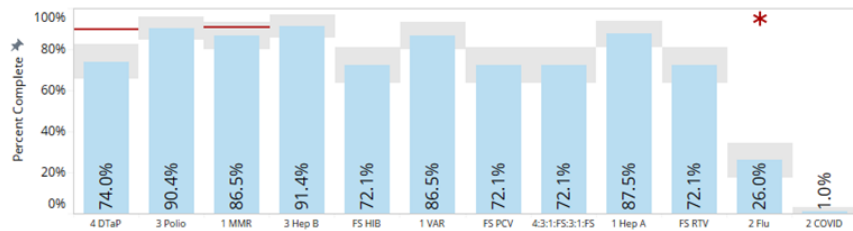
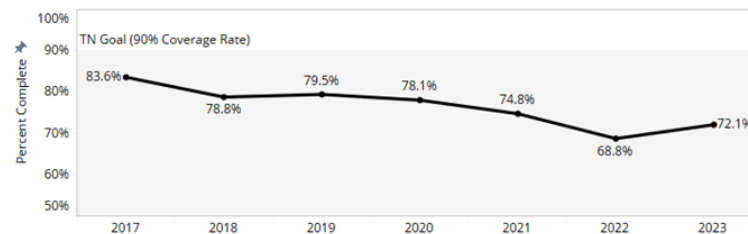


Figure C. UTD Immunization Rate Trend, WTR, 2017-2023



Legend			
■	Region Rate	■	Met Healthy People 2030 Objective
■	Tennessee Rate	■	95% Confidence Interval
★	Significantly Higher than Previous Year	★	Significantly Lower than Previous Year

Notes	
Up-to-Date (UTD) status is defined as the completion of all immunizations and subsequent doses that comprise the Full Series (4:3:1:FS:3:1:FS); 4 DTaP, 3 Polio, 1 MMR, FS (3/4) Hib, 3 Hepatitis B, 1 Varicella, and FS (3/4) PCV administered before or after 24 months of age. Immunization status is based on the childhood immunization and catch-up schedules recommended by the ACIP.	



Jackson-Madison County Region
24-Month-Old Immunization Status Survey, 2023

Figure A. Comparison of JMR and Tennessee UTD Rate by Vaccine Antigen, 2023

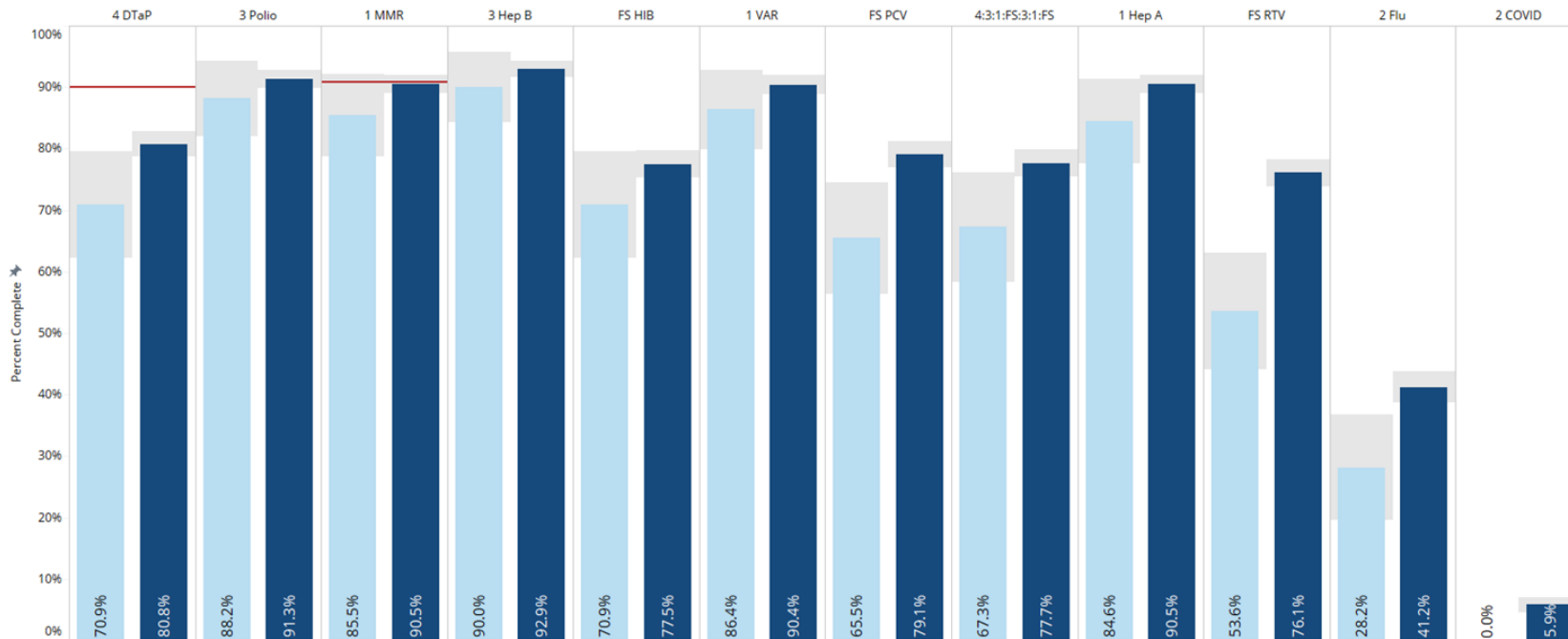


Figure B. JMR Survey Results, by Vaccine Antigen, 2023

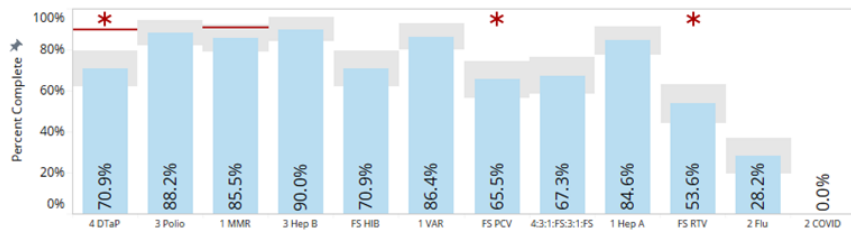
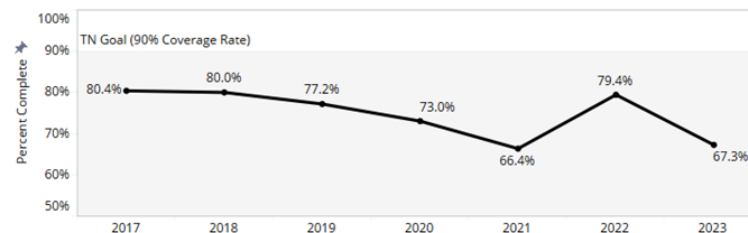


Figure C. UTD Immunization Rate Trend, JMR, 2017-2023



Legend			
■	Region Rate	■	Met Healthy People 2030 Objective
■	Tennessee Rate	■	95% Confidence Interval
★	Significantly Higher than Previous Year	★	Significantly Lower than Previous Year

Notes	
Up-to-Date (UTD) status is defined as the completion of all immunizations and subsequent doses that comprise the Full Series (4:3:1:FS:3:1:FS); 4 DTaP, 3 Polio, 1 MMR, FS (3/4) Hib, 3 Hepatitis B, 1 Varicella, and FS (3/4) PCV administered before or after 24 months of age. Immunization status is based on the childhood immunization and catch-up schedules recommended by the ACIP.	



South Central Region
24-Month-Old Immunization Status Survey, 2023

Figure A. Comparison of SCR and Tennessee UTD Rate by Vaccine Antigen, 2023

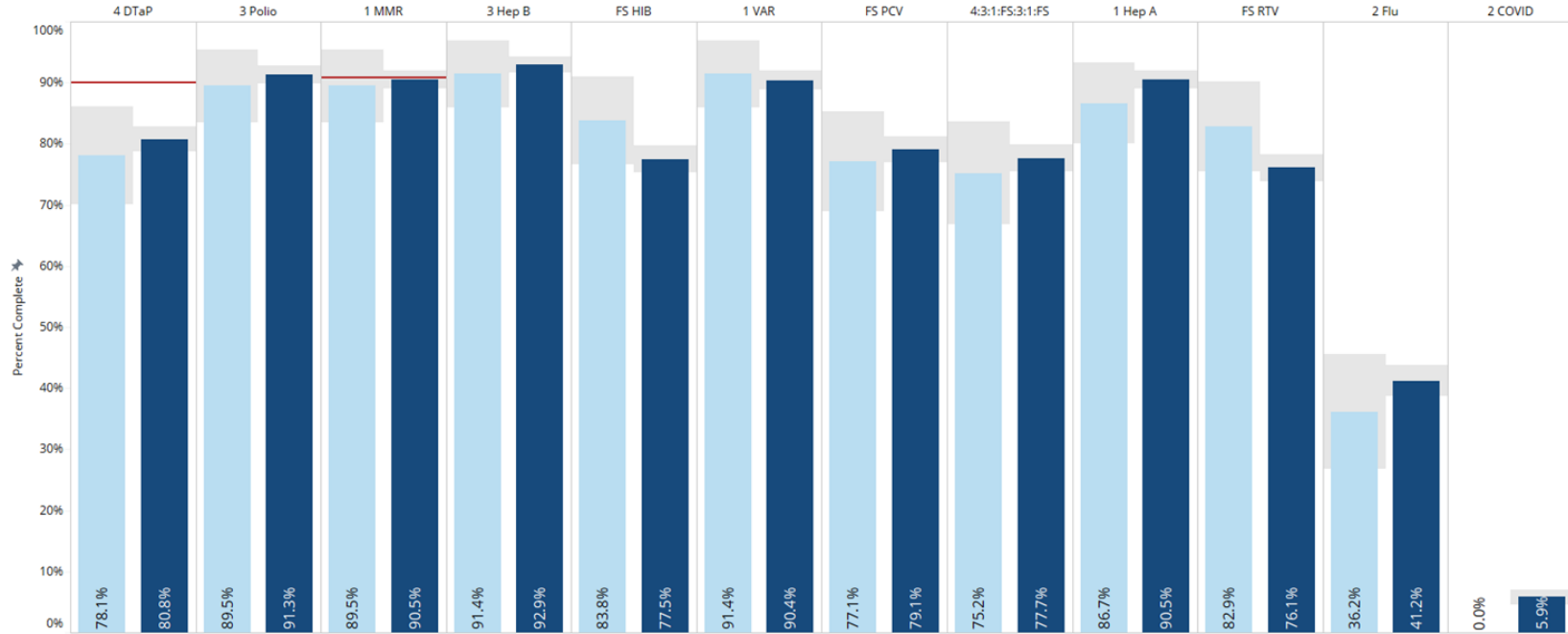


Figure B. SCR Survey Results, by Vaccine Antigen, 2023

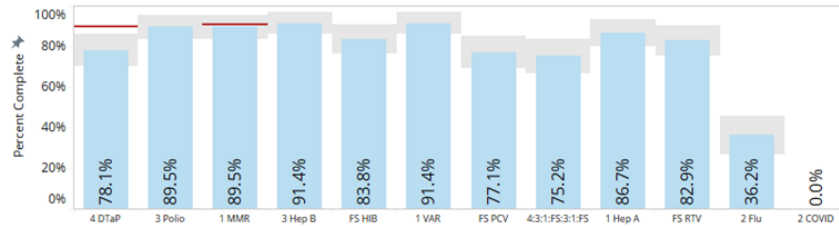
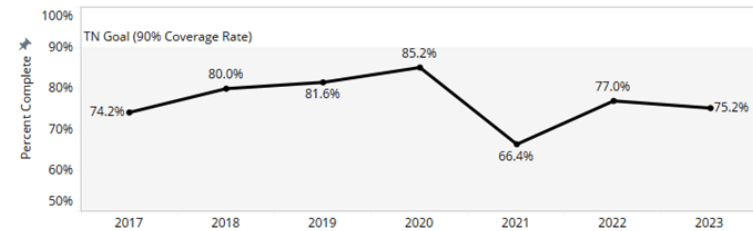


Figure C. UTD Immunization Rate Trend, SCR, 2017-2023



Legend			
■ Region Rate	■ Met Healthy People 2030 Objective	* Significantly Higher than Previous Year	
■ Tennessee Rate	■ 95% Confidence Interval	* Significantly Lower than Previous Year	

Notes
Up-to-Date (UTD) status is defined as the completion of all immunizations and subsequent doses that comprise the Full Series (4:3:1:FS:3:1:FS); 4 DTaP, 3 Polio, 1 MMR, FS (3/4) Hib, 3 Hepatitis B, 1 Varicella, and FS (3/4) PCV administered before or after 24 months of age. Immunization status is based on the childhood immunization and catch-up schedules recommended by the ACIP.

IMMUNIZATION STATUS SURVEY – 2023



Mid-Cumberland Region 24-Month-Old Immunization Status Survey, 2023

Figure A. Comparison of MCR and Tennessee UTD Rate by Vaccine Antigen, 2023

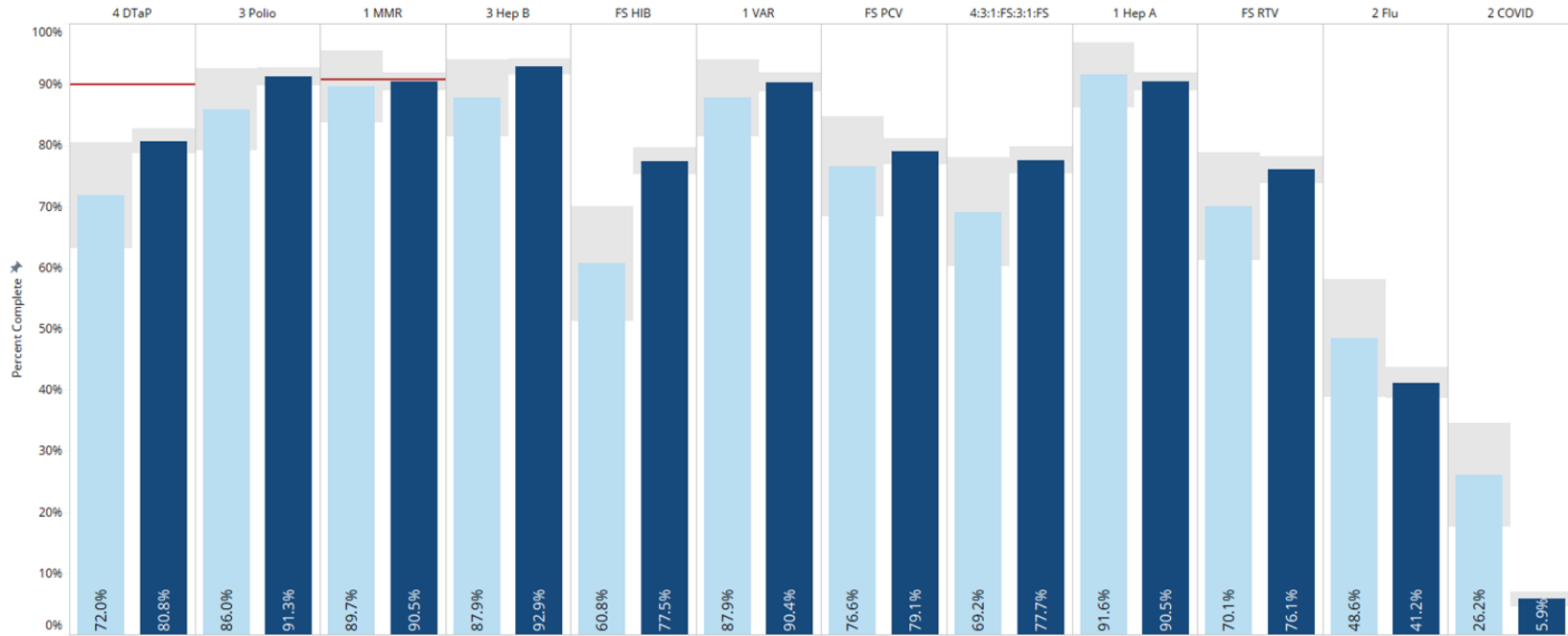


Figure B. MCR Survey Results, by Vaccine Antigen, 2023

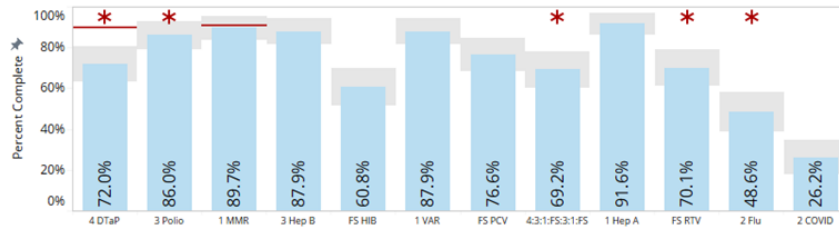
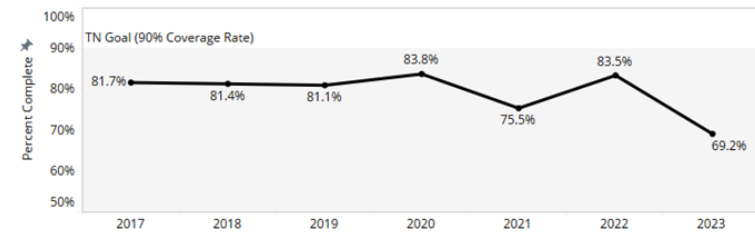


Figure C. UTD Immunization Rate Trend, MCR, 2017-2023



Legend			
■ Region Rate	■ Met Healthy People 2030 Objective	* Significantly Higher than Previous Year	
■ Tennessee Rate	■ 95% Confidence Interval	* Significantly Lower than Previous Year	

Notes
Up-to-Date (UTD) status is defined as the completion of all immunizations and subsequent doses that comprise the Full Series (4:3:1:FS:3:1:FS): 4 DTaP, 3 Polio, 1 MMR, FS (3/4) Hib, 3 Hepatitis B, 1 Varicella, and FS (3/4) PCV administered before or after 24 months of age. Immunization status is based on the childhood immunization and catch-up schedules recommended by the ACIP.

IMMUNIZATION STATUS SURVEY – 2023



Nashville-Davidson County Region 24-Month-Old Immunization Status Survey, 2023

Figure A. Comparison of NDR and Tennessee UTD Rate by Vaccine Antigen, 2023

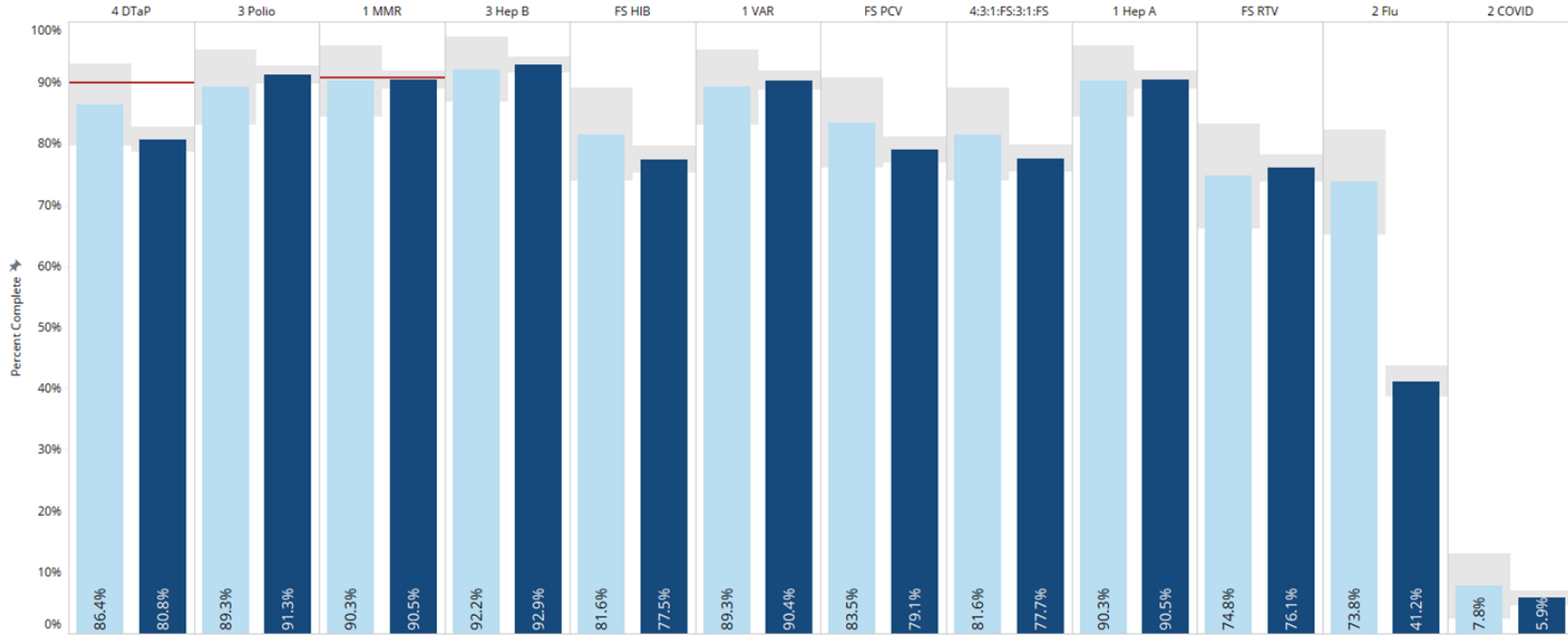


Figure B. NDR Survey Results, by Vaccine Antigen, 2023

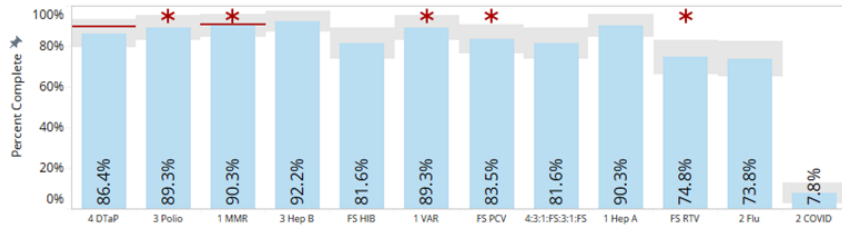
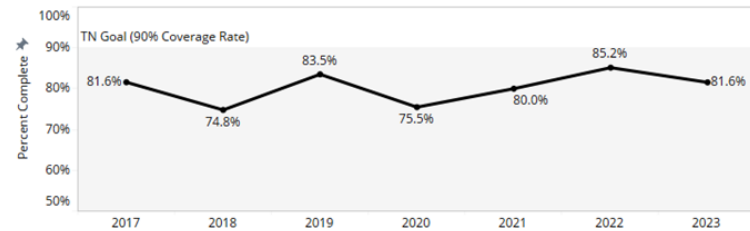


Figure C. UTD Immunization Rate Trend, NDR, 2017-2023



Legend			
■	Region Rate	■	Met Healthy People 2030 Objective
■	Tennessee Rate	■	95% Confidence Interval
*	Significantly Higher than Previous Year	*	Significantly Lower than Previous Year

Notes
Up-to-Date (UTD) status is defined as the completion of all immunizations and subsequent doses that comprise the Full Series (4:3:1:FS:3:1:FS): 4 DTaP, 3 Polio, 1 MMR, FS (3/4) Hib, 3 Hepatitis B, 1 Varicella, and FS (3/4) PCV administered before or after 24 months of age. Immunization status is based on the childhood immunization and catch-up schedules recommended by the ACIP.

IMMUNIZATION STATUS SURVEY – 2023



Upper Cumberland Region 24-Month-Old Immunization Status Survey, 2023

Figure A. Comparison of UCR and Tennessee UTD Rate by Vaccine Antigen, 2023

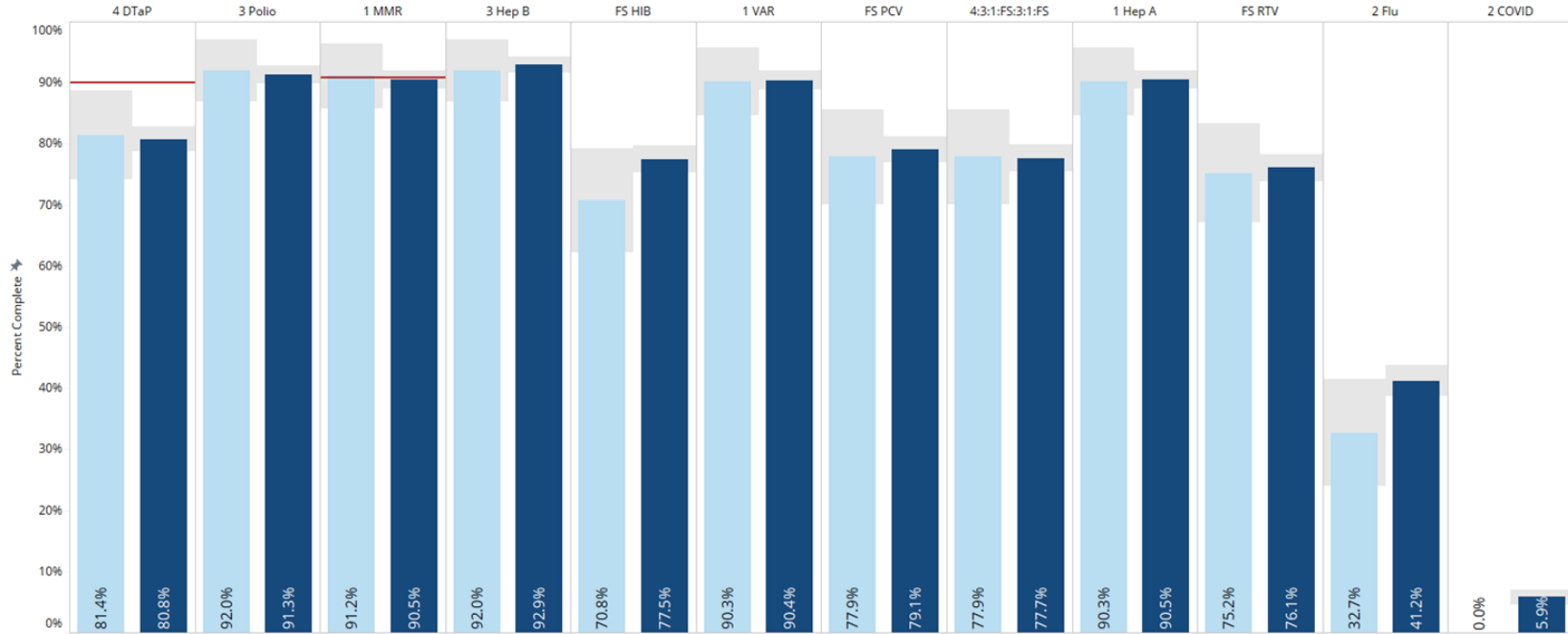


Figure B. UCR Survey Results, by Vaccine Antigen, 2023

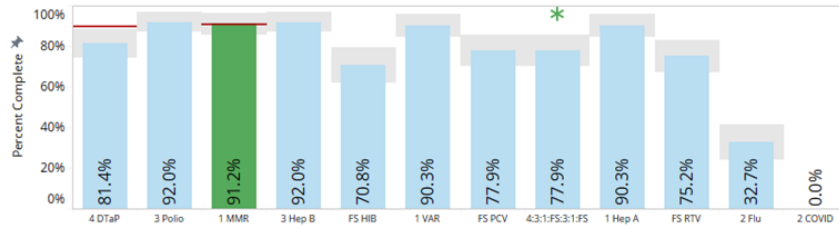
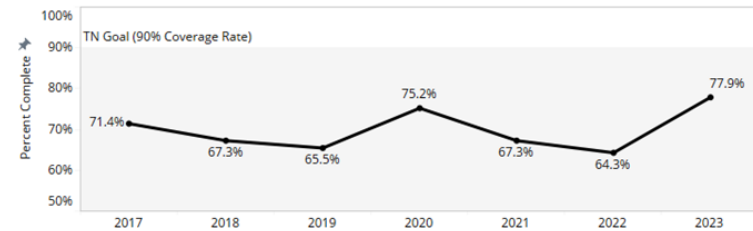


Figure C. UTD Immunization Rate Trend, UCR, 2017-2023



Legend			
■	Region Rate	■	Met Healthy People 2030 Objective
■	Tennessee Rate		95% Confidence Interval
		*	Significantly Higher than Previous Year
		*	Significantly Lower than Previous Year

Notes

Up-to-Date (UTD) status is defined as the completion of all immunizations and subsequent doses that comprise the Full Series (4:3:1:FS:3:1:FS): 4 DTaP, 3 Polio, 1 MMR, FS (3/4) Hib, 3 Hepatitis B, 1 Varicella, and FS (3/4) PCV administered before or after 24 months of age. Immunization status is based on the childhood immunization and catch-up schedules recommended by the ACIP.

IMMUNIZATION STATUS SURVEY – 2023



Chattanooga-Hamilton County Region
24-Month-Old Immunization Status Survey, 2023

Figure A. Comparison of CHR and Tennessee UTD Rate by Vaccine Antigen, 2023

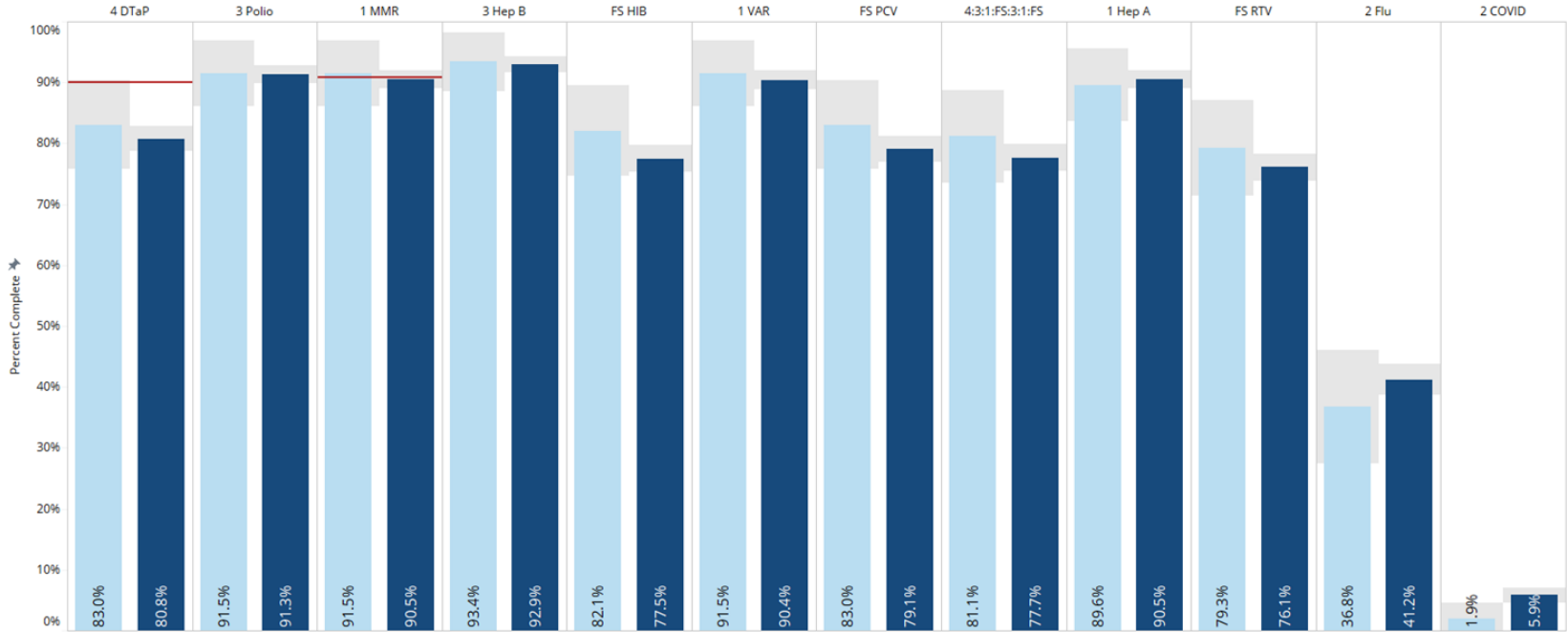


Figure B. CHR Survey Results, by Vaccine Antigen, 2023

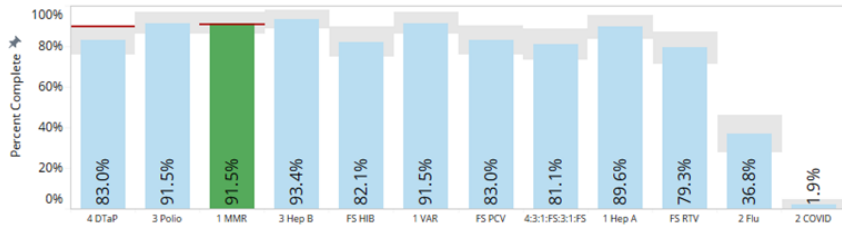
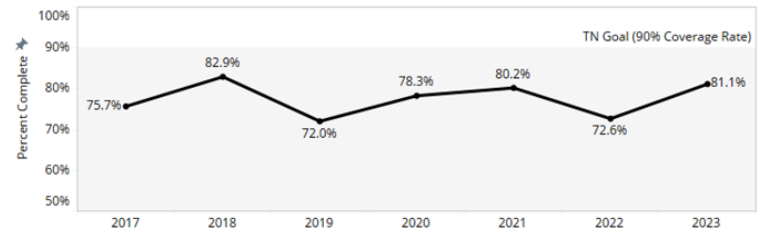


Figure C. UTD Immunization Rate Trend, CHR, 2017-2023



Legend			
■	Region Rate	■	Met Healthy People 2030 Objective
■	Tennessee Rate		95% Confidence Interval
		*	Significantly Higher than Previous Year
		*	Significantly Lower than Previous Year

Notes
Up-to-Date (UTD) status is defined as the completion of all immunizations and subsequent doses that comprise the Full Series (4:3:1:FS:3:1:FS): 4 DTaP, 3 Polio, 1 MMR, FS (3/4) Hib, 3 Hepatitis B, 1 Varicella, and FS (3/4) PCV administered before or after 24 months of age. Immunization status is based on the childhood immunization and catch-up schedules recommended by the ACIP.

IMMUNIZATION STATUS SURVEY – 2023



Chattanooga-Hamilton County Region 24-Month-Old Immunization Status Survey, 2023

Figure A. Comparison of CHR and Tennessee UTD Rate by Vaccine Antigen, 2023

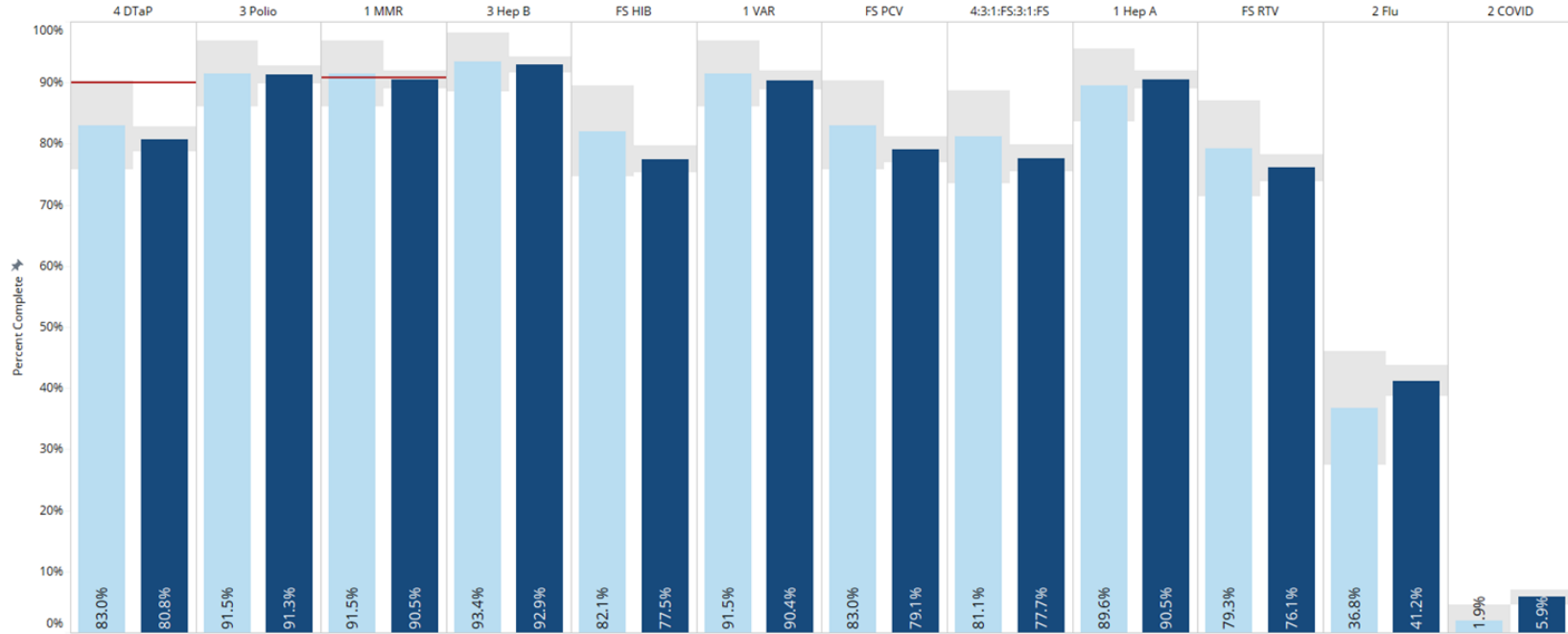


Figure B. CHR Survey Results, by Vaccine Antigen, 2023

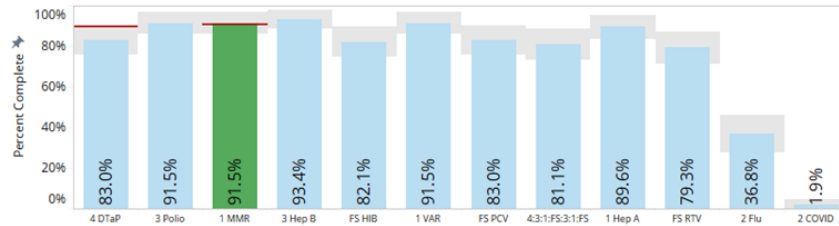
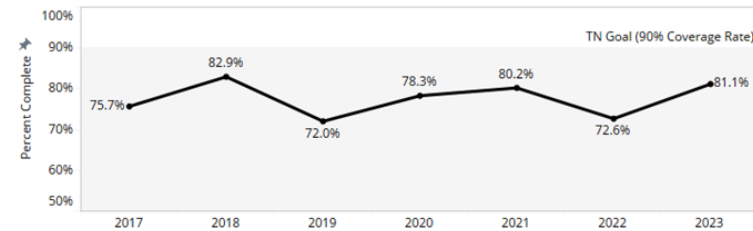


Figure C. UTD Immunization Rate Trend, CHR, 2017-2023



Legend			
■	Region Rate	■	Met Healthy People 2030 Objective
■	Tennessee Rate		95% Confidence Interval
		*	Significantly Higher than Previous Year
		*	Significantly Lower than Previous Year

Notes

Up-to-Date (UTD) status is defined as the completion of all immunizations and subsequent doses that comprise the Full Series (4:3:1:FS:3:1:FS); 4 DTaP, 3 Polio, 1 MMR, FS (3/4) Hib, 3 Hepatitis B, 1 Varicella, and FS (3/4) PCV administered before or after 24 months of age. Immunization status is based on the childhood immunization and catch-up schedules recommended by the ACIP.



East Tennessee Region
24-Month-Old Immunization Status Survey, 2023

Figure A. Comparison of ETR and Tennessee UTD Rate by Vaccine Antigen, 2023

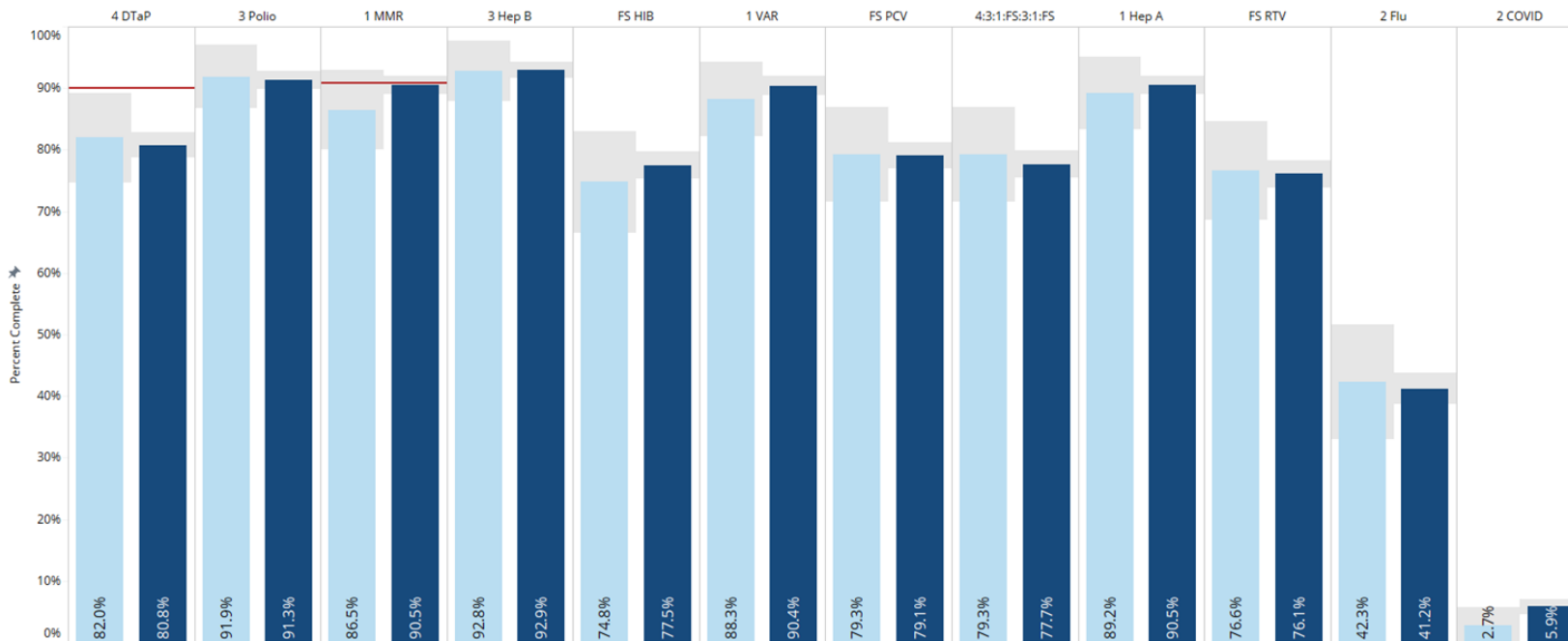


Figure B. ETR Survey Results, by Vaccine Antigen, 2023

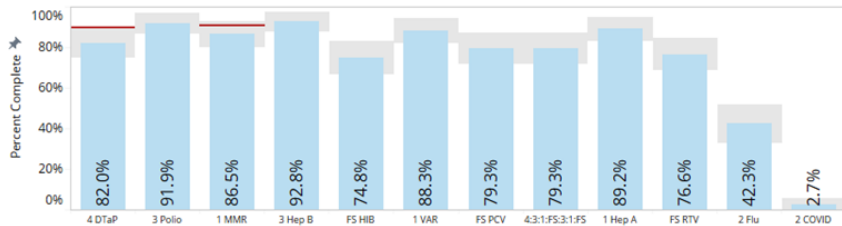
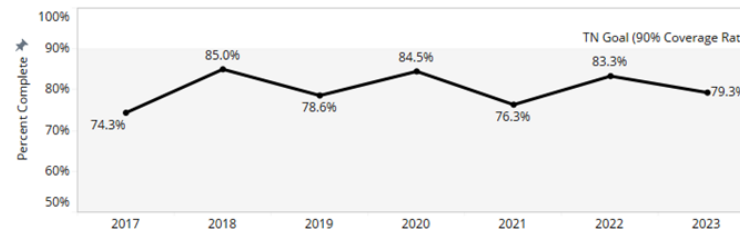


Figure C. UTD Immunization Rate Trend, ETR, 2017-2023



Legend			
■	Region Rate	■	Met Healthy People 2030 Objective
■	Tennessee Rate	■	95% Confidence Interval
		*	Significantly Higher than Previous Year
		*	Significantly Lower than Previous Year

Notes
Up-to-Date (UTD) status is defined as the completion of all immunizations and subsequent doses that comprise the Full Series (4:3:1:FS:3:1:FS): 4 DTaP, 3 Polio, 1 MMR, FS (3/4) Hib, 3 Hepatitis B, 1 Varicella, and FS (3/4) PCV administered before or after 24 months of age. Immunization status is based on the childhood immunization and catch-up schedules recommended by the ACIP.



Knoxville-Knox County Region
24-Month-Old Immunization Status Survey, 2023

Figure A. Comparison of KKR and Tennessee UTD Rate by Vaccine Antigen, 2023

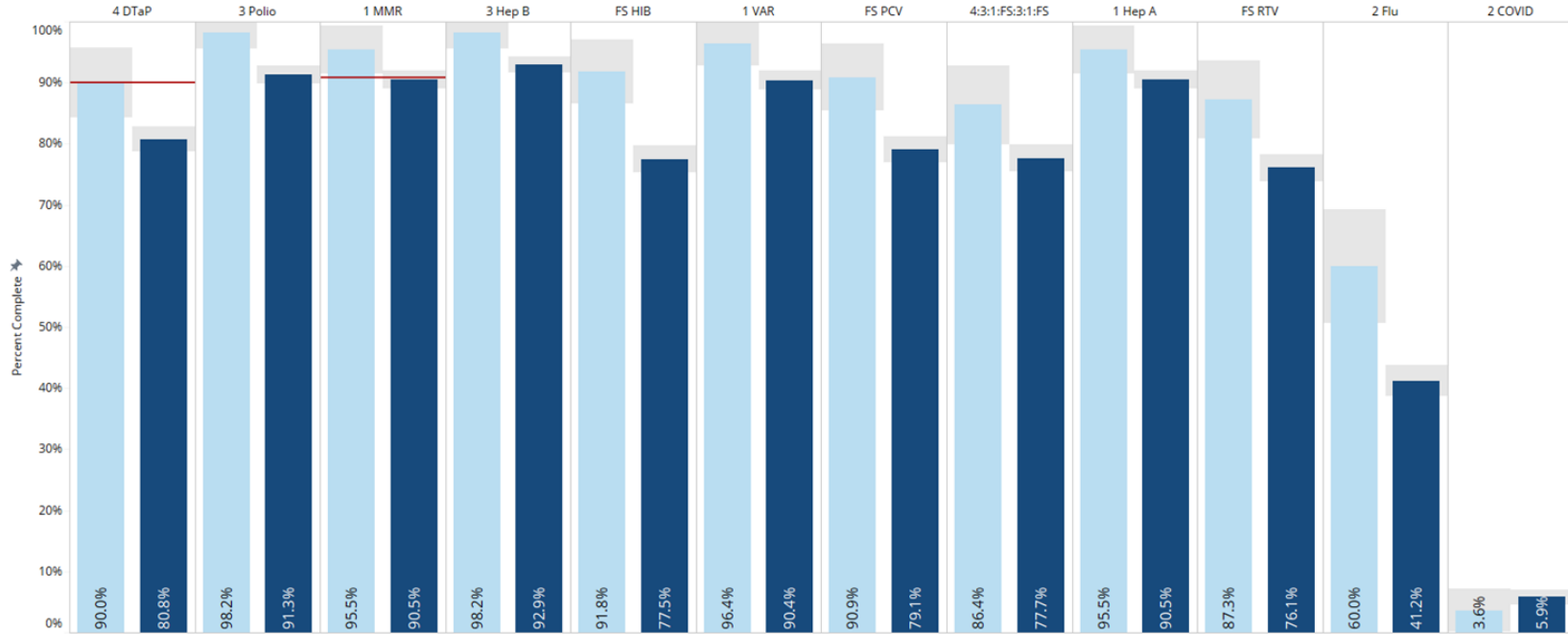


Figure B. KKR Survey Results, by Vaccine Antigen, 2023

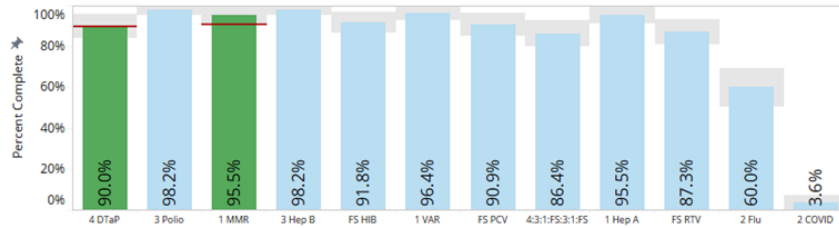
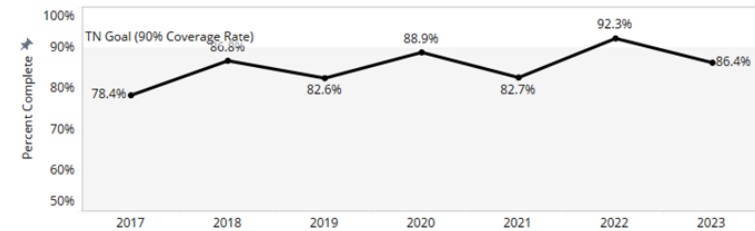


Figure C. UTD Immunization Rate Trend, KKR, 2017-2023



Legend			
■	Region Rate	■	Met Healthy People 2030 Objective
■	Tennessee Rate		95% Confidence Interval
*	Significantly Higher than Previous Year	*	Significantly Lower than Previous Year

Notes
Up-to-Date (UTD) status is defined as the completion of all immunizations and subsequent doses that comprise the Full Series (4:3:1:FS:3:1:FS); 4 DTaP, 3 Polio, 1 MMR, FS (3/4) Hib, 3 Hepatitis B, 1 Varicella, and FS (3/4) PCV administered before or after 24 months of age. Immunization status is based on the childhood immunization and catch-up schedules recommended by the ACIP.

IMMUNIZATION STATUS SURVEY – 2023



Northeast Region 24-Month-Old Immunization Status Survey, 2023

Figure A. Comparison of NER and Tennessee UTD Rate by Vaccine Antigen, 2023

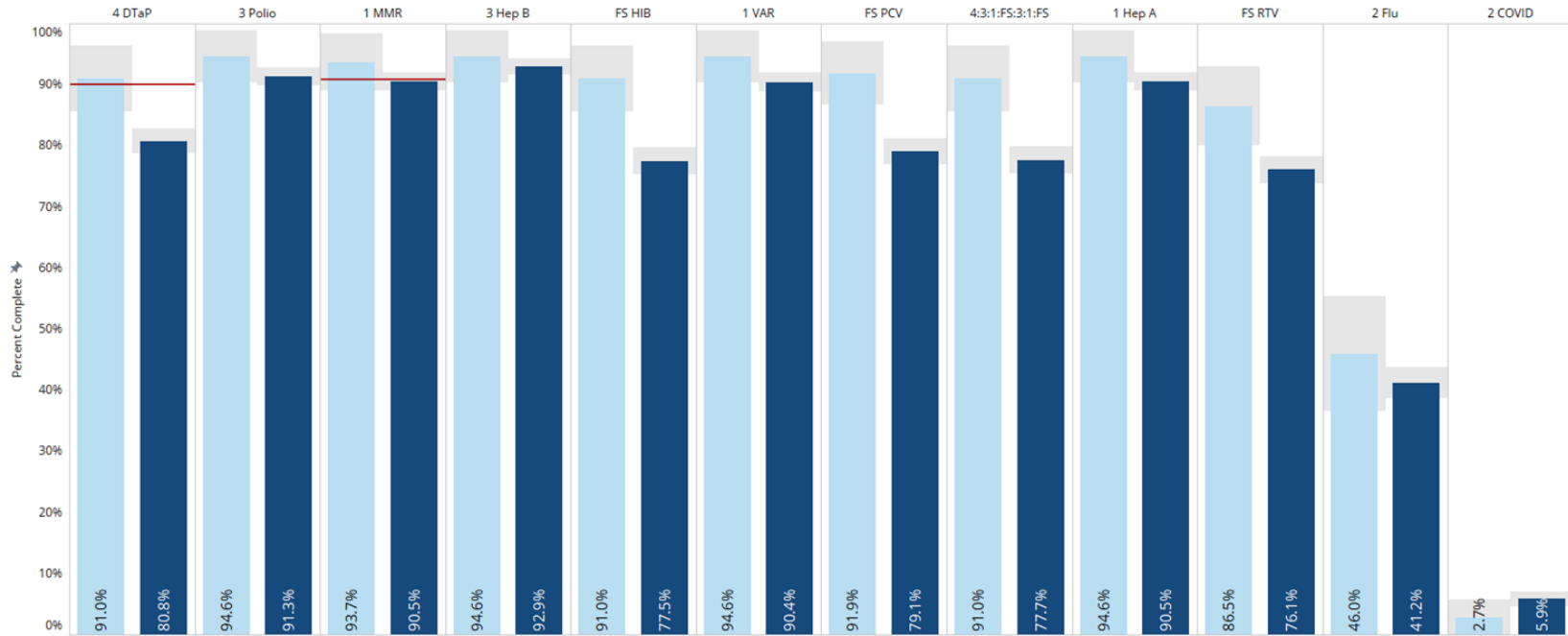


Figure B. NER Survey Results, by Vaccine Antigen, 2023

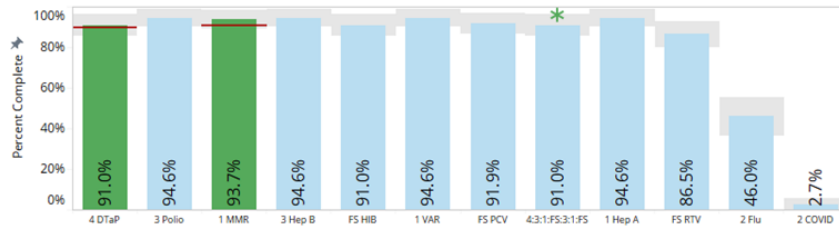
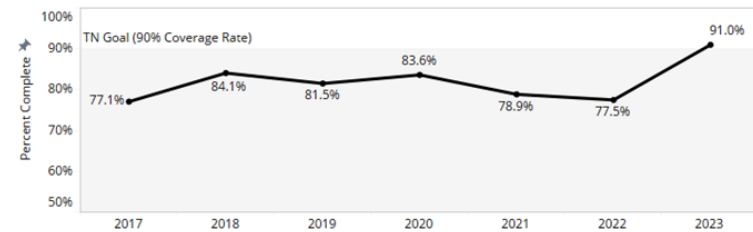


Figure C. UTD Immunization Rate Trend, NER, 2017-2023



Legend			
■ Region Rate	■ Met Healthy People 2030 Objective	* Significantly Higher than Previous Year	
■ Tennessee Rate	■ 95% Confidence Interval	* Significantly Lower than Previous Year	

Notes
Up-to-Date (UTD) status is defined as the completion of all immunizations and subsequent doses that comprise the Full Series (4:3:1:FS:3:1:FS): 4 DTaP, 3 Polio, 1 MMR, FS (3/4) Hib, 3 Hepatitis B, 1 Varicella, and FS (3/4) PCV administered before or after 24 months of age. Immunization status is based on the childhood immunization and catch-up schedules recommended by the ACIP.



Sullivan County Region
24-Month-Old Immunization Status Survey, 2023

Figure A. Comparison of SUL and Tennessee UTD Rate by Vaccine Antigen, 2023

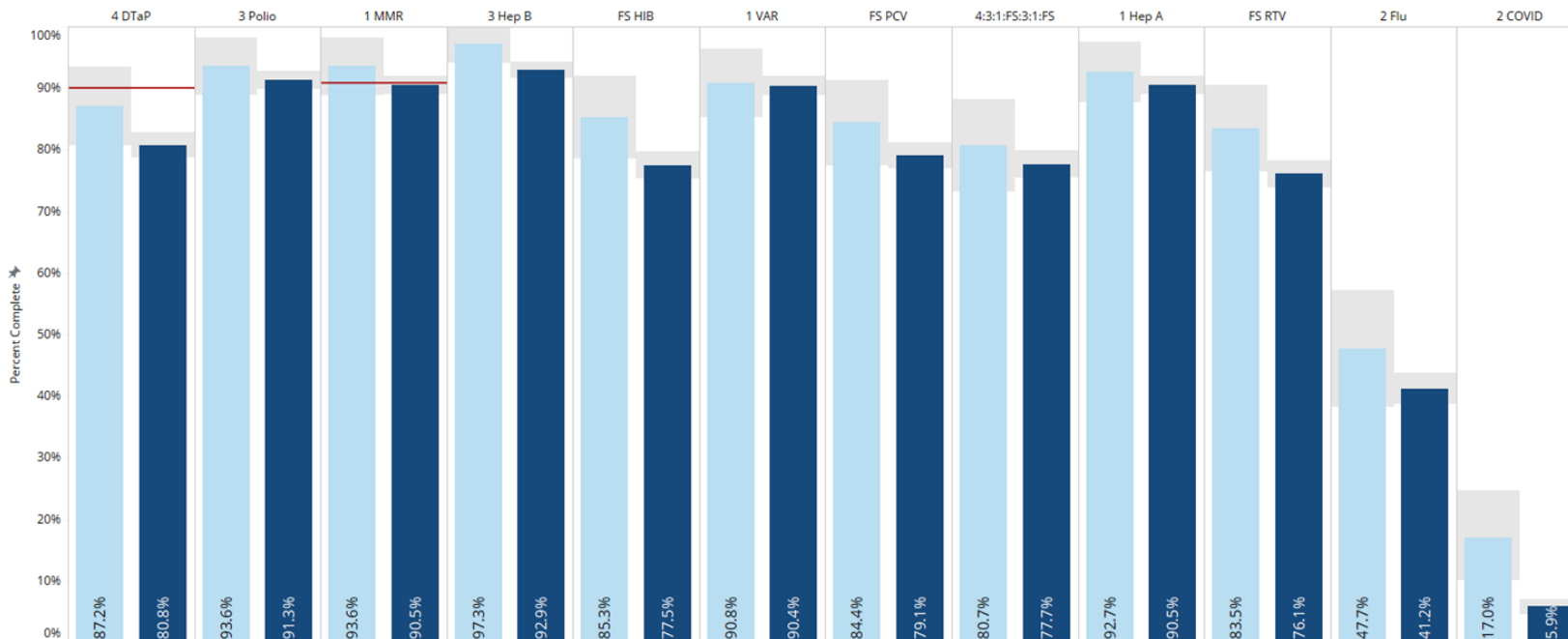


Figure B. SUL Survey Results, by Vaccine Antigen, 2023

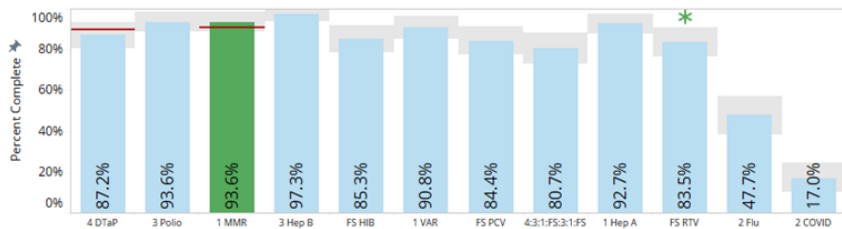
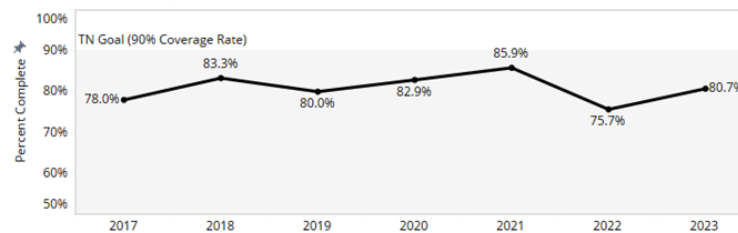


Figure C. UTD Immunization Rate Trend, SUL, 2017-2023

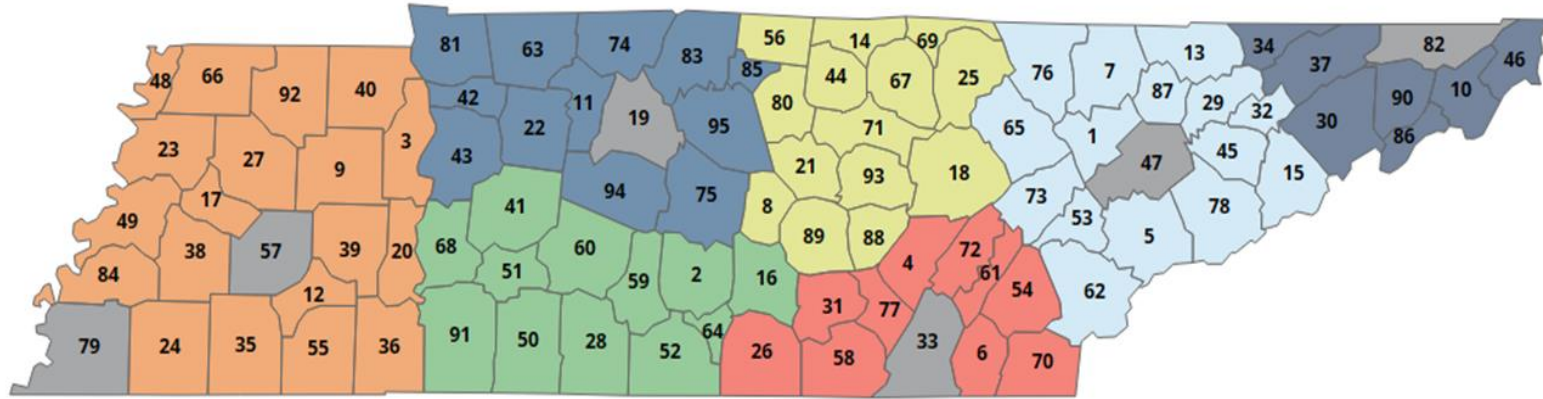


Legend			
■ Region Rate	■ Met Healthy People 2030 Objective	★ Significantly Higher than Previous Year	
■ Tennessee Rate	■ 95% Confidence Interval	★ Significantly Lower than Previous Year	

Notes
Up-to-Date (UTD) status is defined as the completion of all immunizations and subsequent doses that comprise the Full Series (4:3:1:FS:3:1:FS): 4 DTaP, 3 Polio, 1 MMR, FS (3/4) Hib, 3 Hepatitis B, 1 Varicella, and FS (3/4) PCV administered before or after 24 months of age. Immunization status is based on the childhood immunization and catch-up schedules recommended by the ACIP.

Appendix IV

Tennessee Rural and Metro Health Department Regions



West Tennessee Region (WTR)	
Benton	3
Carroll	9
Chester	12
Crockett	17
Decatur	20
Dyer	23
Fayette	24
Gibson	27
Hardeman	35
Hardin	36
Haywood	38
Henderson	39
Henry	40
Lake	48
Lauderdale	49
McNairy	55
Obion	66
Tipton	84
Weakley	92

Mid-Cumberland Region (MCR)	
Cheatham	11
Dickson	22
Houston	42
Humphreys	43
Montgomery	63
Robertson	74
Rutherford	75
Stewart	81
Sumner	83
Trousdale	85
Williamson	94
Wilson	95

South Central Region (SCR)	
Bedford	2
Coffee	16
Giles	28
Hickman	41
Lawrence	50
Lewis	51
Lincoln	52
Marshall	59
Maury	60
Moore	64
Perry	68
Wayne	91

Southeast Region (SER)	
Bledsoe	4
Bradley	6
Franklin	26
Grundy	31
Marion	58
McMinn	54
Meigs	61
Polk	70
Rhea	72
Sequatchie	77

Upper Cumberland Region (UCR)	
Cannon	8
Clay	14
Cumberland	18
DeKalb	21
Fentress	25
Jackson	44
Macon	56
Overton	67
Pickett	69
Putnam	71
Smith	80
Van Buren	88
Warren	89
White	93

East Tennessee Region (ETR)	
Anderson	1
Blount	5
Campbell	7
Claiborne	13
Cocke	15
Grainger	29
Hamblen	32
Jefferson	45
Loudon	53
Monroe	62
Morgan	65
Roane	73
Scott	76
Sevier	78
Union	87

Northeast Region (NER)	
Carter	10
Greene	30
Hancock	34
Hawkins	37
Johnson	46
Unicoi	86
Washington	90

Metro Regions (MSR, JMR, NDR, CHR, KKR, SUL)	
Davidson	19
Hamilton	33
Knox	47
Madison	57
Shelby	79
Sullivan	82

