

# **Results of the 2012 Immunization Status Survey of 24-Month-Old Children in Tennessee**

**Prepared by the  
Tennessee Immunization Program  
Tennessee Department of Health  
<http://health.state.tn.us/CEDS/immunization.htm>  
Phone: 615-741-7247  
December 2012**

# Table of Contents

	<b>Page</b>
<b>Definitions of Abbreviations in Charts</b>	<b>... 3</b>
<b>General Information and Results</b>	<b>... 4</b>
Figure 1. Statewide percentage of children with age-appropriate immunization levels by vaccine	... 7
Figure 2. Percentage of children with on-time 4:3:1:3:3:1:4 immunization by region	... 8
Figure 3. Statewide percentage of age-appropriate vaccinations by vaccine, 2011 and 2012	... 9
Figure 4. 4:3:1:3:3:1:4 and 4:3:1:3:3:1 Immunization Level Trends: Tennessee 2000 to 2012	... 10
Figure 5a. Percentage of children with birth dose of hepatitis B vaccine by third day of life by region	... 10
Figure 5b. Percentage of children with birth dose of hepatitis B vaccine, 2011 and 2012	... 11
Figure 6. Statewide percentage of children with age-appropriate immunization levels by vaccine and race	... 12
Table 1. 4:3:1:3:3:1:4 Completion Levels of 24-Month-Old Children: Selected Characteristics	... 13
Figure 7. Source of Immunizations from 2000 to 2012	... 14
Table 2. Prevalence of risk factors for delayed immunizations by provider type	... 14
Summary of Key Findings and Next Steps	... 15
<b>Appendix 1</b>	
Details of Regional Samples (oversampled, vaccine refusal, child not located)	... 17
<b>Appendix 2: Vaccine Series and Individual Vaccine Charts</b>	<b>... 18</b>
On-time 4:3:1:3:3:1 immunization by region	... 19
4:3:1:3:3:1 and 4:3:1:3:3:1:4 vaccine series	... 19
DTaP (4-dose and 3-dose coverage)	... 20
<i>Haemophilus influenzae</i> type b & Hepatitis A (1-dose coverage)	... 21
Hepatitis A (2-dose coverage) & Hepatitis B	... 22
Influenza (2-dose and 3-dose coverage)	... 23
MMR & Pneumococcus (4-dose coverage)	... 24
Pneumococcus (PCV) (4-dose vs. 3-dose coverage) & Polio	... 25
Rotavirus & Varicella	... 26
<b>Appendix 3: Individual Health Department Region Charts (West→East)</b>	<b>... 27</b>
Shelby County	... 28
West Tennessee Region	... 28
Jackson-Madison County	... 29
South Central Region	... 29
Mid-Cumberland Region	... 30
Nashville-Davidson County	... 30
Upper Cumberland Region	... 31
Southeast Region	... 31
Hamilton County	... 32
East Tennessee Region	... 32
Knoxville-Knox County	... 33
Northeast Region	... 33
Sullivan County	... 34
<b>Appendix 4: Additional Statewide Charts for Specific Groups</b>	<b>... 35</b>
Immunization levels by vaccine and TennCare enrollment status	... 36
Immunization levels by vaccine and WIC enrollment status	... 36
Trends in on-time immunization coverage disparities (black vs. white) for 2010-2012	... 37
<b>Appendix 5: Data Tables for Selected Analyses</b>	<b>... 38</b>
Series Complete (4:3:1:3:3:1:4)	... 39
Series Complete (4:3:1:3:3:1:4) by Provider Type	... 39
Series Complete (4:3:1:3:3:1:4) by Race	... 40
Series Complete (4:3:1:3:3:1:4) by Number of Older Siblings	... 40
Series Complete (4:3:1:3:3:1:4) by TennCare Enrollment	... 41
<b>Appendix 6: Regional Health Department Map</b>	<b>... 42</b>

## Definitions of Abbreviations in Charts

### 1. Vaccines

- a. **DTaP:** diphtheria, tetanus, acellular pertussis
- b. **IPV:** inactivated polio vaccine
- c. **HAV:** hepatitis A vaccine
- d. **HBV:** hepatitis B vaccine
- e. **HIB:** *Haemophilus influenzae*, type B vaccine
- f. **MMR:** measles, mumps, rubella
- g. **VAR:** varicella (chickenpox) vaccine
- h. **PCV:** pneumococcal conjugate vaccine
- i. **FLU:** influenza vaccine
- j. **HAV:** hepatitis A vaccine
- k. **RTV:** rotavirus vaccine

### 2. Public Health Regions

- a. **Rural, multi-county regions**
  - i. **NER:** Northeast Region
  - ii. **ETR:** East Tennessee Region
  - iii. **SER:** Southeast Region
  - iv. **UCR:** Upper Cumberland Region
  - v. **SCR:** South Central Region
  - vi. **MCR:** Mid-Cumberland Region
  - vii. **WTR:** West Tennessee Region
- b. **Metropolitan, single county regions**
  - i. **SUL:** Sullivan County
  - ii. **KKR:** Knoxville-Knox County
  - iii. **HAM:** Hamilton County (Chattanooga area)
  - iv. **NDR:** Nashville-Davidson County
  - v. **JMR:** Jackson-Madison County
  - vi. **SBY:** Shelby County (Memphis area)

# Results of the 2012 Immunization Status Survey

## Of 24-Month-Old Children in Tennessee

### General:

An annual survey of the immunization status of 24 month old children is conducted by the Tennessee Department of Health's (TDH) Immunization Program (TIP) to track progress toward achieving at least 90% on-time immunization with each routinely recommended vaccine for that population. The survey is composed of random, statistically-valid samples drawn from birth certificates of infants born in each of the 13 health department regions. Regional samples are aggregated to give statewide statistics on immunization coverage levels in Tennessee.

### *Introduction:*

This survey assesses the immunization status of Tennessee's young children for each of 10 vaccines, protecting against the following 14 diseases: diphtheria, tetanus, pertussis, (combined as DTaP); poliomyelitis (IPV); measles, mumps, rubella (combined as MMR); *Haemophilus influenzae* type B (HIB); hepatitis B (HBV); varicella (VAR); certain strains of pneumococcus (PCV); hepatitis A (HAV); rotavirus (RTV) and influenza (FLU).

This survey uses the same vaccine series definitions for its population as the Centers for Disease Control and Prevention (CDC) National Immunization Survey (NIS), which assesses 19-35 month old children. Beginning in 2010, the CDC added complete PCV vaccination (4 doses) to the aggregate immunization coverage rate it reports from the NIS. Thus, complete immunization in the 2012 survey is defined as having received four doses of DTaP, three doses of IPV, one dose of MMR, three doses of HIB, three doses of HBV, one dose of VAR and four doses of PCV (abbreviated hereafter as the **4:3:1:3:3:1:4** series). Tennessee surveys conducted from 2002-2009 reported coverage rates for the **4:3:1:3:3:1** series, excluding PCV.

Recommended vaccines not included in the 4:3:1:3:3:1:4 series are reported individually. Influenza vaccine (FLU) is considered complete with 2 or more doses. Hepatitis A vaccine (HAV) is complete with 2 doses; however, the recommended dose spacing of 6-18 months means that children who have 1 dose by the second birthday are not behind schedule. For this reason, this survey reports children as up to date with 1 dose of HAV. Rotavirus vaccine (RTV) is considered complete with at least 2 doses because this survey does not capture the brand of vaccine given (one rotavirus vaccine requires 2 doses and the other requires 3 doses). Coverage levels are typically lower for these vaccines because they are more recent additions to the routine immunization schedule.

### *Healthy People 2020 objectives*

Healthy People (HP) 2020 objectives are established by the federal Department of Health and Human Services (HHS) to provide national targets for population health: these objectives include vaccine coverage levels among children 19-35 months of age and are tracked nationally through the NIS. TDH aims to reach or exceed each of these. The following objectives for the percentage of children immunized by 19-35 months of age have been established by HP 2020: 80% complete the 4:3:1:3:3:1:4 series; 90% complete each individual vaccine included in the 4:3:1:3:3:1:4 series; 60% complete hepatitis A vaccination; 80% complete rotavirus vaccination with 2 or more doses; and 80% appropriately immunized against influenza. In addition to these objectives, HP 2020 objectives also include having 85% of all children receive their first dose of hepatitis B vaccine within 3 days of life.

### *The 2012 sample population:*

The 2012 statewide sample consisted of 1,591 children born in the first quarter of 2010 (January, February and March). Oversampling for black children was done in each region where the random sample contained fewer black children than the actual proportion of black children born in the first quarter of 2010 in that region. The oversampled records (n=19 of the 1,591) were included only in the state-level analysis of black-white racial disparities; one of these was excluded because the child had moved out of state and one because the parents decided not to participate, leaving 17 oversampled records in the final racial analysis. Of the 1,591 children in the primary sample, 143 were excluded from the analysis for one of the following reasons: parents refused to participate (n=26), the child had moved out of state (n = 112), the child had been adopted, in foster care or was in state custody (n=4) or the child had died (n=1). After exclusions, 1,431 children remained in the primary sample (1,431 + 17 =1,448 total records). See

Appendix 1 for a table showing details by region of numbers of children who refused vaccines, children who could not be located and the number of oversampled records used for racial disparity assessment in each region.

***Unable to locate:***

Of the 1,448 total children, 4 children could not be located or confirmed as having left the state. By protocol, these children are included in the analysis with any immunization records in the state immunization registry: all 4 had incomplete immunization information in the registry. See Appendix 1 for the regions of residence of these children.

***Vaccine refusal:***

Of the 1,448 children, 25 children with no immunizations (1.7%) had parents who confirmed that they refused vaccine for religious, philosophical or medical reasons. Parents of the 25 children who had received zero immunizations cited religious (n=12) or personal philosophical (n=13) reasons for not vaccinating their child; none reported medical reasons for not vaccinating their child. Four additional children received only one dose of vaccine: two cited philosophical objections; one a religious reason, and one other did not give a reason. These children impacted regional coverage rates to different degrees: 7 regions had 0-1 children refuse vaccination, while one region had 7 children refuse vaccination. The rural South Central Region is home to some religious communities that traditionally avoid vaccination. See Appendix 1 for details of the number of unvaccinated children in each regional sample.

***Statistical notes:***

The survey is designed to allow valid statistical comparisons of the populations in each of the 13 health department regions; however, the sample size in a given region is too small to yield interpretable results at the county level within multi-county rural health department regions or to permit comparisons among subpopulations within a region.

Ninety-five percent confidence intervals (CI) were calculated and are displayed as whisker plots on graphs in this report to permit readers to visualize the statistical significance (or absence of significance) of differences in point estimates. Confidence intervals that do not overlap indicate that the point-estimate differences being compared have at least a 95% chance of representing true differences in the populations being compared. If CIs overlap, then differences are not considered statistically significant differences. CIs were not calculated for surveys before 2007.

***Minimum intervals:***

On-time immunization classification in this survey may overestimate appropriate immunization because analysis does not take into account whether dose intervals or ages meet CDC recommendations. Historically, minimum intervals were not considered in previous surveys: to add these criteria would limit the ability to compare current and past survey results.

**Additional information on specific vaccines:**

***Hepatitis B vaccine (HBV) birth dose***

This report includes information about the proportion of children receiving a birth dose of hepatitis B vaccine (given within 3 days of life). Widespread adoption of a routine birth dose in hospitals is a key strategy in national efforts to eliminate transmission of hepatitis B virus in the United States. These rates reflect the policies and practices of the delivery hospitals in each region. Data are provided in Figure 3.

***Influenza vaccine (FLU)***

Children born in the first quarter of 2010 who received every influenza vaccine on time could have received 3 doses of seasonal influenza vaccine; however, the numbers of children who received 3 doses are very small and CDC has not yet begun to include this vaccine in the NIS national report, so a national standard for measurement of completeness is not yet routinely used. This survey reports the percentage of children who received at least 2 doses of seasonal influenza vaccine by their second birthday.

***Haemophilus influenzae type B vaccine (HIB)***

Two different HIB schedules exist, depending upon the HIB formulation used. The Merck product requires a 2-dose primary series with a booster dose after the first birthday (total of 3 doses); the Sanofi Pasteur product requires a 3-dose primary series, with a booster dose after the first birthday (total of 4 doses). Because brand names are not captured in this survey, children with at least 3 doses have been classified as complete, with the acknowledgement that this may misclassify as complete some children who received only three doses of the 4-dose product.

***Rotavirus vaccine (RTV)***

The 2010 survey was the first to report coverage with the oral rotavirus vaccine (RTV), first licensed and recommended in 2006. Like HIB, 2 different brands are available with different dose schedules. Rotateq<sup>®</sup> (Merck), requires 3 doses, typically given at 2, 4, and 6 months; Rotarix<sup>®</sup> (GSK, licensed early 2009) requires 2 doses, typically given at 2 and 4 months. RTV is unique among vaccines because the series must be initiated no later than 15 weeks of life and no doses should be given after a child turns 8 months old. Because brand names of doses administered are not collected, children who received at least 2 doses of RTV are classified as complete.

**Statewide Results and Trend Analysis:**

***Vaccine specific on-time immunization coverage***

The proportion of children in the survey fully immunized on-time for each vaccine is in Figure 1 below. The HP 2020 objective of 90% on time coverage was exceeded for 5 out of 7 vaccines in the 4:3:1:3:3:1:4 series. Two vaccines requiring 4 doses, DTaP and PCV, failed to reach 90%; however, this target is within reach, as the percentages of children who had received 3 or more doses were 95.2% for DTaP and 93.9% for PCV (Appendix 2).

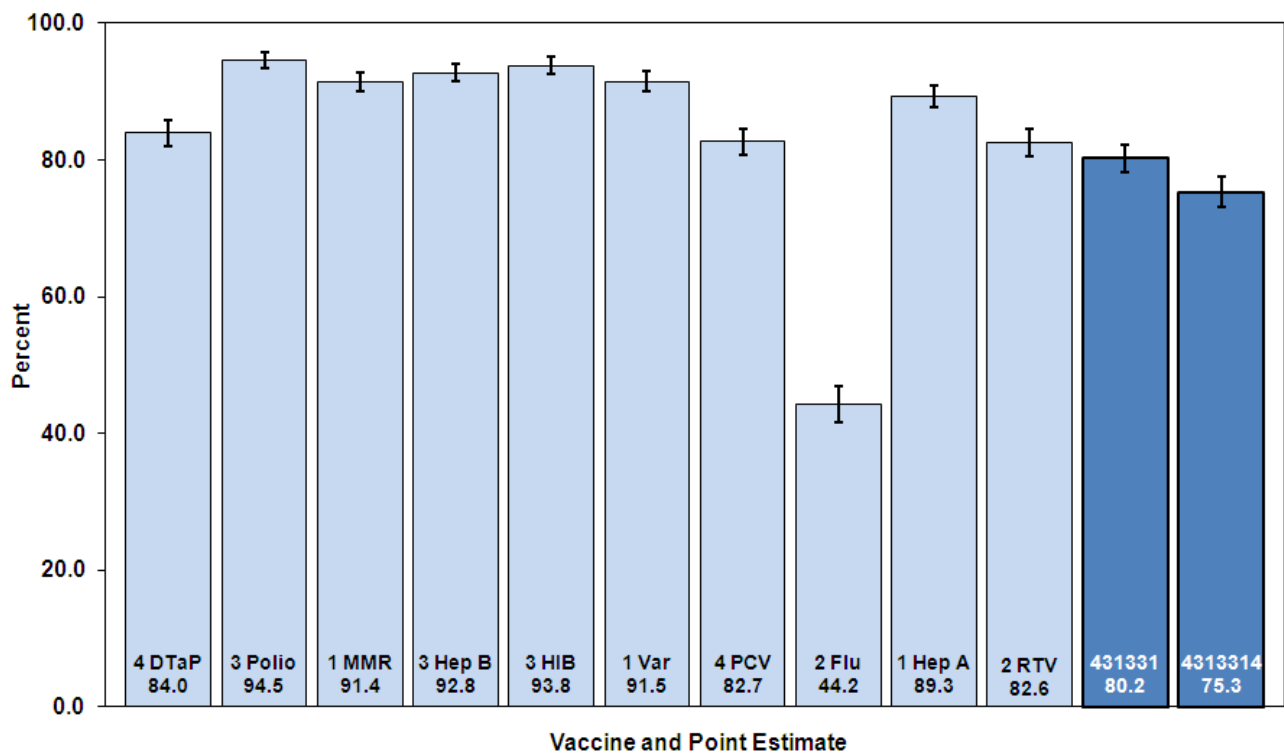
For the second year, the HP 2020 objective of 80% coverage with 2 or more doses of rotavirus vaccine was exceeded: 82.6% of children had at least 2 doses of RTV. For HAV, 57.7% of children had completed the 2 dose series by the second birthday (HP 2020 objective is 60% completion by 35 months of age) and 89.3% were up to date, having had the first dose and on track to complete the series within the recommended 6 to 18 months later. Influenza vaccination rates remain unchanged from 2011 and the lowest of all recommended vaccines.

The HP 2020 objective for achieving 80% completion of the 4:3:1:3:3:1 vaccine series was met at 80.2%. However, when including the PCV vaccine for the 4:3:1:3:3:1:4 vaccine series, Tennessee achieved 75.3% coverage, short of the 80% targeted completion rate for HP 2020. The series completion rates are driven by the lower rates of completion of 4-dose vaccines: DTaP and PCV. See Figure 4 for trends in these series completion rates over time.

Appendix 2 of this report contains charts of on-time immunization coverage rates in each region for each vaccine.

**Figure 1**

**2012 Immunization Status of 24-Month-Old Children in Tennessee:  
Statewide percentage of children with age-appropriate immunization levels by vaccine  
(point estimates and 95% confidence intervals, n=1431)**



**Complete immunization levels statewide and by public health region**

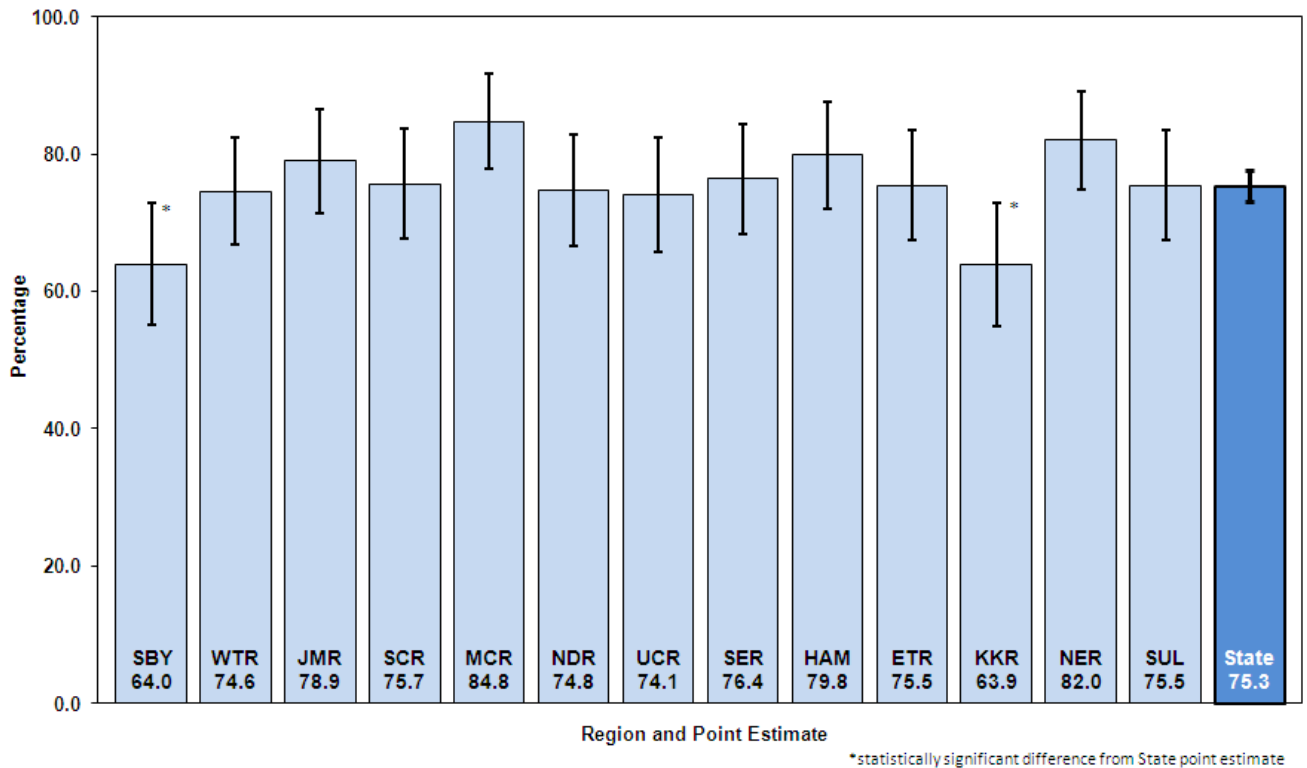
The percentage of children immunized on time with all vaccines in 4:3:1:3:3:1:4 series, statewide and in each public health region, is shown in Figure 2. The results of the limited 4:3:1:3:3:1 series are available in appendix 2. Statewide complete coverage reached 75.3% (95% CI: 73.1-77.6%). The point estimates in two regions (Mid-Cumberland [MCR] and Northeast [NER]) exceeded the HP 2020 objective of 80% coverage. No regional coverage estimate was statistically significantly higher than the state as a whole, but two regions were significantly lower (Shelby County [SBY] and Knoxville-Knox County [KKR]).

Figure 3 compares the statewide coverage rates measured in 2011 and 2012: no significant changes are noted.

Appendix 3 of this report contains charts for each public health region displaying the percentage of children in each region who were immunized on-time for each of the vaccines and for the 4:3:1:3:3:1:4 complete series.

**Figure 2**

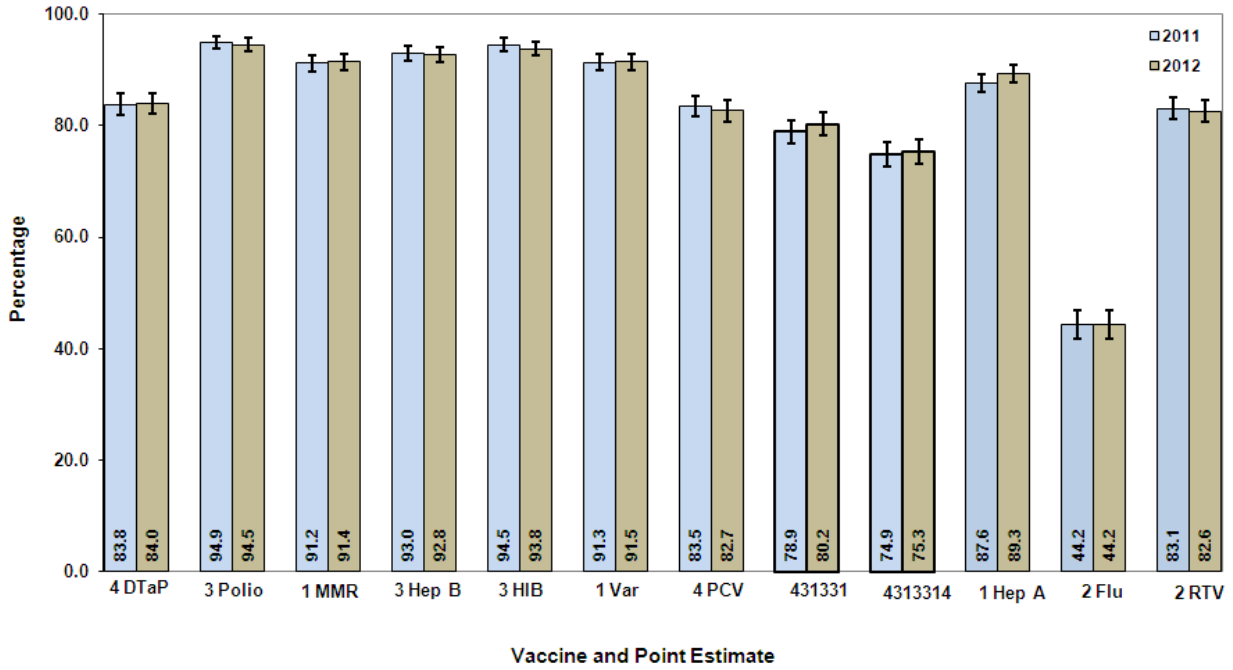
**2012 Immunization Status Survey of 24-Month-Old Children in Tennessee:  
Percentage of 24-month-old children with on-time immunization (4:3:1:3:3:1:4)  
by health department region  
(point estimates and 95% confidence intervals, n=1431)**





**Figure 3**

**2012 Immunization Status of 24-Month-Old Children in Tennessee:  
Statewide percentage of children with age-appropriate immunization levels  
by vaccine in 2011 and 2012**  
(point estimates and 95% confidence intervals, 2011 n=1465, 2012 n=1431)

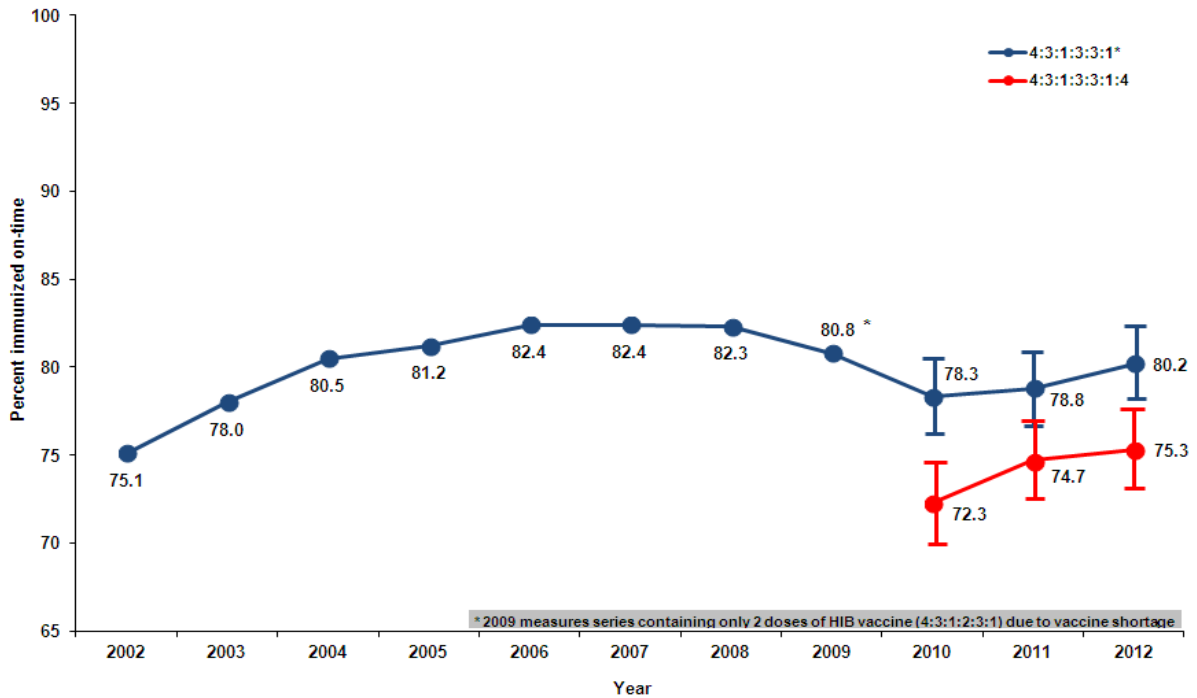


*Series completion trends over time*

Figure 4 below shows the trend over time of the 4:3:1:3:3:1 series completion rate from 2002 to 2012, as well as the 4:3:1:3:3:1:4 completion rate from 2010 to 2012.

**Figure 4**

**2012 Immunization Status Survey of 24-Month-Old Children in Tennessee:  
4:3:1:3:3:1\* and 4:3:1:3:3:1:4 Immunization Level Trends: Tennessee 2002 to 2012**  
(point estimates and 95% confidence interval, n=1431)



## Hepatitis B birth dose

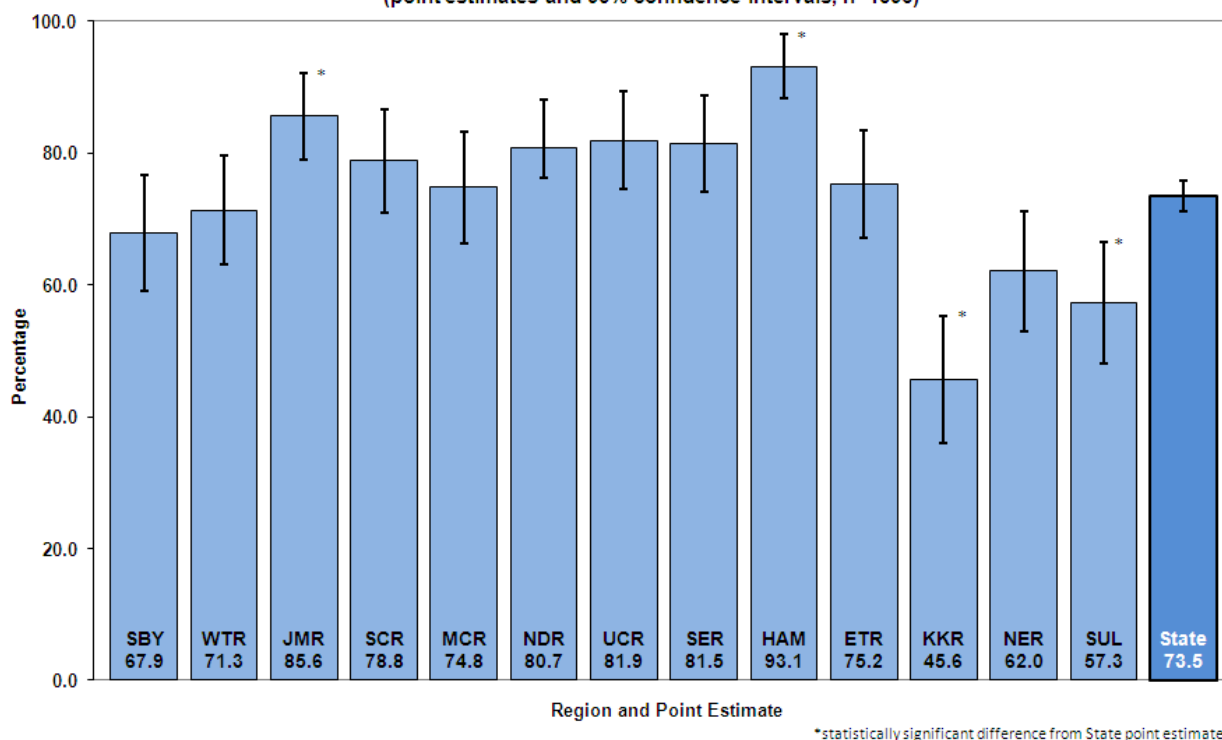
Figure 5 shows the percentage of children assessed in each region who received a birth dose of hepatitis B vaccine (a dose given by day 3 of life). Without intervention, the risk of hepatitis B infection of infants born to infected women is up to 70%. About 90% of infected infants go on to develop chronic infection, leading to liver damage, cirrhosis or liver cancer later in life. The risk of transmission can be reduced by about 95% by administering a dose of HBV vaccine and immunoglobulin within 12 hours of life to infants born to mothers known to be infected. Infants born to mothers of unknown status are recommended to receive vaccine within 12 hours. To ensure no at-risk child is missed, the CDC recommends that all other newborns be vaccinated before discharge. This birth dose can help protect the neonate if the mother's infection is not detected by laboratory tests or if the newborn experiences another type of perinatal exposure to the virus.

The CDC recommends strict adherence to a birth dose policy: “in rare circumstances, the first dose may be delayed until after hospital discharge for an infant who weighs >2,000 g and whose mother is HbsAg [hepatitis B surface antigen] negative, but only if a physician's order to withhold the birth dose and a copy of the mother's original HbsAg-negative laboratory report are documented in the infant's medical record.” For details, see Table 3 in the CDC's 2005 Comprehensive Immunization Strategy to Eliminate Transmission of Hepatitis B Virus Infection in the United States,” available at <http://www.cdc.gov/mmwr/PDF/rr/rr5416.pdf>.

The HP 2020 objective is for 85% of infants to receive a birth dose of hepatitis B vaccine. The comparison of Tennessee rates in 2011 and 2012 reveal significant improvements in one year. The most recent national birth dose (up to day 3 of life) coverage rate is 68.6% (95% CI: +/- 1.3%), from the 2011 NIS reported in September 2012 at [http://www.cdc.gov/vaccines/stats-surv/nis/data/tables\\_2011.htm](http://www.cdc.gov/vaccines/stats-surv/nis/data/tables_2011.htm). The 2012 TDH 24 month old survey documented a rate of 73.5% (95% CI: +/- 2.3%). Ten of 13 public health regions reported increases in coverage; three point estimates were significantly higher than the state measurement for 2011. Because birth doses are administered at the delivery hospital, differences in hospital policies and protocols for administering the birth dose may account for regional variations in birth dose coverage.

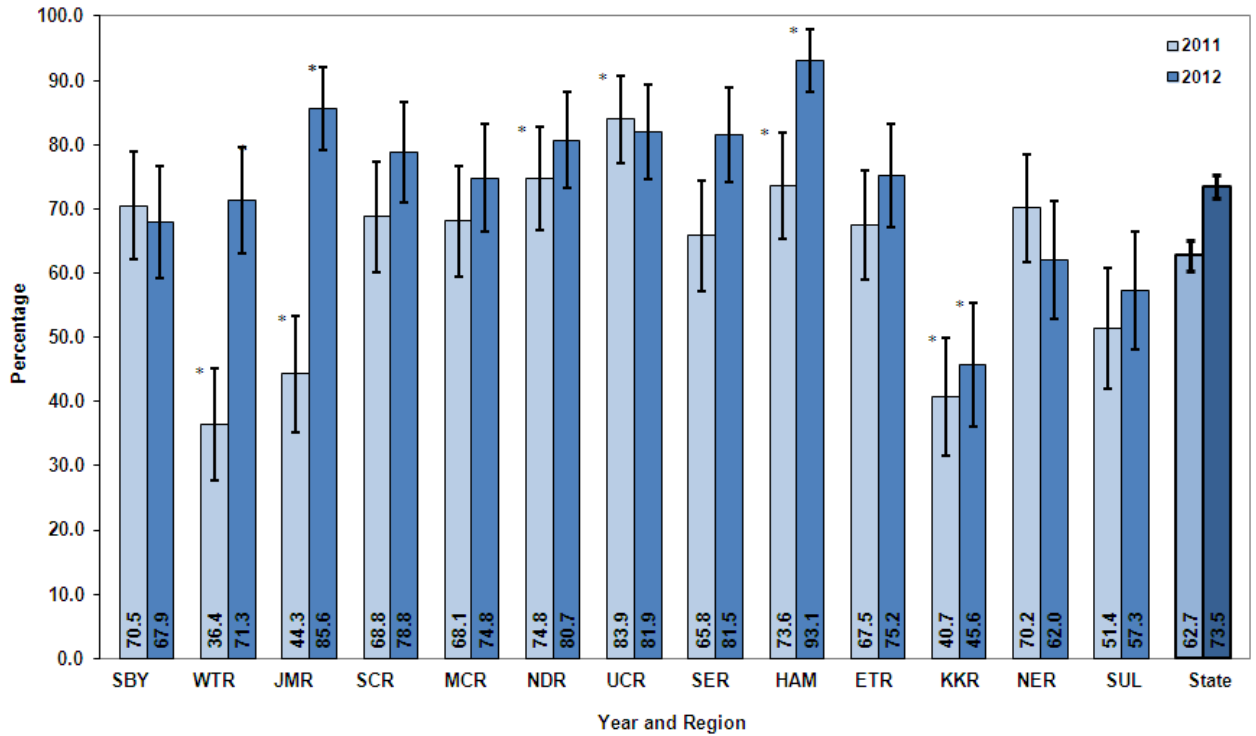
**Figure 5a**

**2012 Immunization Status Survey of 24-Month-Old Children in Tennessee:  
Percentage of children with birth dose of Hepatitis B (HBV) by third day of life  
by health department region  
(point estimates and 95% confidence intervals, n=1396)**



**Figure 5b**

**2012 Immunization Status Survey of 24-Month-Old Children in Tennessee:  
Percentage of children with birth dose of Hepatitis B (HBV) by third day of life  
by health department region in 2011 and 2012  
(point estimates and 95% confidence intervals)**



\*statistically significant difference from State point estimate

**Racial disparities**

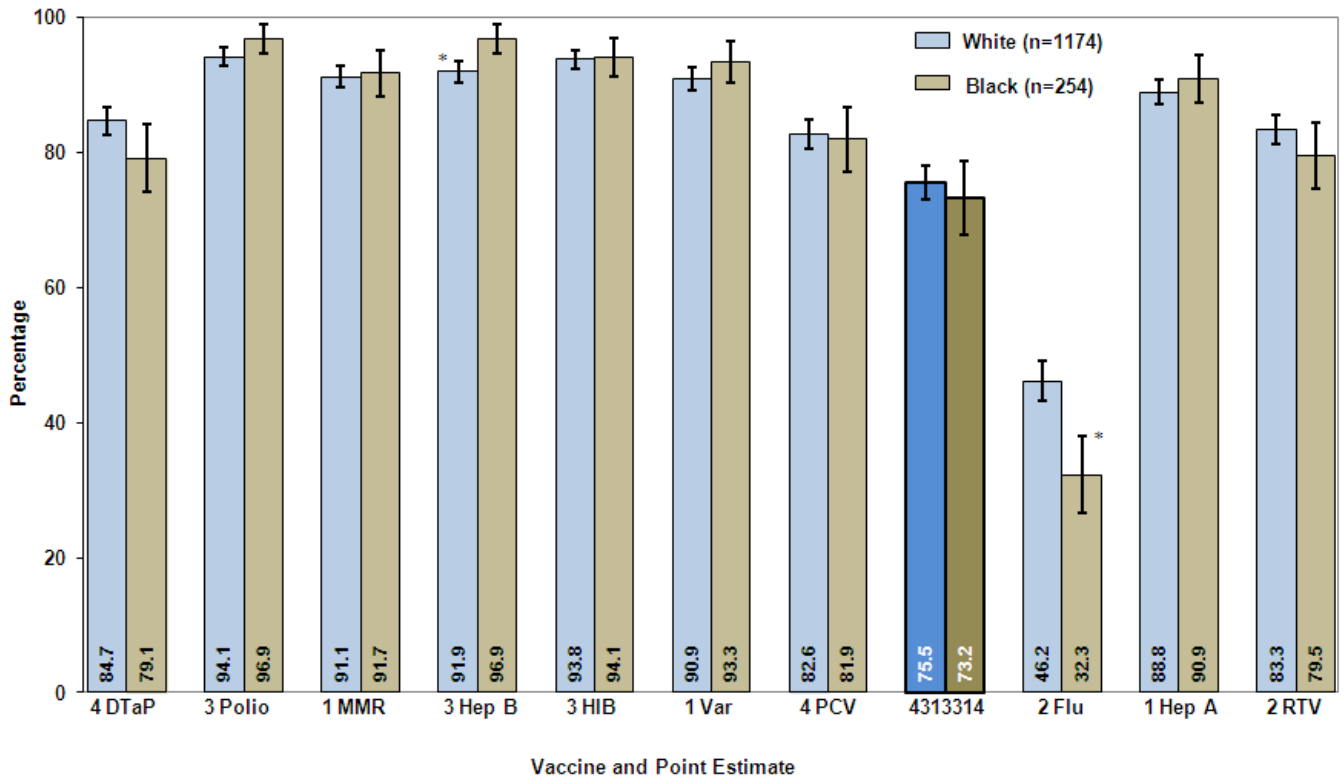
The differences measured between black and white children in on-time completion of the routine vaccine series have been small or statistically insignificant in recent years. This year the comparison was made between black (n = 254) and white (n=1,174) children. Because of small numbers, children of other races (n=20) are excluded from this analysis.

The statistically significant difference detected in the 2011 survey between black and white children in the 4:3:1:3:3:1:4 series was not present in this year’s analysis. Both black and white children exceeded the 90% coverage targets for 5 of the 7 vaccines in the series, and both fell short in the DTaP and PCV vaccines. A comparison of the trends in on-time 4:3:1:3:3:1:4 series completion by race from 2010-2012 can be found in Appendix 4. Figure 6 shows the rates of on-time immunization of black and white children for each vaccine assessed.

In 2012, the racial disparity in influenza vaccine coverage narrowed slightly from 16.7% in 2011 to 13.9% in 2012. The overall coverage rates for influenza vaccine were unchanged at 44.2% from 2011. The large racial disparity in influenza coverage rates has been relatively consistent since influenza vaccine was first assessed in this survey in 2008. The narrowing of the gap this year is due to a slight rise in coverage among blacks and a slight drop in coverage among white children.

**Figure 6**

**2012 Immunization Status of 24-Month-Old Children in Tennessee: Statewide percentage of children with age-appropriate immunization levels by vaccine and race (point estimates and 95% confidence intervals)**



\* statistically significant difference

### ***Immunization among selected sub-populations***

Certain risk factors consistently are associated with failure to complete the recommended series of immunizations on time, such as starting routine immunizations late (greater than 120 days of age), or having two or more siblings. In the past, racial disparities made black race an important risk factor, though race has become less predictive of late immunization, other than for influenza vaccination. Having more than one sibling or starting routine immunizations late remain characteristics most likely to result in not being immunized on time.

The survey examines other groups of interest, as well. The survey captures the immunization provider type (public, private or both), TennCare (Medicaid) participation, and enrollment in the Women, Infants and Children (WIC) nutrition program for each child in the survey. Because only a small number of children (98 of 1,407) received all their immunizations in health departments, the point estimate for public provider coverage has wide confidence intervals. Infants in WIC have immunization records reviewed at WIC visits. Since mid-2008, targeted education and telephone follow-up have been used as the primary tools used to encourage catch-up immunization of WIC infants.

Children who begin routine immunizations after 4 months (120 days) of age are at very high risk of failing to catch up and be fully immunized on time. The survey reports children who receive their first routine vaccination other than rotavirus or birth dose hepatitis B vaccine after 120 days of age: 43 children (3.0%) met these criteria. Table 1 below summarizes the 2012 on-time completion rates for 4:3:1:3:3:1:4 in these groups.

**Table 1**

<b>4:3:1:3:3:1:4 Completion Levels in the 2012 Survey of 24-Month-Old Children: Selected Characteristics</b>			
<b>Provider Type</b>	Public n=69/98	Private n=838/1081	Both n=171/228
	<b>70.4% ± 9.04</b>	<b>77.5% ± 2.49</b>	<b>75.0% ± 5.62</b>
<b>TennCare Enrollment</b>	Enrolled n=619/827	Not Enrolled n=459/604	
	<b>74.8% ± 2.96</b>	<b>74.2% ± 3.89</b>	
<b>WIC Enrollment</b>	Enrolled n=718/946	Not Enrolled n=374/498	
	<b>75.9% ± 2.73</b>	<b>75.1% ± 3.80</b>	
<b>Other Siblings</b>	None n=503/603	One n=346/476	Two or more n=229/351
	<b>83.4% ± 4.00</b>	<b>72.7% ± 4.98</b>	<b>65.2% ± 4.98</b>
<b>Age at First Immunization*</b>	≤120 days n=1076/1378	120 days n=14/43	
	<b>78.1% ± 2.18</b>	<b>32.6% ± 14.01</b>	

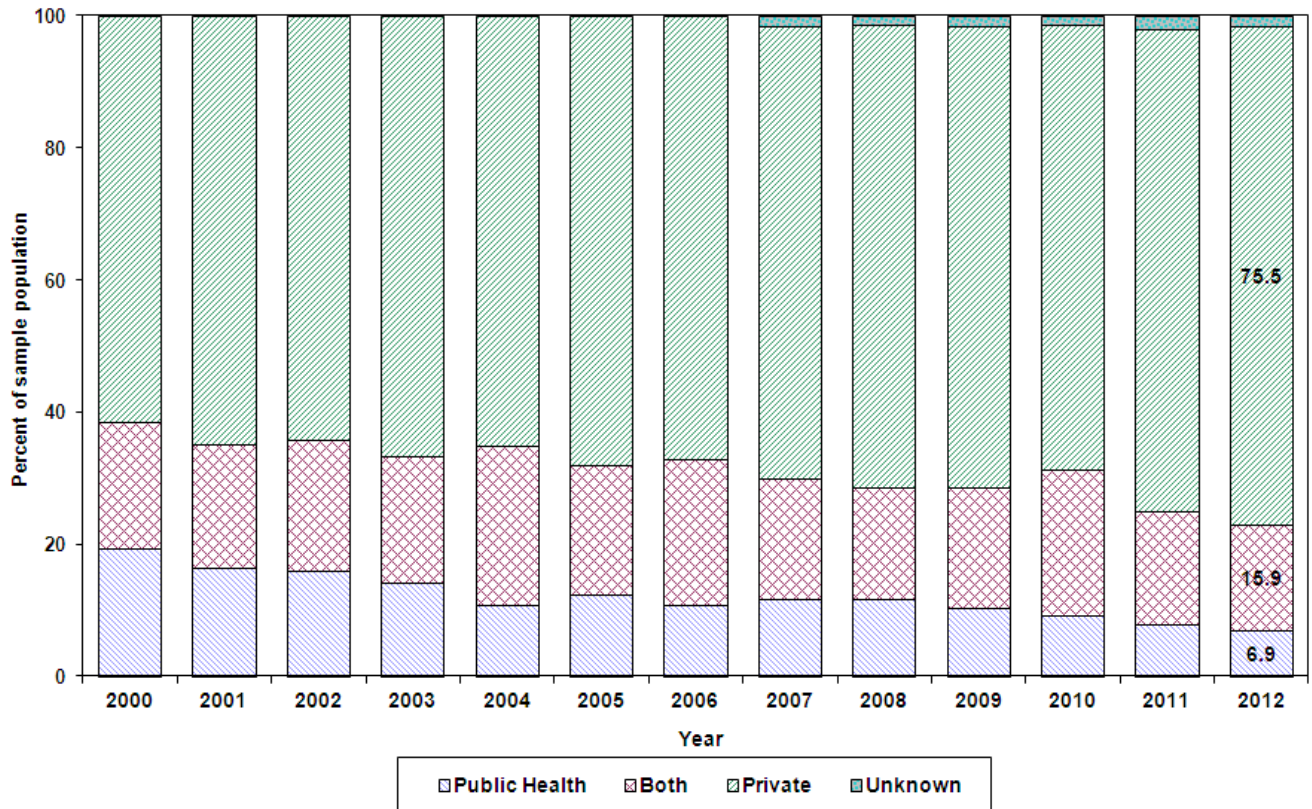
\*the first dose of a vaccine other than oral rotavirus vaccine or the birth dose of hepatitis B vaccine

### ***Immunization provider types and patient populations***

The proportion of children immunized in public health departments began to decline in the late 1990s after TennCare and the Vaccines for Children (VFC) Program enabled medically underserved children to receive immunizations in a private medical home. Of children in the 2012 survey, 75.5% were immunized exclusively in private clinic settings, 15.9% received immunizations in a combination of private and public health clinics, 6.9% received their immunizations exclusively at a public health department, and the setting was unknown for 1.7%. Figure 7 below shows the trends in these proportions over time.

**Figure 7**

**2012 Immunization Status Survey of 24-Month-Old Children in Tennessee:  
Source of Immunizations from 2000 to 2012 (n=1431)**



Although only a small number of children surveyed were immunized exclusively in public health clinics, those immunized in health departments have a higher prevalence of risk factors for failure to complete immunization. Table 2 shows the prevalence of risk factors for incomplete immunization among populations immunized in a public health department, private clinic or a combination of settings.

**Table 2**

<b>Prevalence of risk factors for delayed immunizations in the survey population by provider type</b>			
<b>Risk Factor</b>	<b>Health Department</b>	<b>Both Private and Public</b>	<b>Private Only</b>
Black (risk for influenza)	19.4% (19/98)	25.0% (57/228)	14.9% (161/1081)
2 or more siblings	36.7% (36/98)	28.5% (65/228)	22.0% (238/1080)
Age at first dose >120 days	5.1% (5/98)	2.2% (5/233)	0.7% (8/1090)
Any of above risk factors	49.0% (48/98)	45.6% (104/228)	33.8% (365/1081)

**Summary of Key Findings:**

1. Tennessee’s (TN) measurement against national Health People (HP) 2020 objectives for this age group:

Measurement	HP 2020 Objective (19-35 months)	TN 2012 (24 months)
Complete 4:3:1:3:3:1:4 series	80%	75.3%
Each vaccine in 4:3:1:3:3:1:4 (DTaP, IPV, MMR, Hib, HBV, VZV, PCV)	90% rate for each of the 7 vaccines	<b>Exceeded 90% for 5 of 7, except:</b> 4 doses of DTaP (84.0%) and 4 doses of PCV (82.7%)
3 doses DTaP and PCV	<i>None: this is a process measure</i>	3 DTaP (95.2%) and 3 PCV (93.9%) <i>[could reach goals by closing gap in 3 dose and 4 dose coverage]</i>
Hepatitis A vaccine	60% 2 doses by 35 months	57.7% 2 doses; 89.3% 1 dose
Influenza vaccine	80% appropriately immunized	44.2%
Rotavirus vaccine	80% with 2 doses	<b>82.6%</b>
Hepatitis B birth dose	85%	73.5%

2. The hepatitis B birth dose rate improved significantly from 62.7% to 73.5%, a major step toward the Healthy People 2020 target. Regional rates vary, but several regions made significant improvements in coverage from 2011 to 2012. This may reflect the implementation of stricter birth dose policies in delivery hospitals and wider acceptance of this routine recommendation among caregivers of neonates by early 2010, when the children in this survey population were born.
3. Influenza vaccine 2-dose coverage remains low and unchanged from 2011 at 44.2%. Although the gap between the state average and the public health regions in the western third of the state has narrowed over time, coverage rates in the three regions in the western part of the state remain significantly lower than the statewide coverage rate; two regions were significantly higher (see Appendix 2 for influenza coverage by region).
4. The significant racial disparity in influenza vaccine coverage between black and white children continues (32.3% vs. 46.2%). However, the statistically significant racial disparities in completion of these two vaccine series in 2011 were not present in 2012. There were no significant racial disparities in the aggregate 4:3:1:3:3:1:4 series rates.
5. Completion of the DTaP and pneumococcal four-dose series continues to be the primary barrier in Tennessee in achieving the Health People 2020 goal of 80% coverage for the 4:3:1:3:3:1:4 series for all children.
6. Children enrolled in TennCare and/or WIC had immunization rates for the 4:3:1:3:3:1:4 series equivalent to children never enrolled in these programs. For most individual vaccines (polio, MMR, varicella, HBV, and HAV), WIC enrollees had a significantly higher percentage of on-time coverage than children who were not enrolled in WIC; however, they had lower influenza coverage. Those receiving TennCare benefits also had lower influenza coverage rates than those not enrolled in TennCare.
7. Rotavirus vaccine coverage continues to exceed the national Healthy People 2020 goal of 80% coverage for the second year in a row. This is a notable contrast to the influenza vaccine coverage, which has been recommended for about the same period of time.

**Next Steps:**

The following steps should continue to improve on-time immunization of Tennessee children:

1. In late 2013, TDH plans to phase in a new immunization registry managed through a federal contract to be issued in 2013. The new registry will include new tools to help all immunization providers reduce missed opportunities to vaccinate children. A forecasting tool will display the vaccines due or overdue for a child when the child’s record is opened by the healthcare provider. A reminder/recall tool will enable the healthcare provider to generate for patients in his or her practice reminders of vaccination appointments and recall children behind on vaccines. Neither tool is available in the current registry; both have been shown to

improve immunization completion rates. These tools should be especially valuable in improving on-time rates of completion of DTaP and PCV.

2. In order to improve completion rates among children served by Tennessee health department clinics, TIP will continue to create monthly reports of children immunized in health departments aged 20-24 months whose immunization registry records show incomplete DTaP immunization. These reports are sent to key staff at regional health departments to facilitate active follow up of these children in order to complete all overdue immunizations.
3. In addition to forecasting and reminder/recall systems in the forthcoming immunization registry, TIP also will continue to emphasize in its education of private providers the importance of having a system to recall patients who have missed doses of vaccine, especially using DTaP and PCV as sentinel vaccines for tracking.
4. TIP will continue to encourage providers to give the third DTaP at 6 months of age so the fourth DTaP may be administered as soon as the 12-month visit. The risk of incomplete immunization goes up after the first birthday among children at risk for falling behind schedule.
5. 2010 state immunization requirements for complete pneumococcal vaccination and a dose of HAV for daycare attendance should continue to improve age-appropriate immunization with PCV and HAV. Since 2011, children starting Kindergarten have been required to have 2 doses of HAV.
6. TIP will continue to collaborate with healthcare providers willing to submit immunization records into the state immunization registry. Electronic data exchange has increased as a result of ongoing improvements in technology and Federal financial incentives, known as “Meaningful Use” grants from the Centers for Medicaid and Medicare Services (CMS), given to qualified healthcare providers. These grants require providers to move toward sharing immunization information with the state immunization registry.
7. TIP will share survey findings with WIC and TennCare leadership, highlighting influenza vaccine coverage.
8. Patients enrolled in WIC will continue to receive immunization education, reminder and follow-up phone calls. These remain important to assure that WIC infant immunization rates remain equivalent, or exceed, those of children who do not qualify for WIC.
9. TIP will continue to conduct the annual Immunization Spring Review, an educational conference free to all healthcare providers enrolled in the Vaccines for Children (VFC) program. It also continues other educational outreach, including site visits to the offices of VFC vaccine providers. All immunization providers should know risk factors for delayed immunization and the importance of reminder-recall systems to help families keep up with current immunization recommendations.
10. TIP staff located in each public health region will conduct site visits in 50% of VFC participating offices annually to evaluate compliance with VFC Program requirements and to provide vaccine education.



## Appendix 1

### 2012 Immunization Status Survey of 24-Month-Old Children in Tennessee

Details of Regional Samples: Oversampled Records, Vaccine Refusal and Children with Incomplete Records Who were Not Located

Region	Records analyzed <sup>1</sup> (oversampled) <sup>2</sup>	Total vaccine refusals	Reason given for refusing vaccine <sup>3</sup>			Total % Refusal	Children who could not be located <sup>4</sup>	Total % not located
			Religious	Philosophical	Medical			
Northeast TN	113 (2)	3	2	1	-	2.7%	0	-
East TN	111 (1)	2	1	1	-	1.8%	0	-
Southeast TN	111 (1)	1	1	-	-	0.9%	0	-
Upper Cumberland	108 (0)	2	1	1	-	1.9%	0	-
Mid-Cumberland	105 (0)	0	-	-	-	-	1	1.0%
South Central	115 (4)	7	5	2	-	6.1%	0	-
West TN	119 (1)	3	1	2	-	2.5%	1	0.8%
Shelby County	112 (1)	1	-	1	-	0.9%	2	1.8%
Davidson County	116 (5)	1	-	1	-	0.8%	0	-
Knox County	110 (2)	3	-	3	-	2.7%	0	-
Hamilton County	104 (0)	1	1	-	-	1.0%	0	-
Madison County	114 (0)	1	1	-	-	0.9%	0	-
Sullivan County	110 (0)	0	-	-	-	-	0	-
<b>TOTAL</b>	<b>1448 (17)</b>	<b>25 of 1448</b>	<b>13</b>	<b>12</b>	<b>0</b>	<b>1.7%</b>	<b>4 of 1448</b>	<b>0.3%</b>

<sup>1</sup>Total records included in analysis, excluding children in the original sample who had moved out of state or refused to participate.

<sup>2</sup>Number in parentheses is the number of oversampled records of black children. Oversampling was done in regions where the proportion of black children in the original sample was smaller than the proportion of black children born in the region during the period when the sample was drawn. These additional records were included only in the statewide analysis of racial disparities in immunization rates. Among the 17 oversampled records analyzed, all were located and none had refused vaccine.

<sup>3</sup>Of the 25 whose parents had refused vaccinations, all had received  $\leq 2$  doses.

<sup>4</sup>Children assigned to each region that could not be located. These children were included in the analysis with any vaccinations recorded in the state immunization registry. Of these, 3 had 2 or fewer doses documented in the registry, 1 had more than 2 doses in the registry.

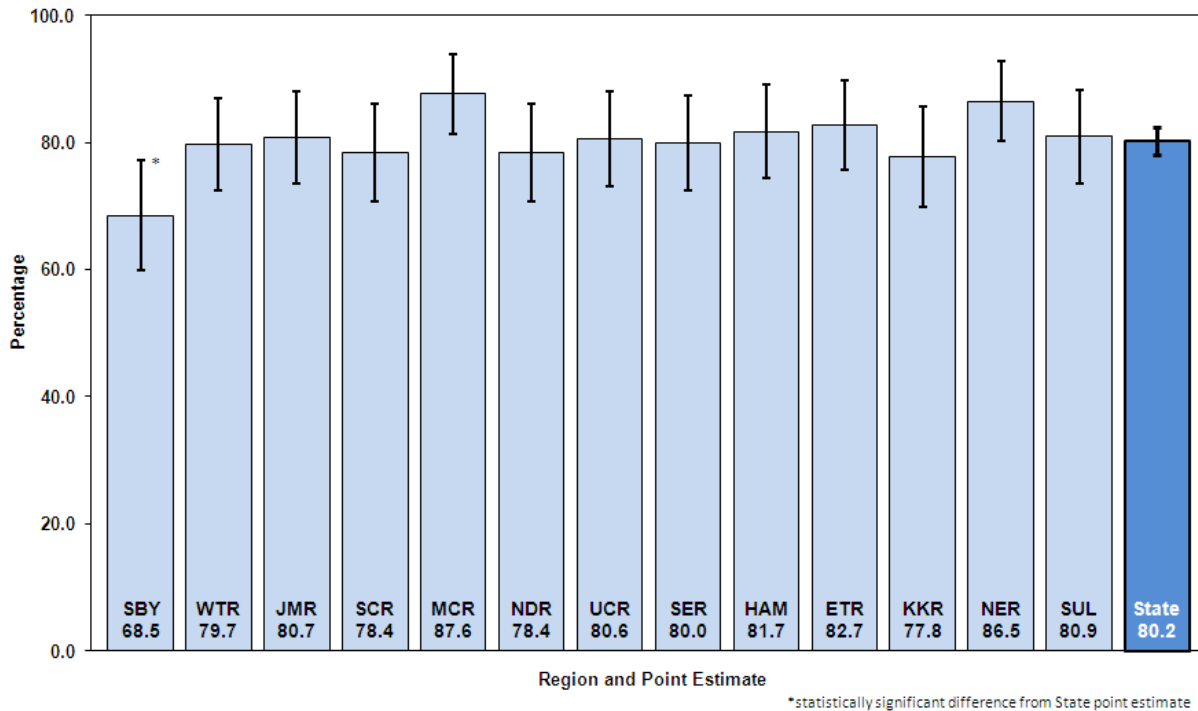
# Appendix 2

## 2012 Immunization Status Survey Of 24-Month-Old Children in Tennessee

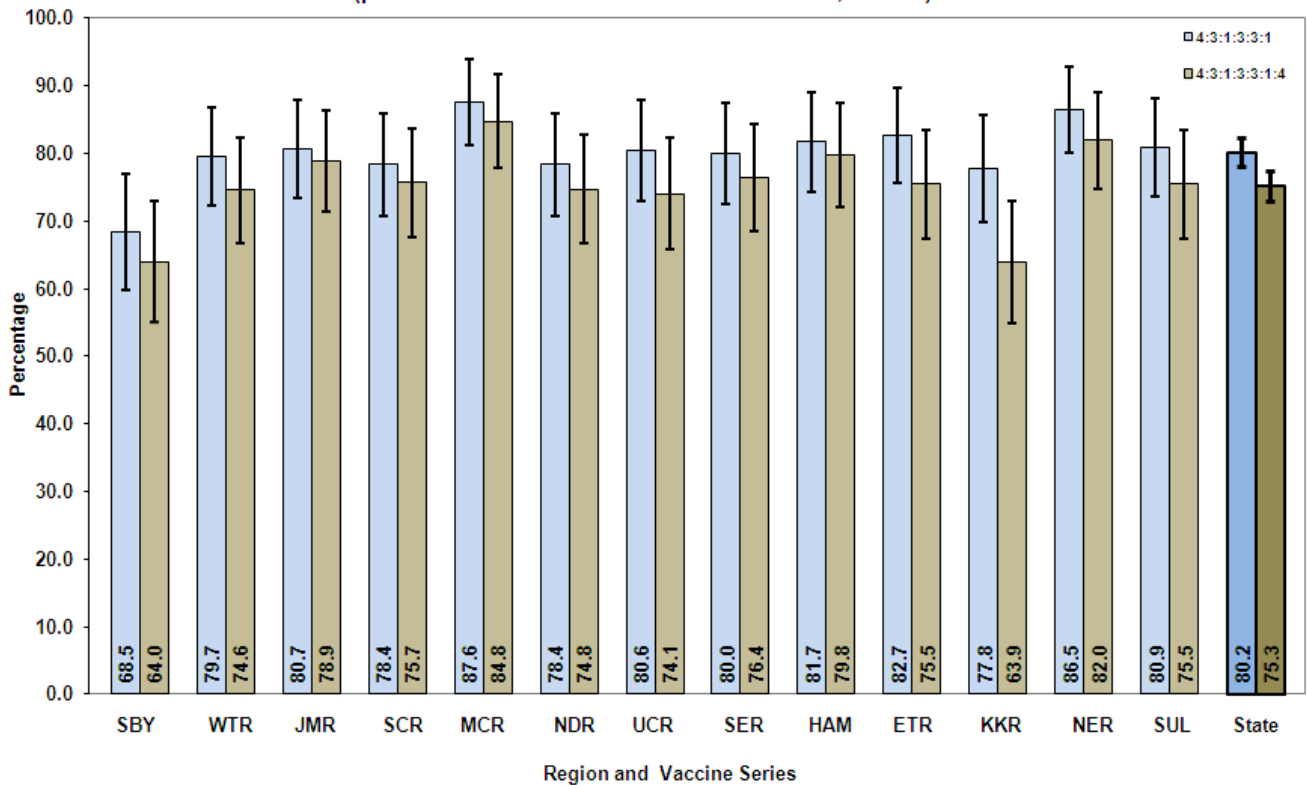
### Individual Vaccine Charts, with Coverage Rates Measured in Each Health Department Region and Statewide

	Page
On-time 4:3:1:3:3:1 and 4:3:1:3:3:1:4 vaccine series	... 19
DTaP (4-dose and 3-dose coverage)	... 20
<i>Haemophilus influenzae</i> type b & Hepatitis A (1-dose coverage)	... 21
Hepatitis A (2-dose coverage) & Hepatitis B	... 22
Influenza (2-dose and 3-dose coverage)	... 23
MMR & Pneumococcus (4-dose coverage)	... 24
Pneumococcus (PCV) (4-dose vs. 3-dose coverage) & Polio	... 25
Rotavirus & Varicella	... 26

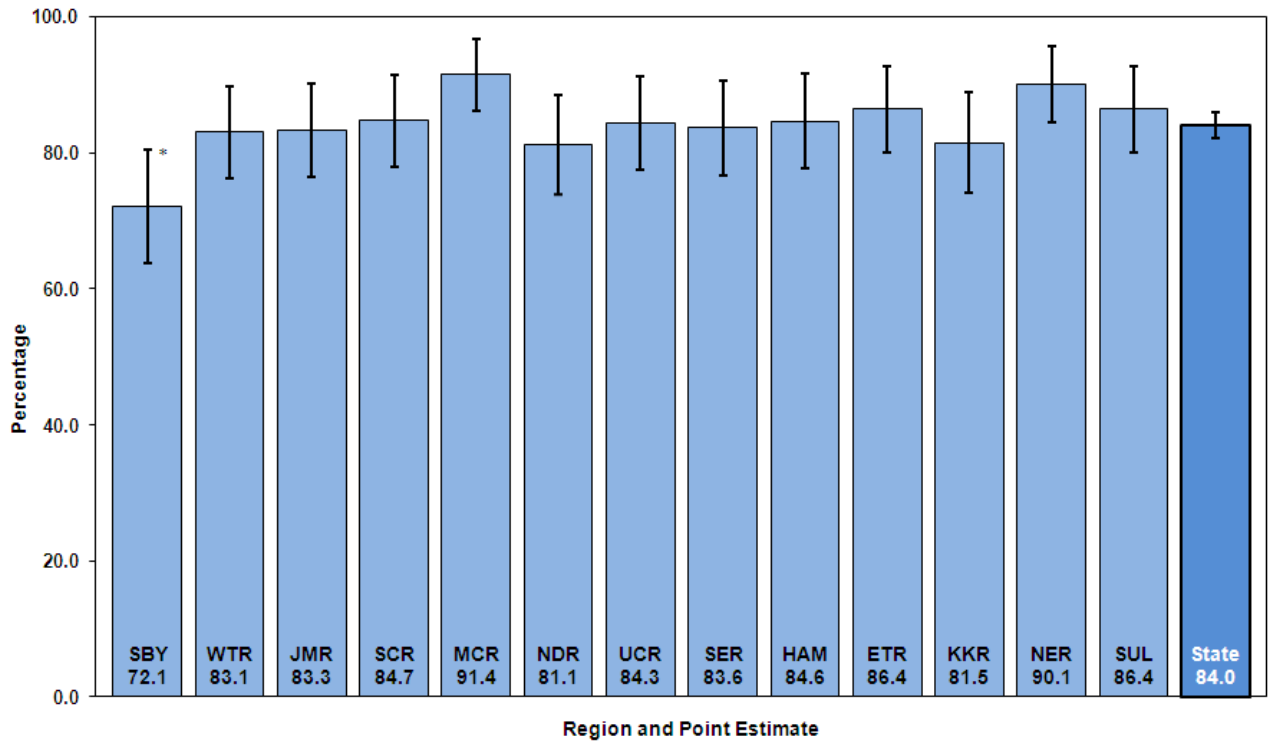
**2012 Immunization Status Survey of 24-Month-Old Children in Tennessee:  
 Percentage of 24-month-old children with on-time immunization (4:3:1:3:3:1)  
 by health department region  
 (point estimates and 95% confidence intervals, n=1431)**



**2012 Immunization Status Survey of 24-Month-Old Children in Tennessee:  
 Percentage (%) of children complete for 4:3:1:3:3:1 and 4:3:1:3:3:1:4 vaccine series  
 by health department region  
 (point estimates and 95% confidence intervals, n=1431)**

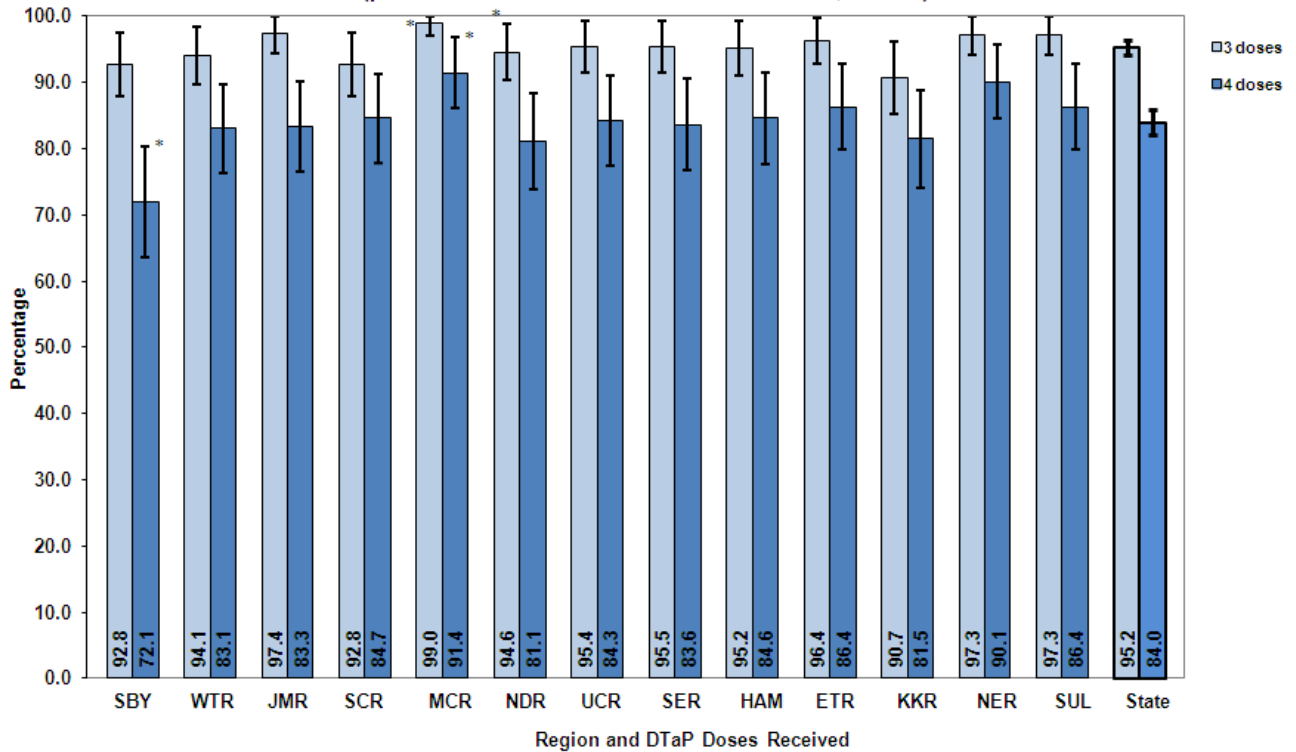


**2012 Immunization Status Survey of 24-Month-Old Children in Tennessee:  
Percentage of children with complete DTaP series (4 doses) by health department region  
(point estimates and 95% confidence intervals, n=1431)**



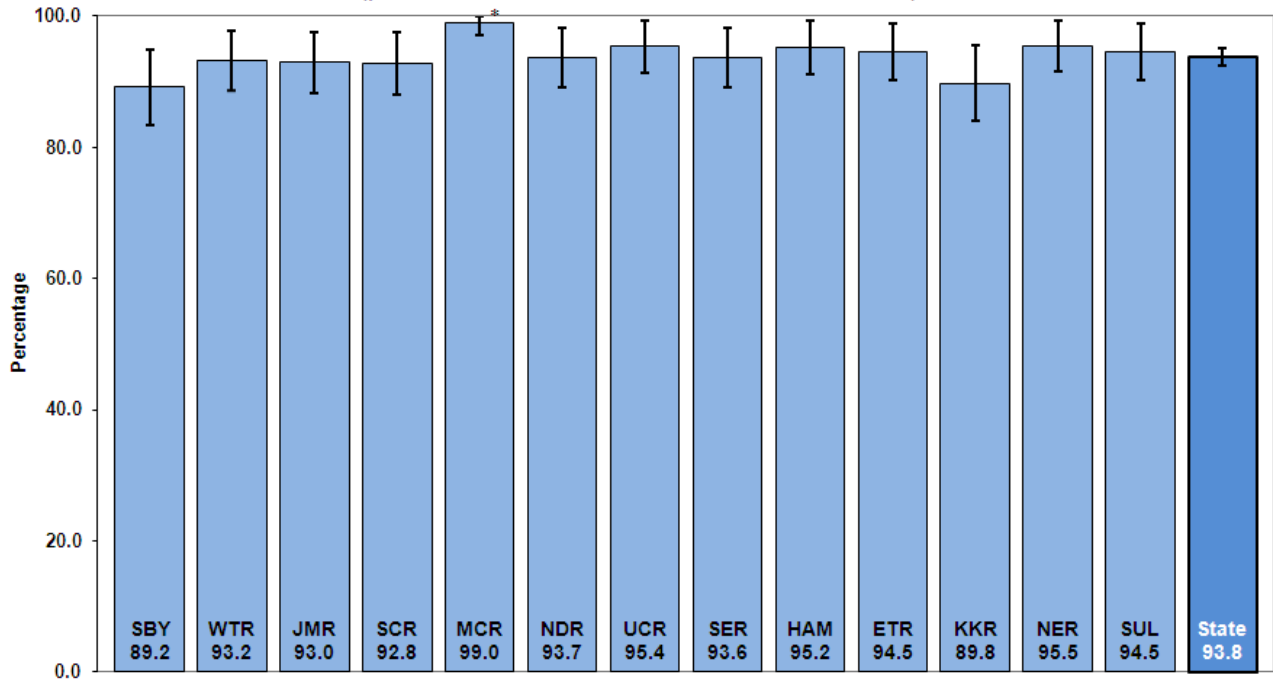
\*statistically significant difference from State point estimate

**2012 Immunization Status Survey of 24-Month-Old Children in Tennessee: Percentage of  
children with 3 or 4 doses of diphtheria, tetanus and acellular pertussis (DTaP)  
by health department region  
(point estimates and 95% confidence intervals, n=1431)**



\*statistically significant difference from State point estimate

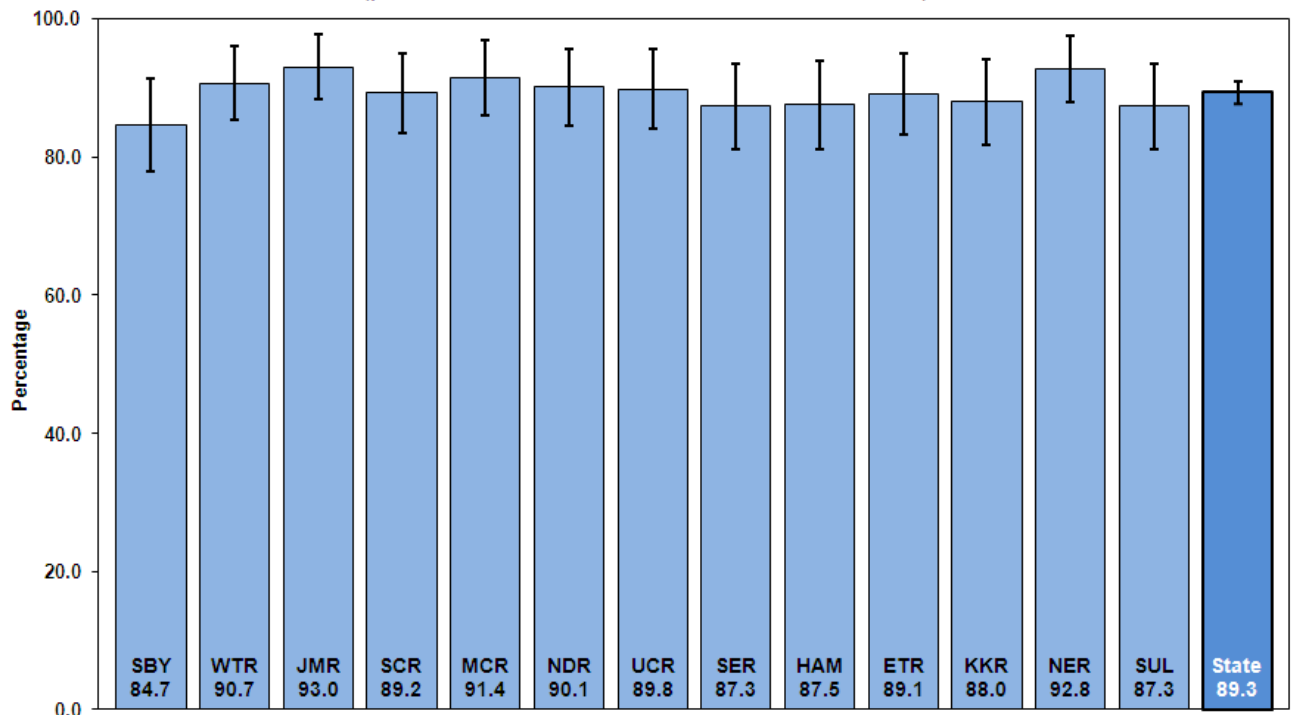
**2012 Immunization Status Survey of 24-Month-Old Children in Tennessee:  
Percentage of children with complete *Haemophilus influenzae* type B (Hib) series (≥ 3 doses)  
by health department region  
(point estimates and 95% confidence intervals, n=1431)**



Region and Point Estimate

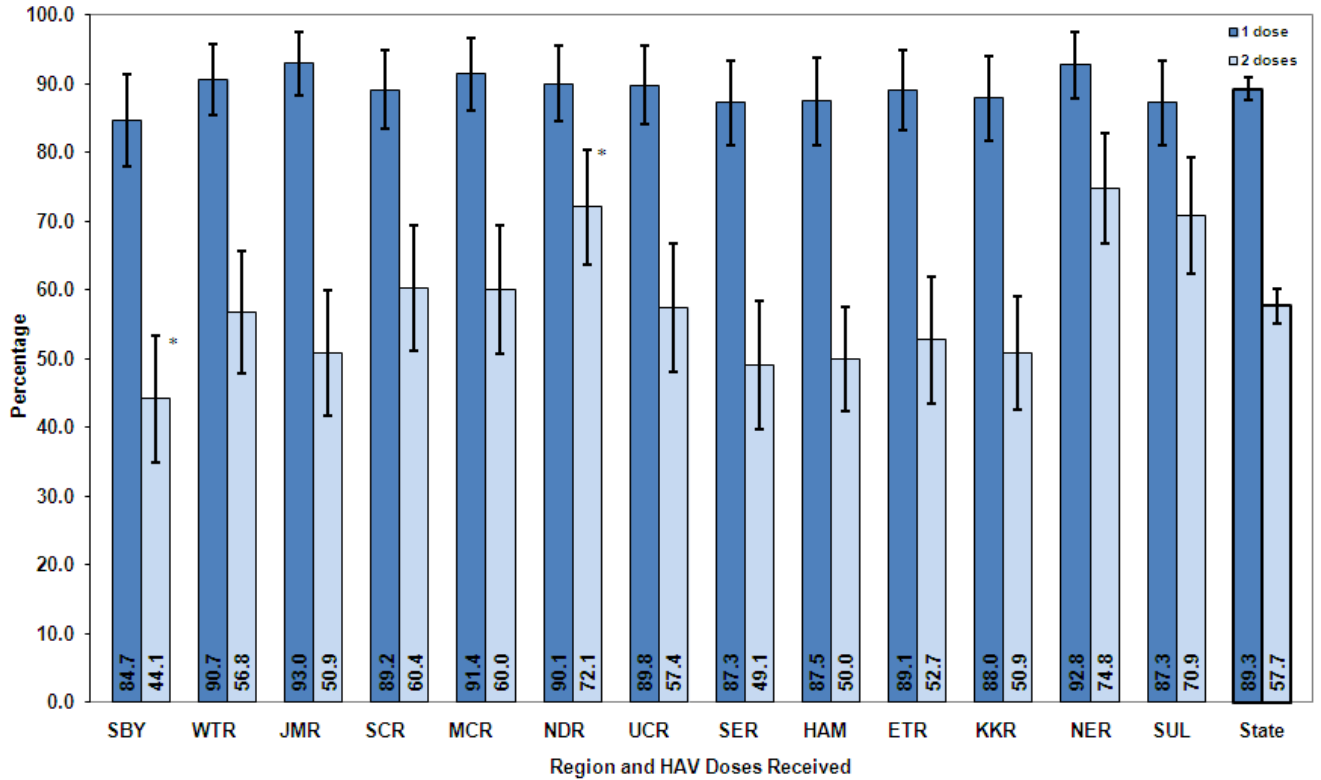
\*statistically significant difference from State point estimate

**2012 Immunization Status Survey of 24-Month-Old Children in Tennessee:  
Percentage of children with at least one dose of Hepatitis A (HAV)  
by health department region  
(point estimates and 95% confidence intervals, n=1431)**



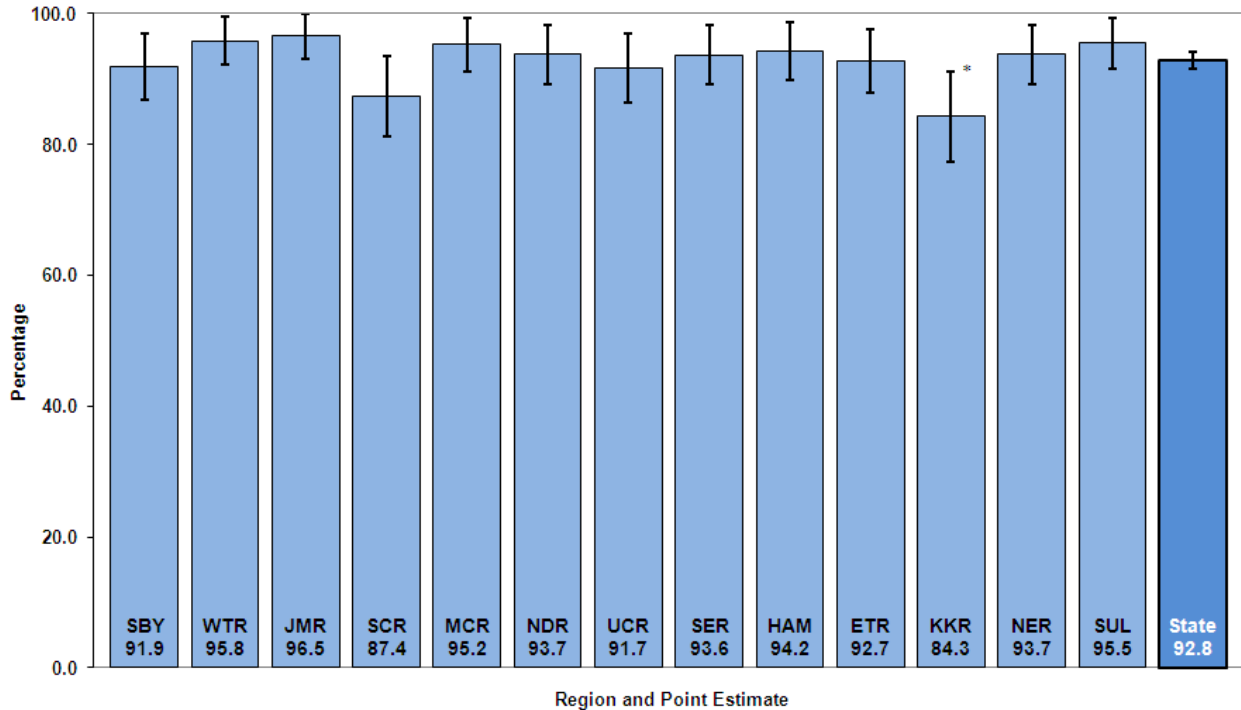
Region and Point Estimate

**2012 Immunization Status Survey of 24-Month-Old Children in Tennessee:  
Percentage of children with 1 or 2 doses of Hepatitis A (HAV) by health department region  
(point estimates and 95% confidence intervals, n=1431)**



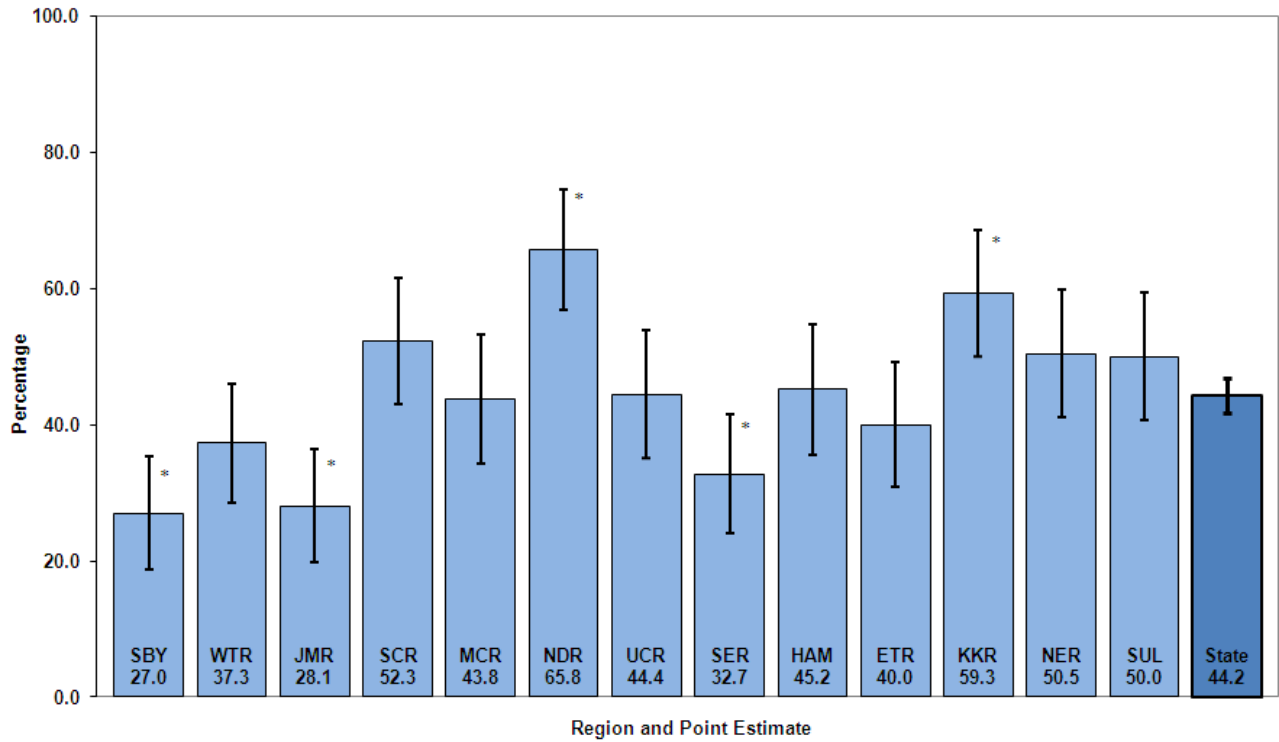
\*statistically significant difference from State point estimate

**2012 Immunization Status Survey of 24-Month-Old Children in Tennessee:  
Percentage of children with complete Hepatitis B (HBV) series ( $\geq 3$  doses)  
by health department region  
(point estimates and 95% confidence intervals, n=1431)**



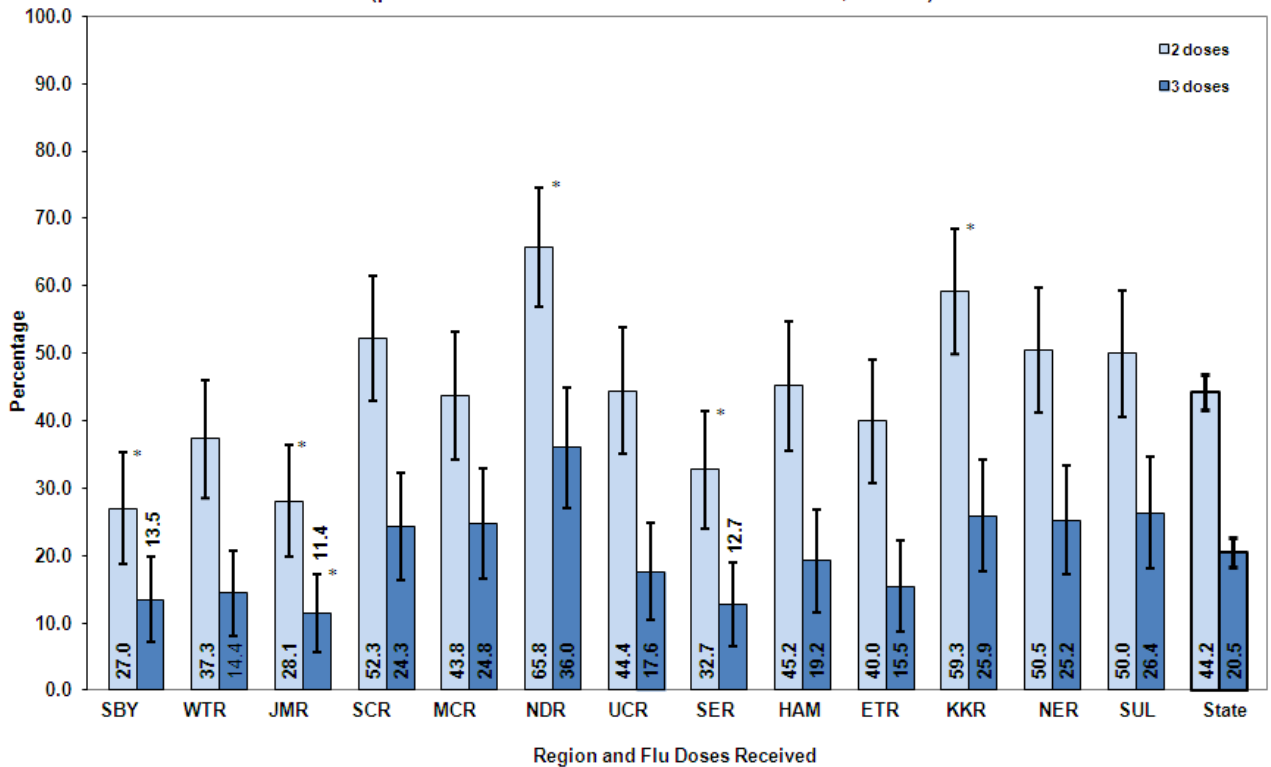
\*statistically significant difference from State point estimate

**2012 Immunization Status Survey of 24-Month-Old Children in Tennessee:**  
**Percentage of children with 2 doses of Influenza vaccine by health department region**  
 (point estimates and 95% confidence intervals, n=1431)



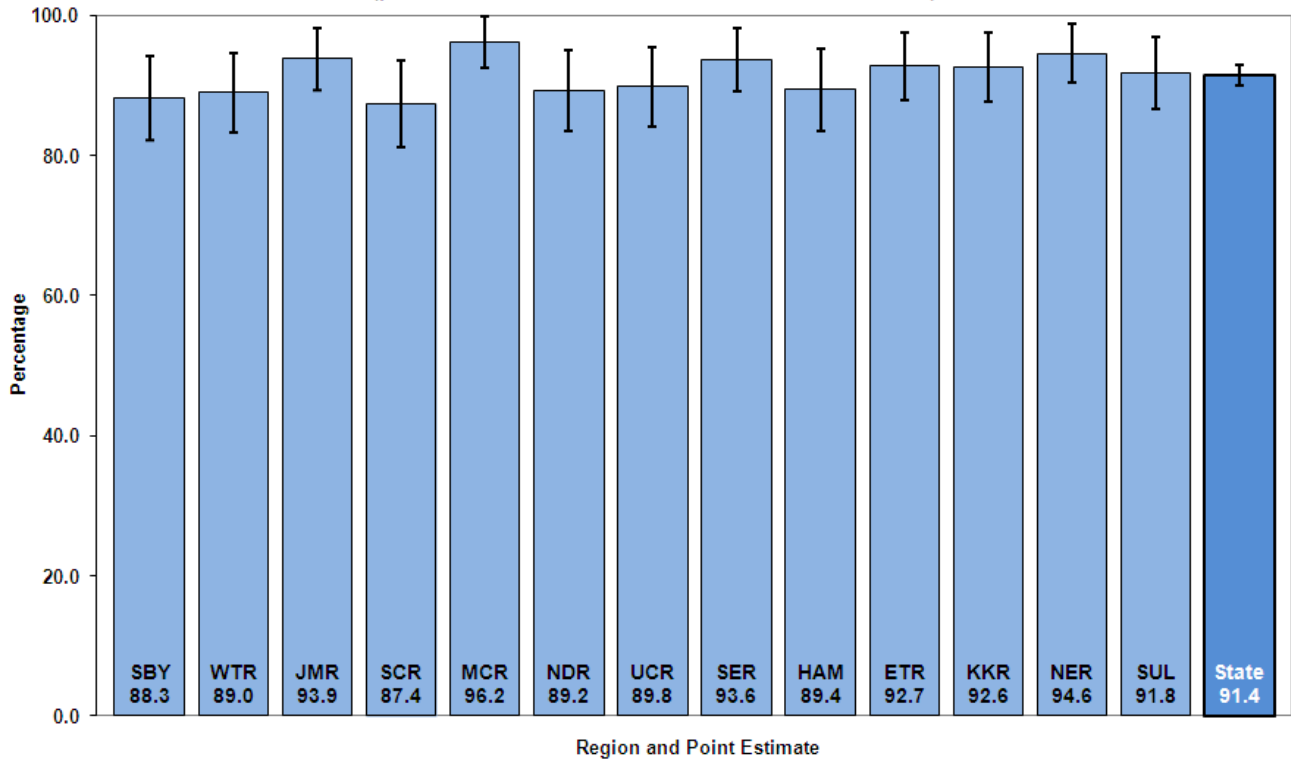
\*statistically significant difference from State point estimate

**2012 Immunization Status Survey of 24-Month-Old Children in Tennessee:**  
**Percentage of children with 2 or 3 doses of Influenza vaccine by health department region**  
 (point estimates and 95% confidence intervals, n=1431)

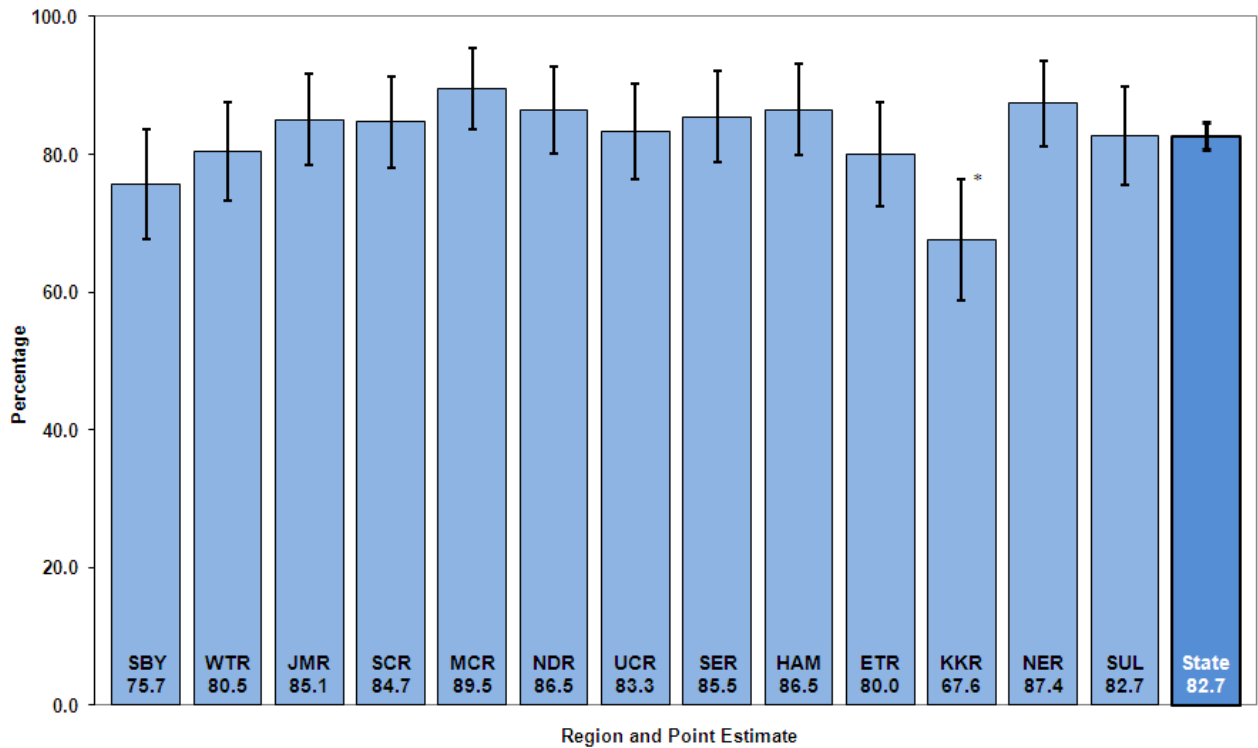


\*statistically significant difference from State point estimate

**2012 Immunization Status Survey of 24-Month-Old Children in Tennessee:  
Percentage of children with complete measles, mumps, and rubella (MMR) series (1 dose)  
by health department region  
(point estimates and 95% confidence intervals, n=1431)**



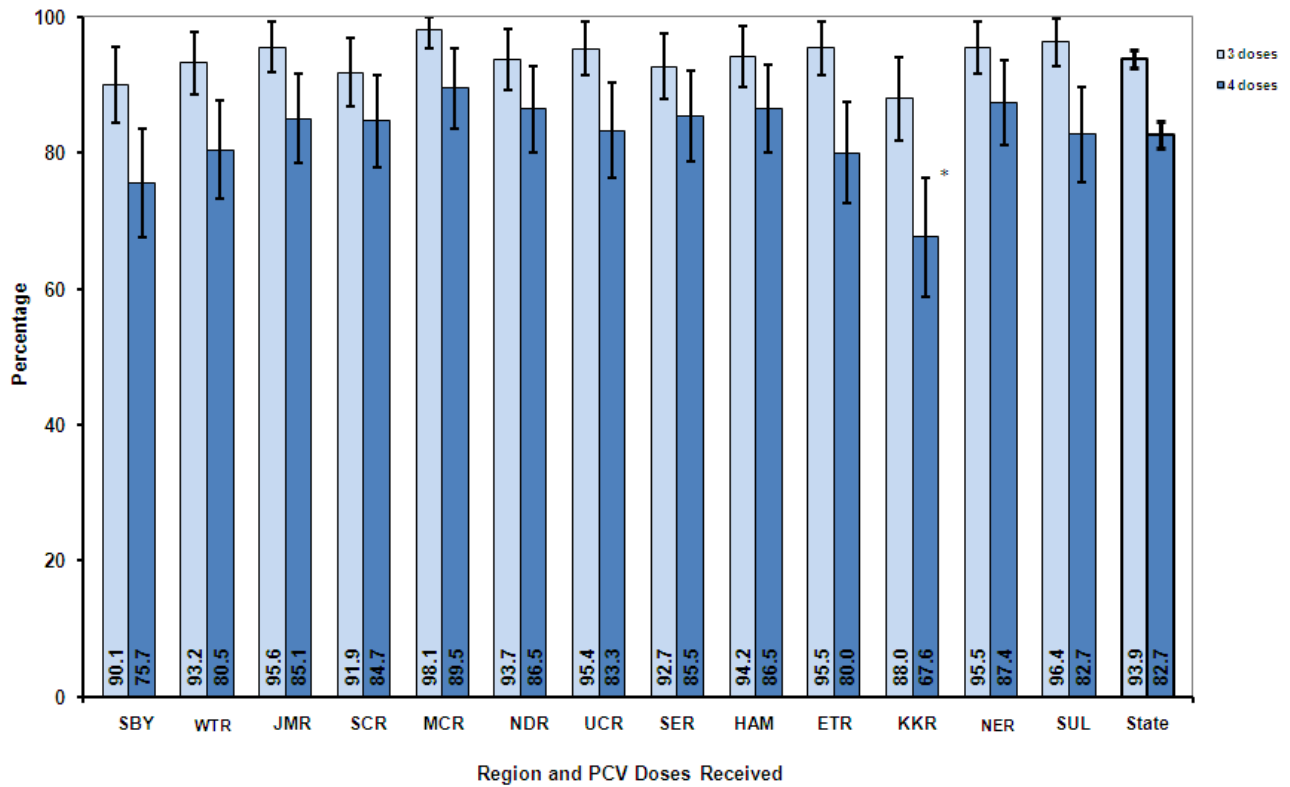
**2012 Immunization Status Survey of 24-Month-Old Children in Tennessee:  
Percentage of children with complete PCV series (4 doses) by health department region  
(point estimates and 95% confidence intervals, n=1431)**



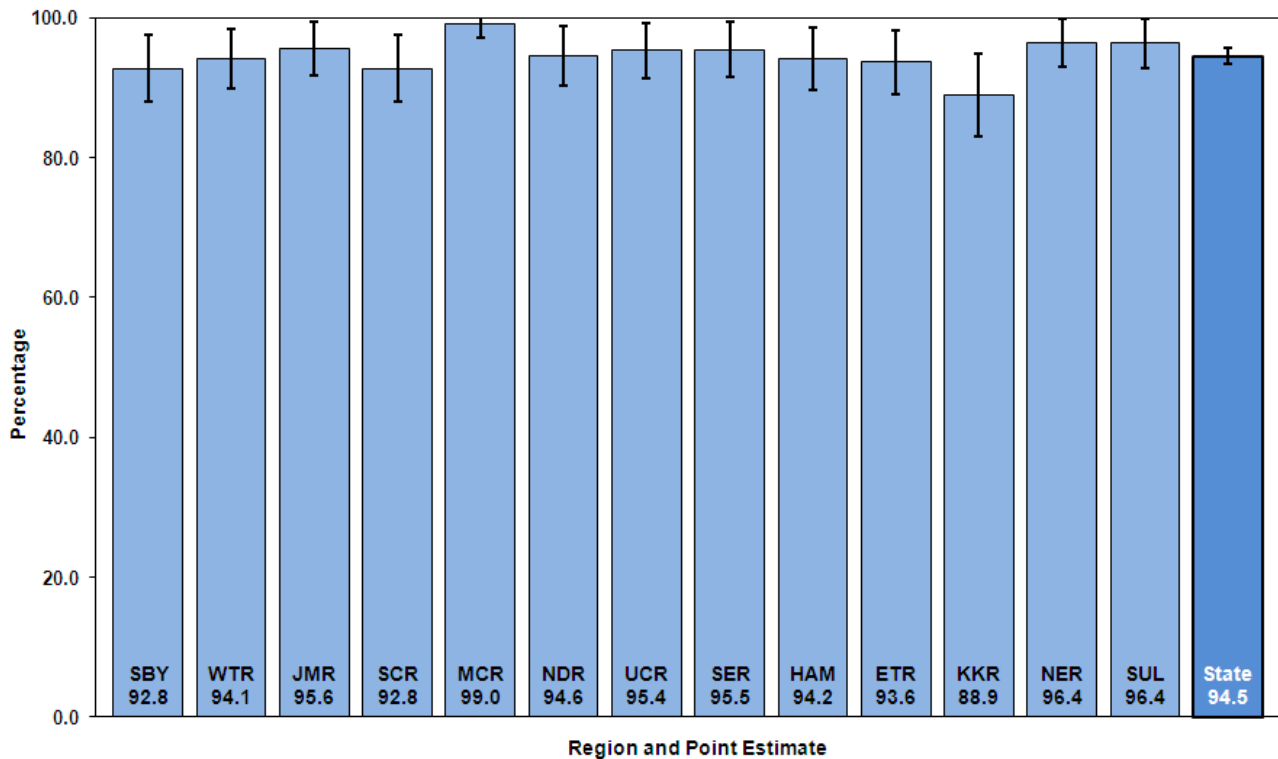
\*statistically significant difference from State point estimate



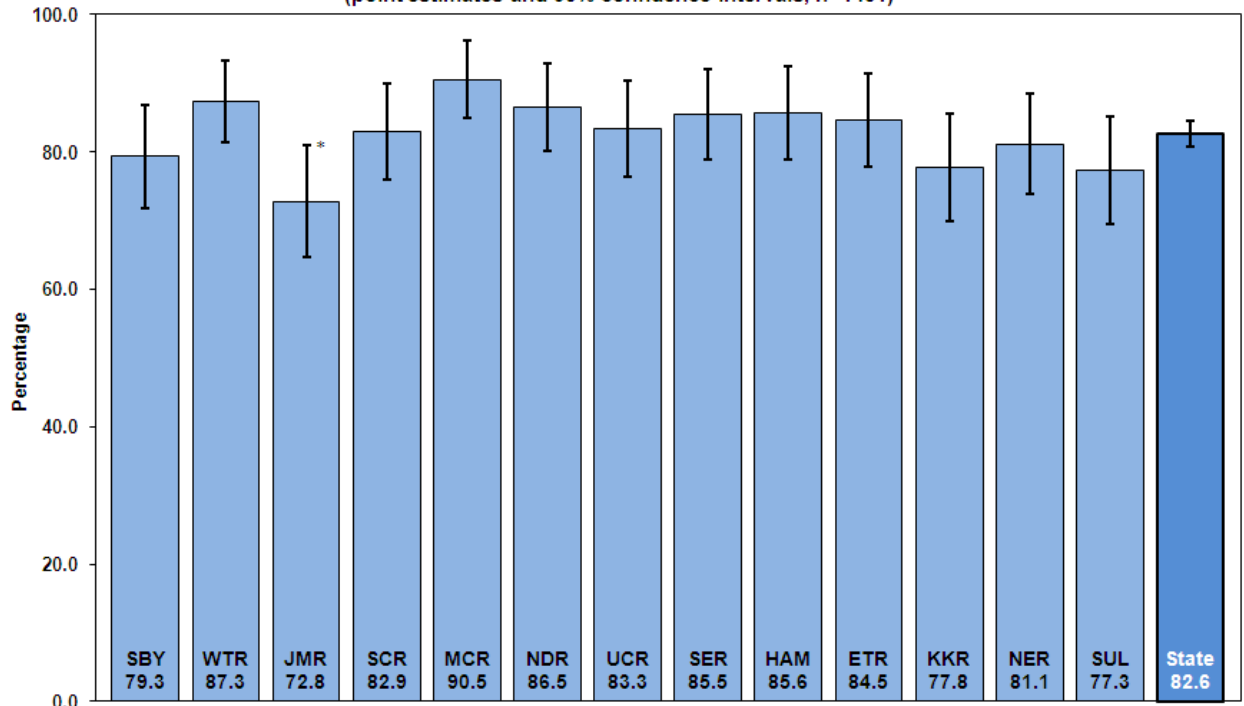
**2012 Immunization Status Survey of 24-Month-Old Children in Tennessee:  
Percentage of children with 3 or 4 doses of PCV by health department region  
(point estimates and 95% confidence intervals, n=1431)**



**2012 Immunization Status Survey of 24-Month-Old Children in Tennessee:  
Percentage of children with complete polio (IPV) series (3 doses) by health department region  
(point estimates and 95% confidence intervals, n=1431)**



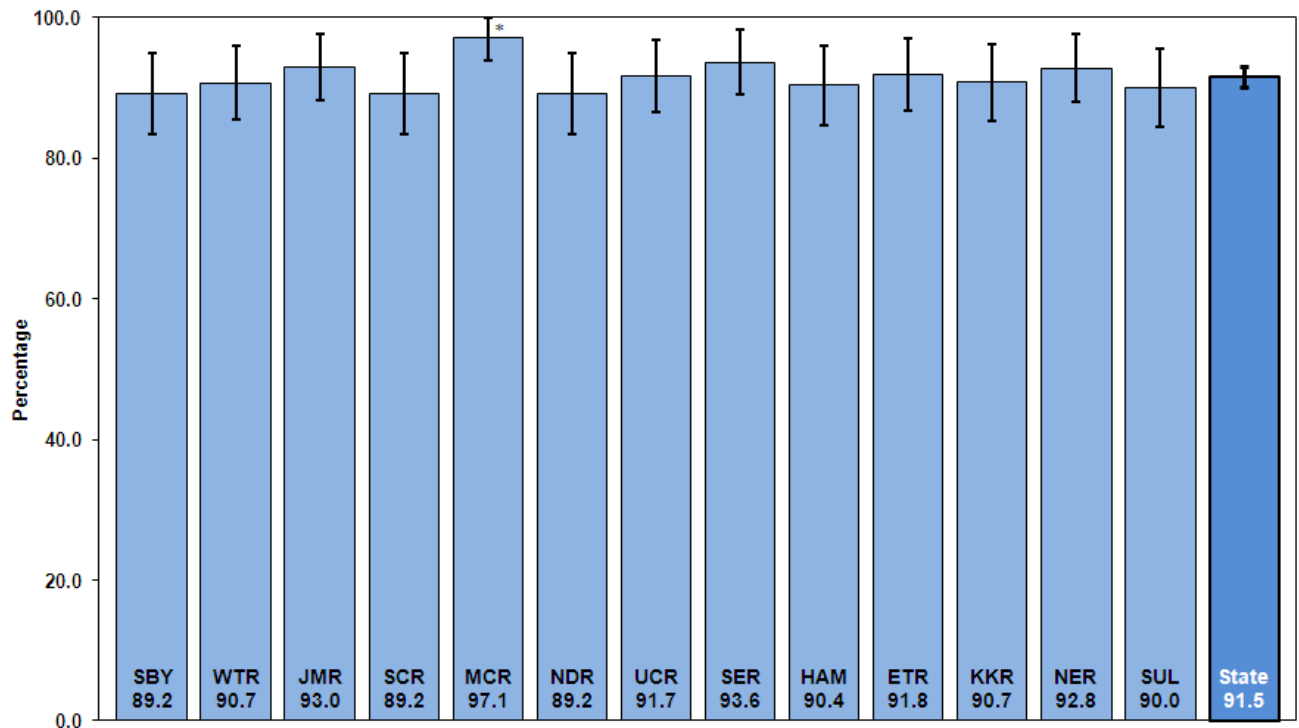
2012 Immunization Status Survey of 24-Month-Old Children in Tennessee:  
 Percentage of children with complete Rotavirus (RTV) series ( $\geq 2$  doses)  
 by health department region  
 (point estimates and 95% confidence intervals, n=1431)



Region and Point Estimate

\*statistically significant difference from State point estimate

2012 Immunization Status Survey of 24-Month-Old Children in Tennessee:  
 Percentage of children with complete Varicella vaccine (1 dose) by health department region  
 (point estimates and 95% confidence intervals, n=1431)



Region and Point Estimate

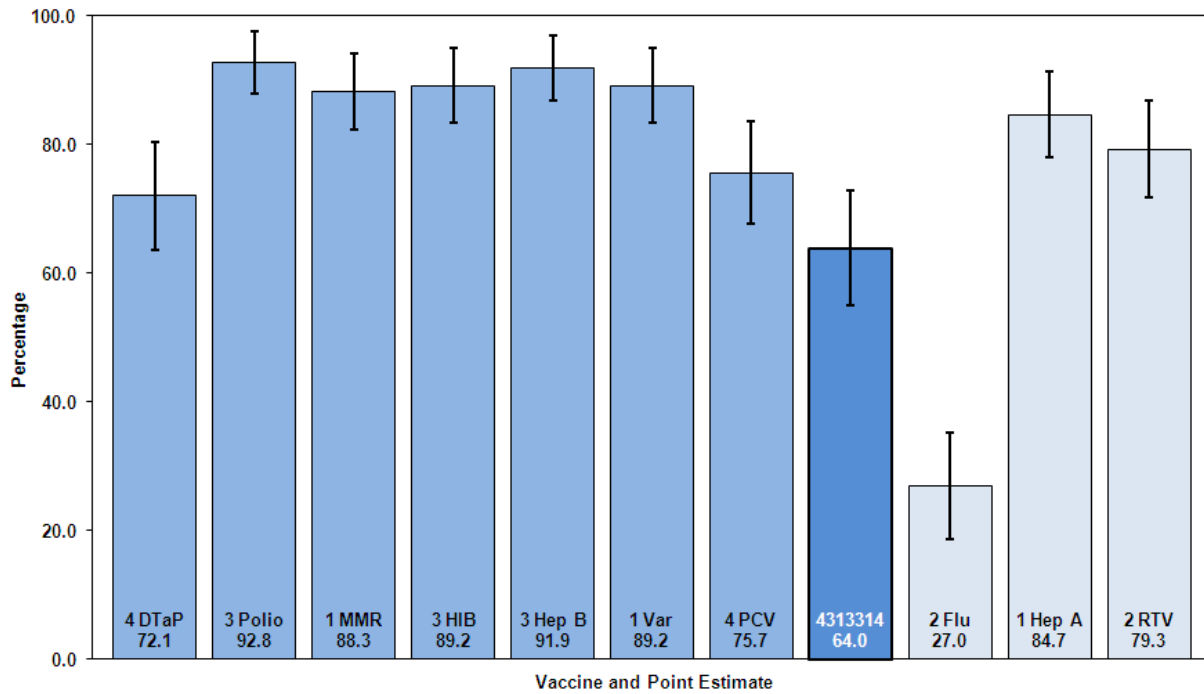
\*statistically significant difference from State point estimate

**Appendix 3**  
**2012 Immunization Status Survey**  
**Of 24-Month-Old Children in Tennessee**

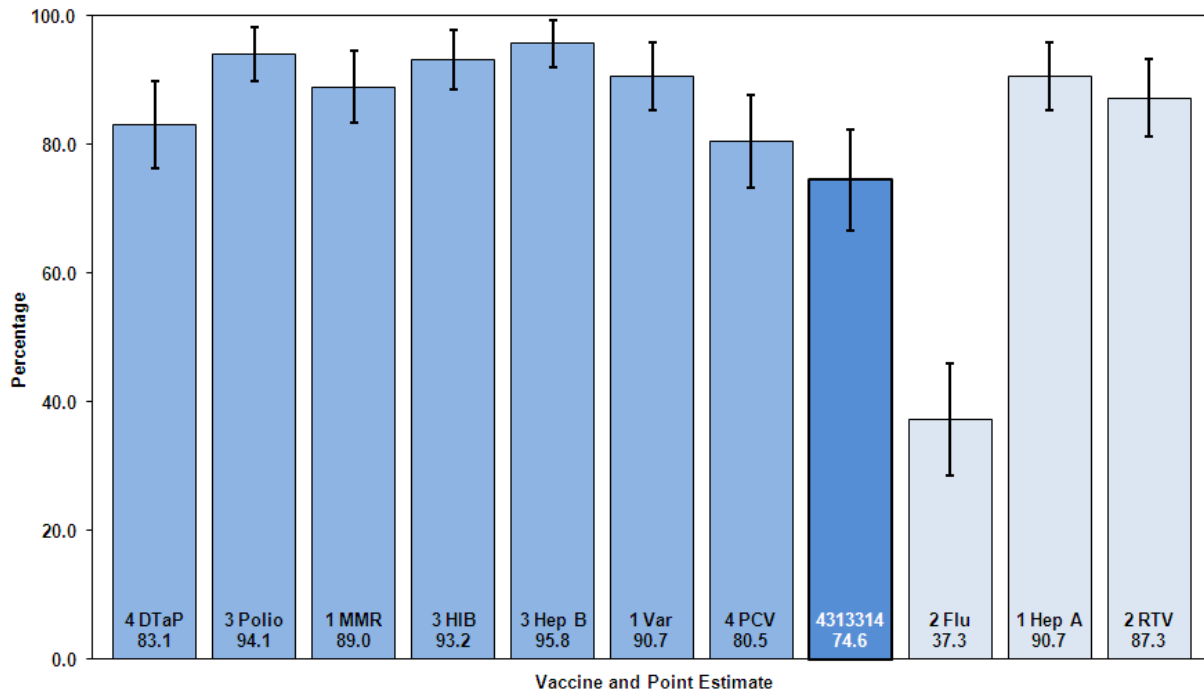
**Individual Health Department Region Charts with Coverage Rates for All  
Vaccines Assessed**

	Page
Shelby County	... 28
West Tennessee Region	... 28
Jackson-Madison County	... 29
South Central Region	... 29
Mid-Cumberland Region	... 30
Nashville-Davidson County	... 30
Upper Cumberland Region	... 31
Southeast Region	... 31
Hamilton County	... 32
East Tennessee Region	... 32
Knoxville-Knox County	... 33
Northeast Region	... 33
Sullivan County	... 34

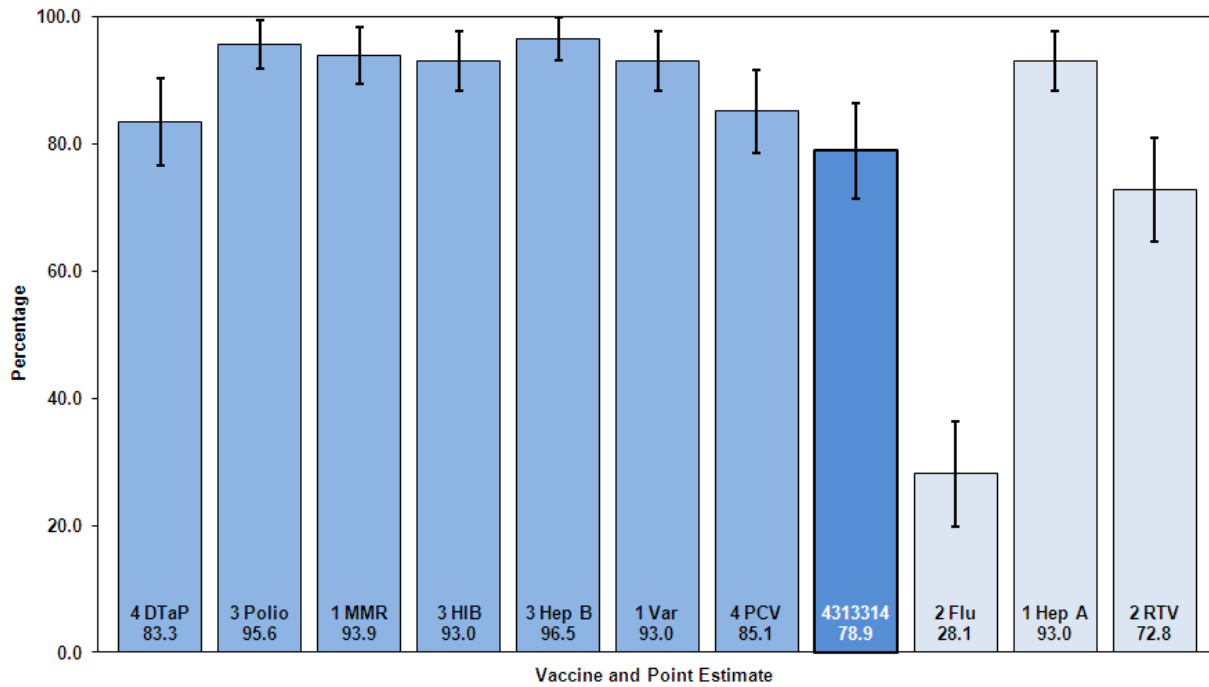
2012 Immunization Status Survey of 24-Month-Old Children in Tennessee:  
 Percentage of children complete in Shelby County (SBY) by vaccine  
 (point estimates and 95% confidence intervals, n=111)



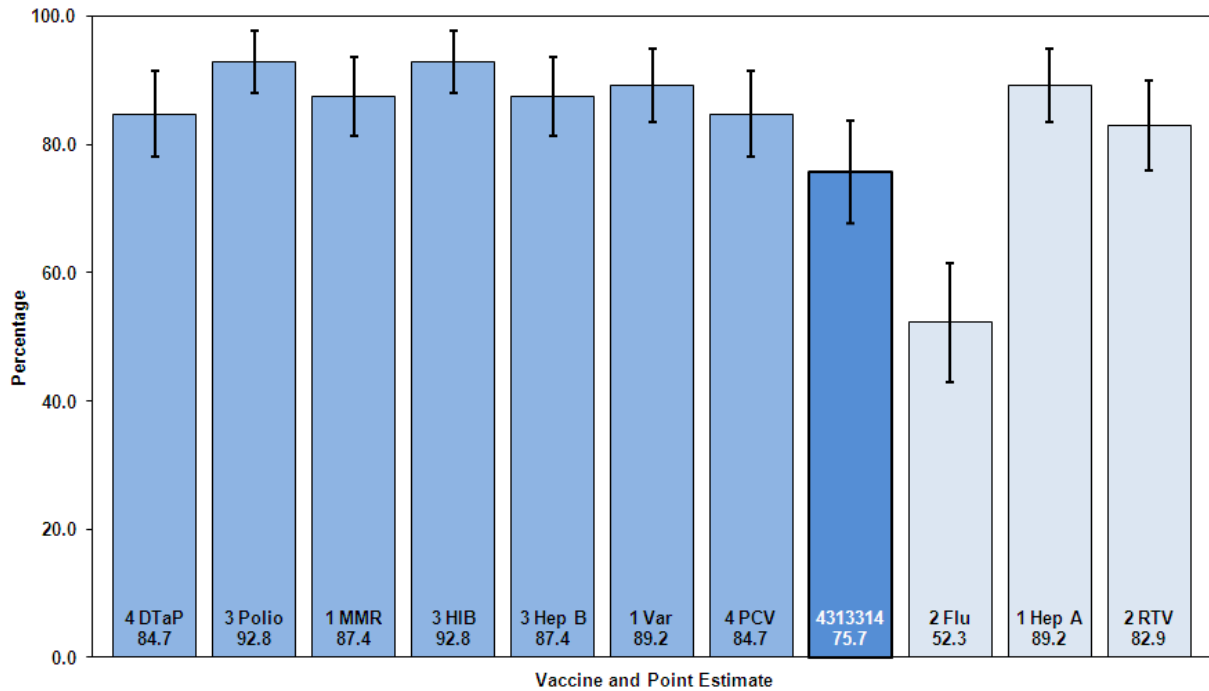
2012 Immunization Status Survey of 24-Month-Old Children in Tennessee:  
 Percentage of children complete in West Tennessee Region (WTR) by vaccine  
 (point estimates and 95% confidence intervals, n=118)



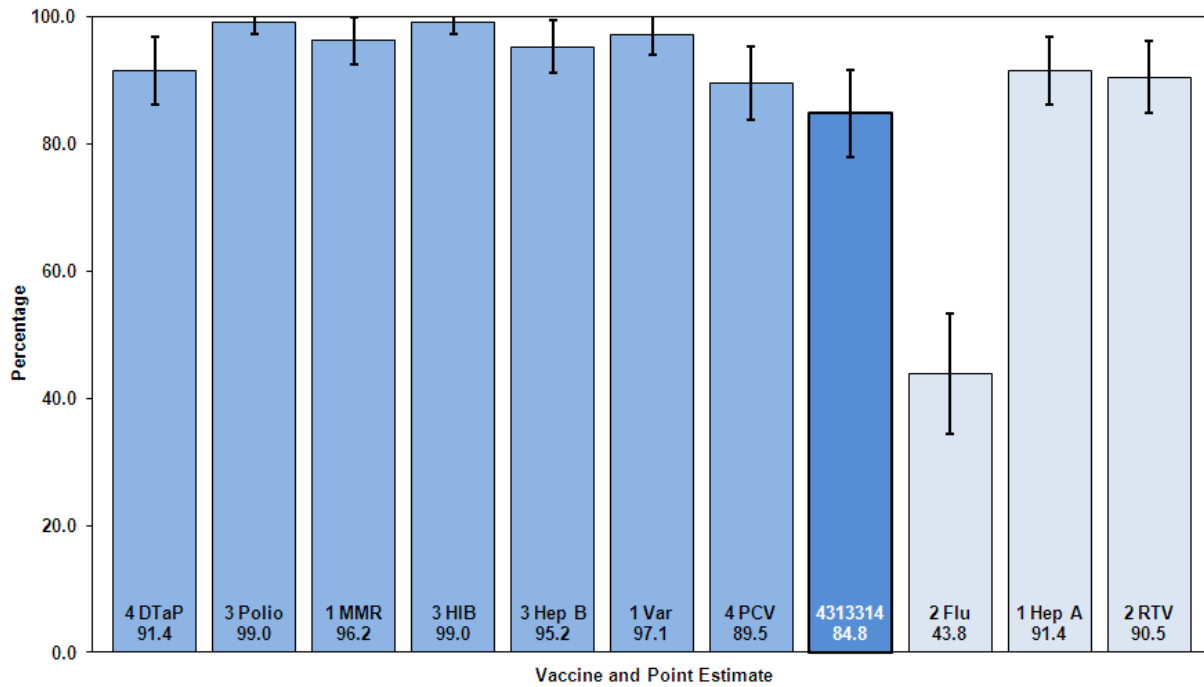
2012 Immunization Status Survey of 24-Month-Old Children in Tennessee:  
 Percentage of children complete in Jackson-Madison Region (JMR) by vaccine  
 (point estimates and 95% confidence intervals, n=114)



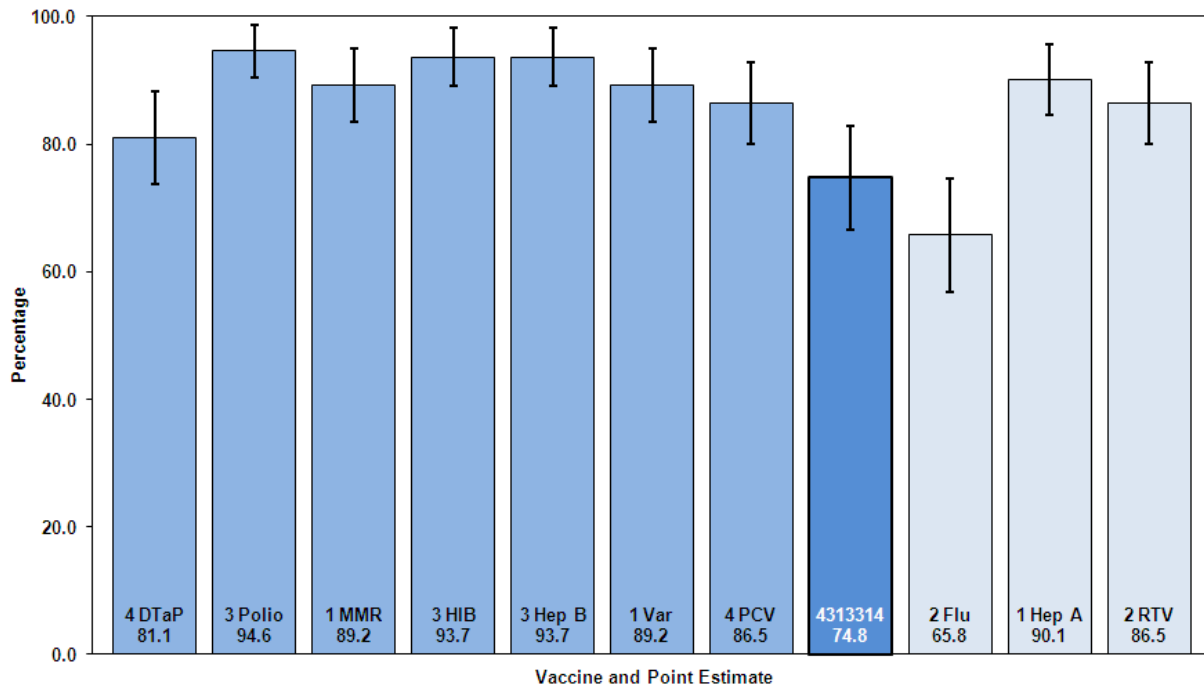
2012 Immunization Status Survey of 24-Month-Old Children in Tennessee:  
 Percentage of children complete in South Central Region (SCR) by vaccine  
 (point estimates and 95% confidence intervals, n=111)



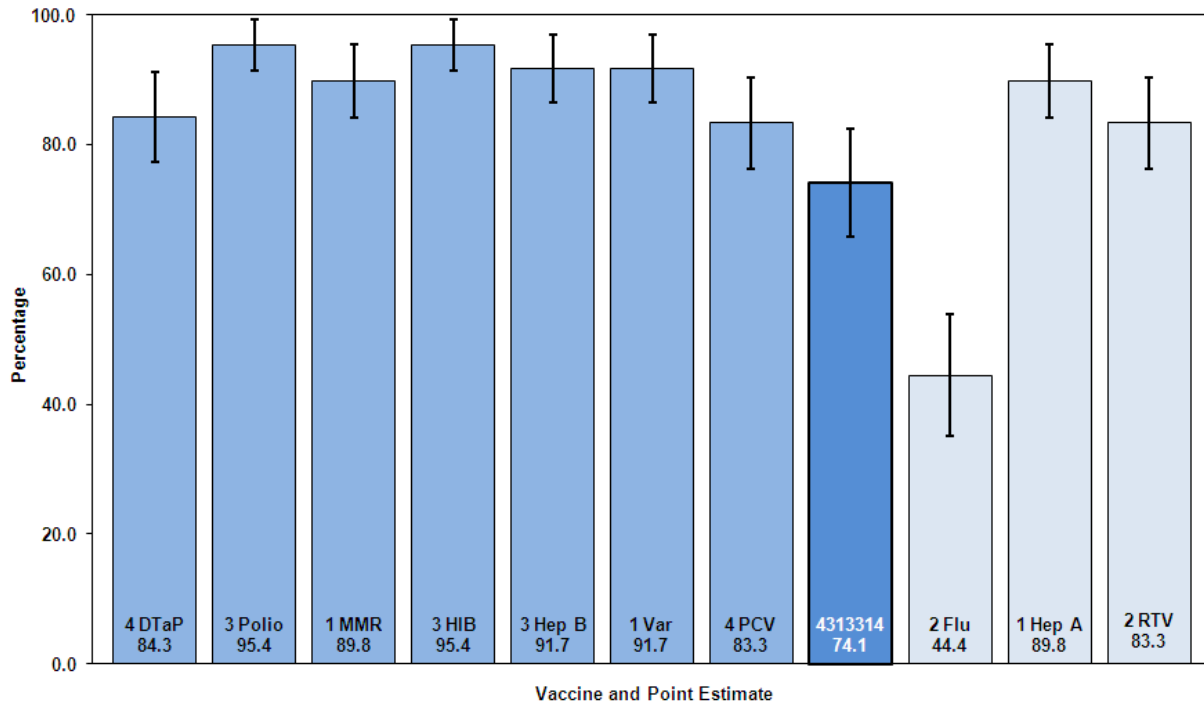
2012 Immunization Status Survey of 24-Month-Old Children in Tennessee:  
 Percentage of children complete in Mid-Cumberland Region (MCR) by vaccine  
 (point estimates and 95% confidence intervals, n=105)



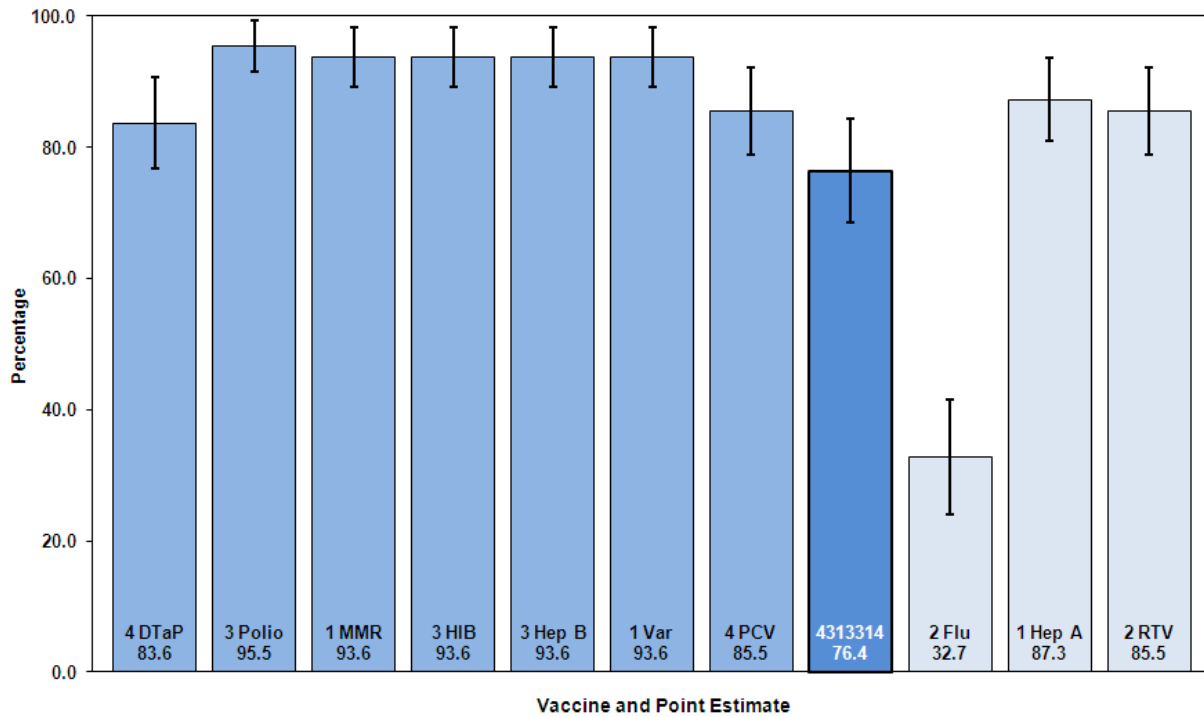
2012 Immunization Status Survey of 24-Month-Old Children in Tennessee:  
 Percentage of children complete in Nashville-Davidson Region (NDR) by vaccine  
 (point estimates and 95% confidence intervals, n=111)



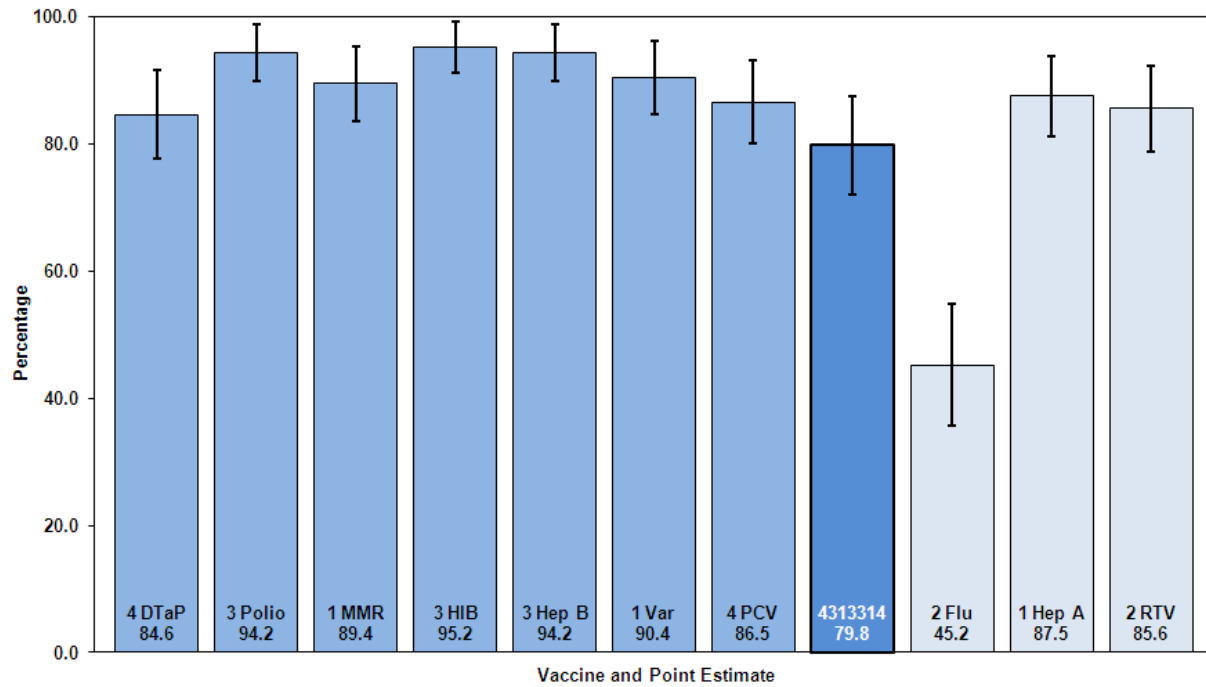
2012 Immunization Status Survey of 24-Month-Old Children in Tennessee:  
 Percentage of children complete in Upper Cumberland Region (UCR) by vaccine  
 (point estimates and 95% confidence intervals, n=108)



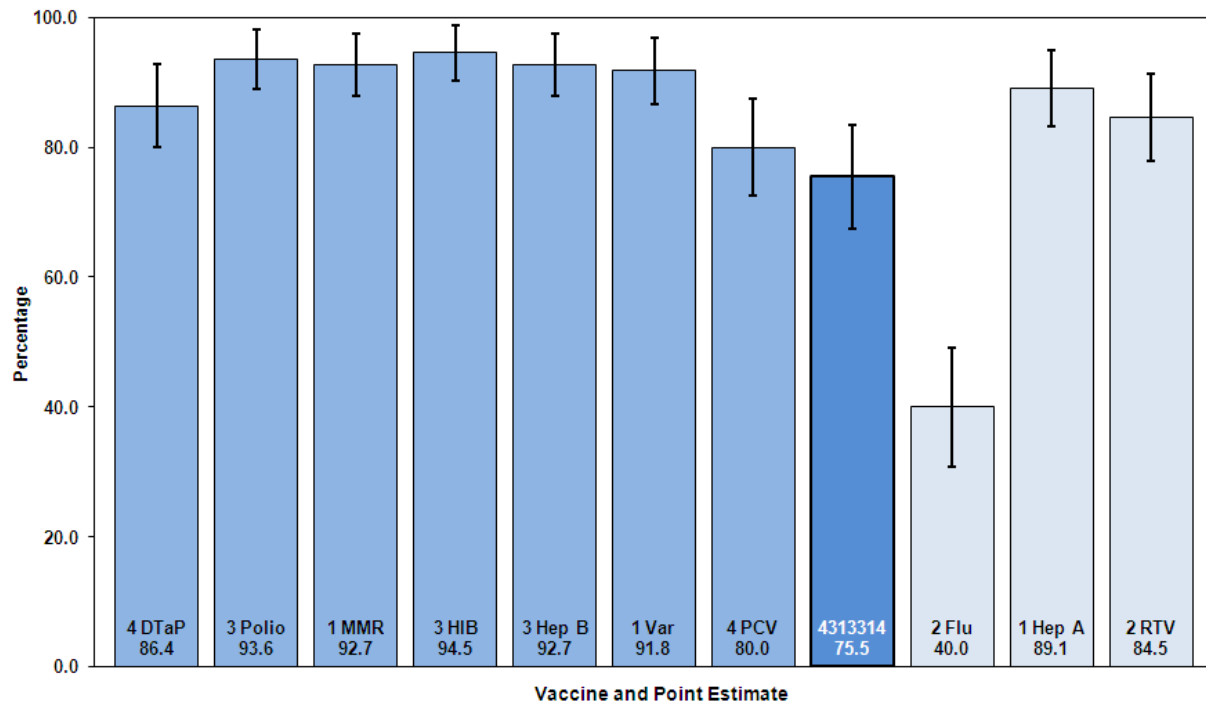
2012 Immunization Status Survey of 24-Month-Old Children in Tennessee:  
 Percentage of children complete in Southeast Region (SER) by vaccine  
 (point estimates and 95% confidence intervals, n=110)



2012 Immunization Status Survey of 24-Month-Old Children in Tennessee:  
 Percentage of children complete in Hamilton County (HAM) by vaccine  
 (point estimates and 95% confidence intervals, n=104)

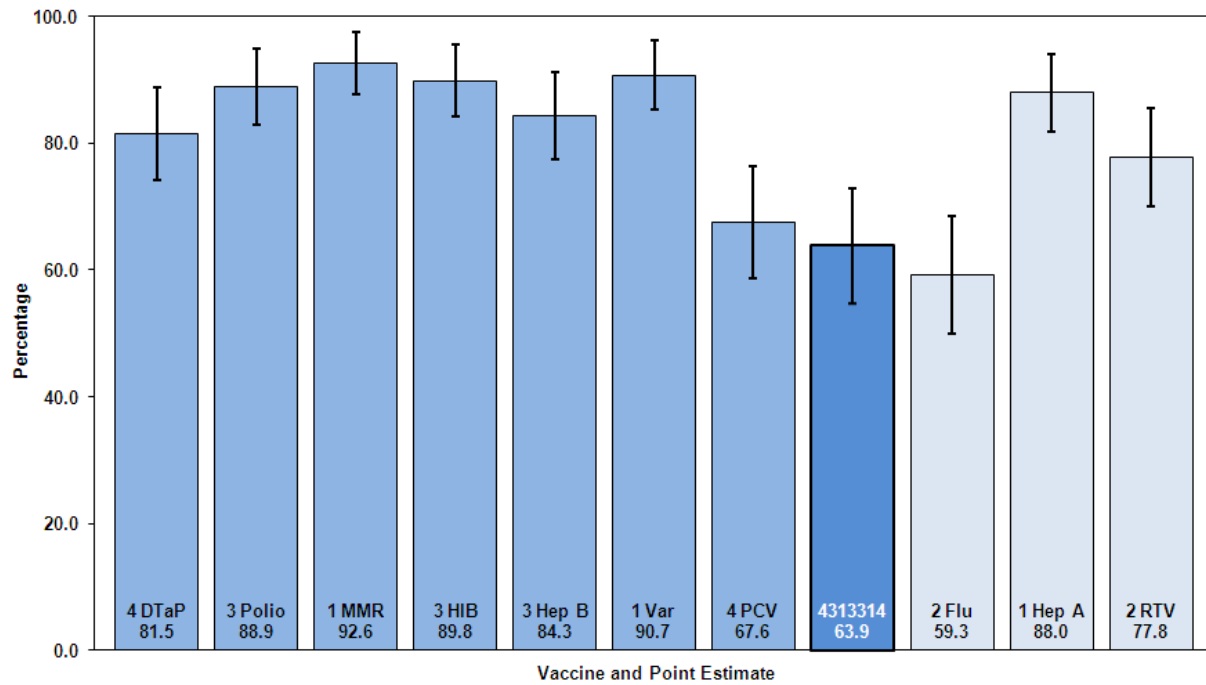


2012 Immunization Status Survey of 24-Month-Old Children in Tennessee:  
 Percentage of children complete in East Tennessee Region (ETR) by vaccine  
 (point estimates and 95% confidence intervals, n=110)

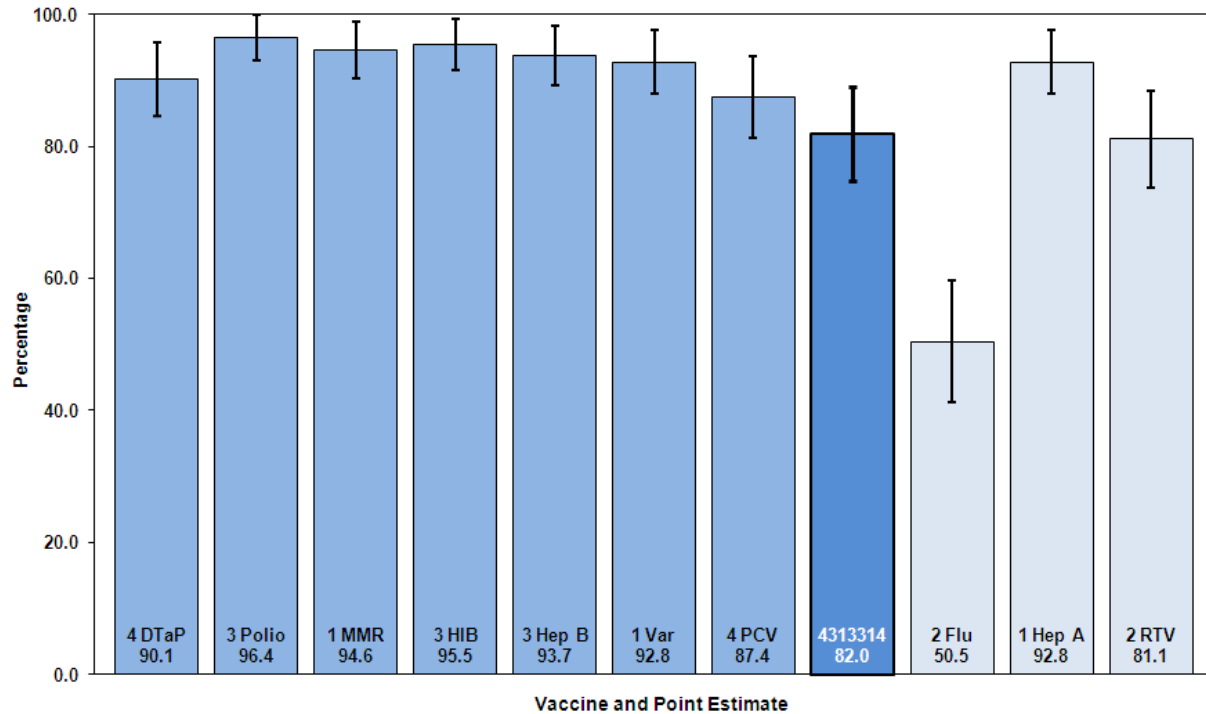




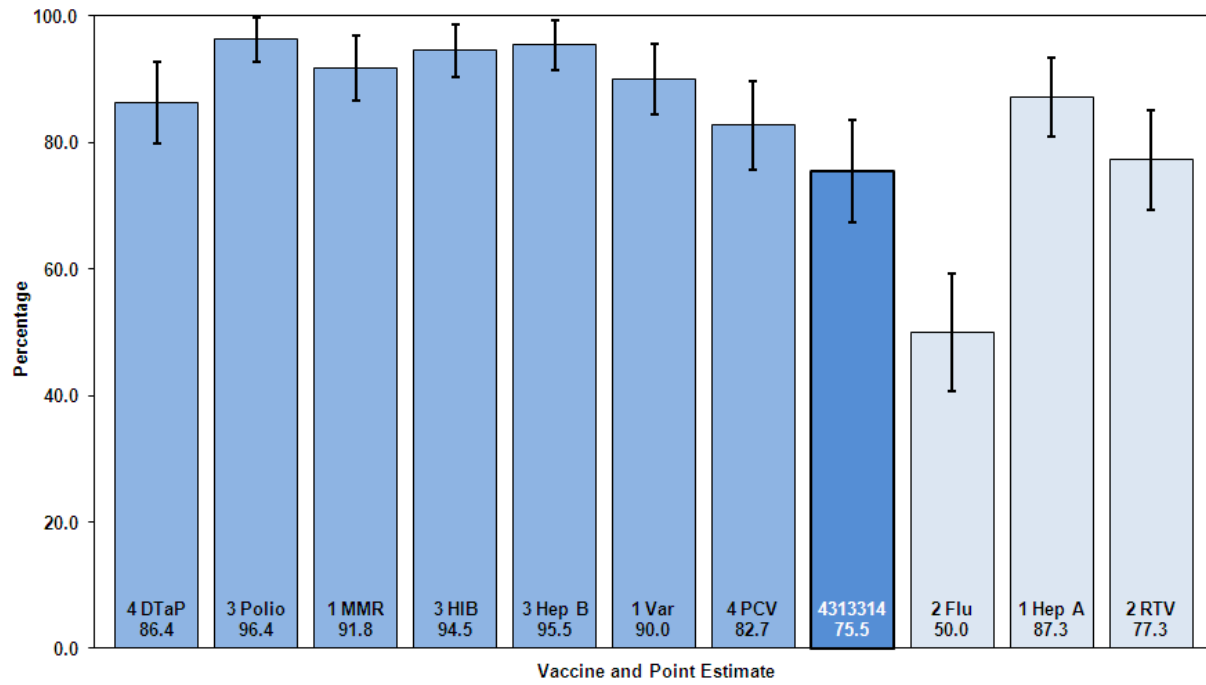
2012 Immunization Status Survey of 24-Month-Old Children in Tennessee:  
 Percentage of children complete in Knoxville-Knox Region (KKR) by vaccine  
 (point estimates and 95% confidence intervals, n=108)



2012 Immunization Status Survey of 24-Month-Old Children in Tennessee:  
 Percentage of children complete in Northeast Region (NER) by vaccine  
 (point estimates and 95% confidence intervals, n=111)



2012 Immunization Status Survey of 24-Month-Old Children in Tennessee:  
 Percentage of children complete in Sullivan County (SUL) by vaccine  
 (point estimates and 95% confidence intervals, n=110)



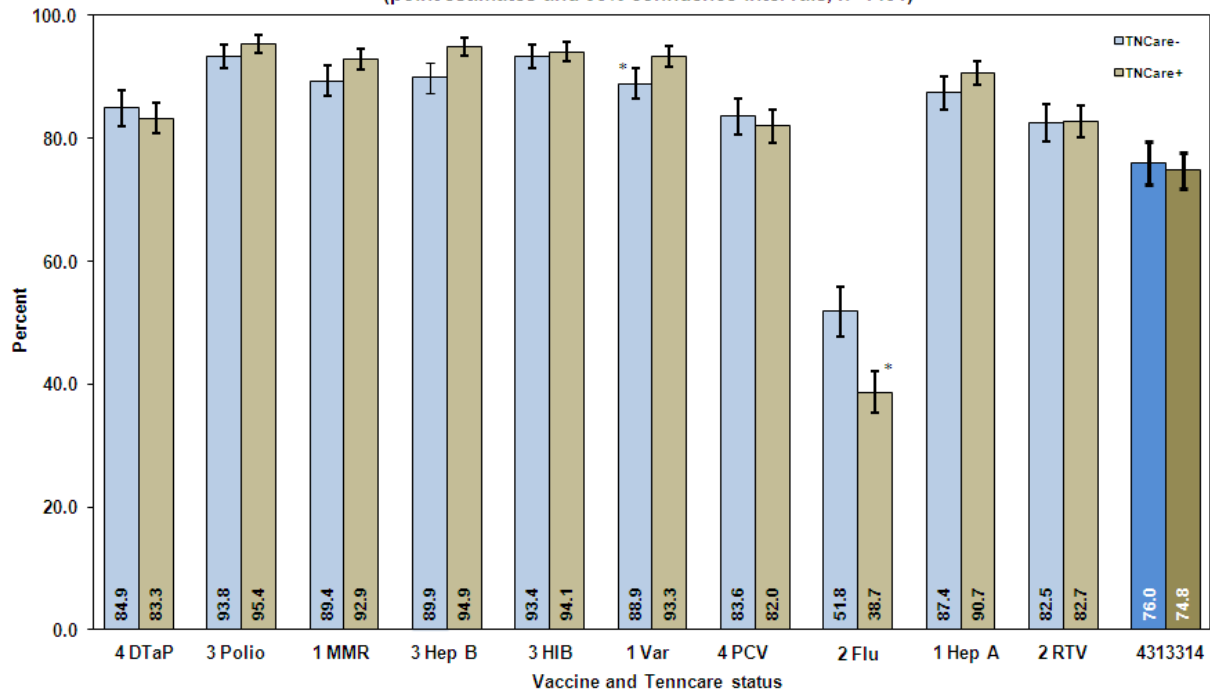
# **Appendix 4**

## **2012 Immunization Status Survey Of 24-Month-Old Children in Tennessee**

### **Additional Statewide Charts for Specific Groups**

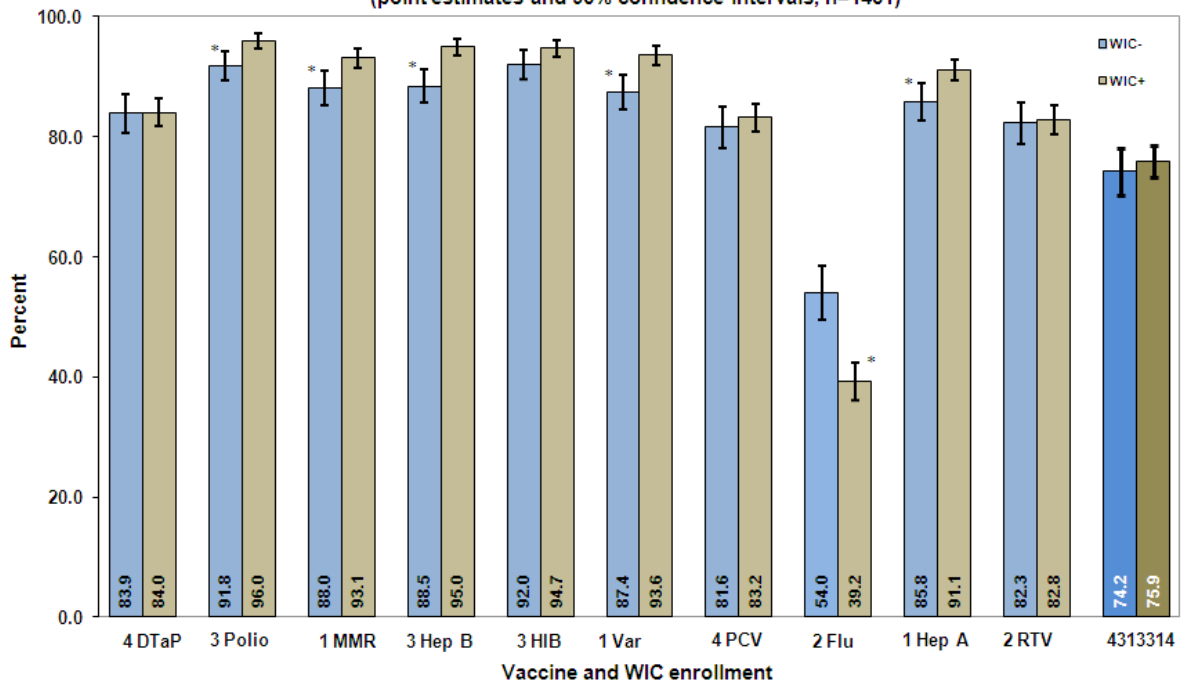
	Page
Immunization levels by vaccine and TennCare enrollment status	... 36
Immunization levels by vaccine and WIC enrollment status	... 36
Trends in on-time immunization coverage disparities (Black vs. White, 2010-2012)	... 37

**2012 Immunization Status of 24-Month-Old Children in Tennessee:  
Statewide percentage of children with age-appropriate immunization levels  
by vaccine and TennCare enrollment status  
(point estimates and 95% confidence intervals, n=1431)**



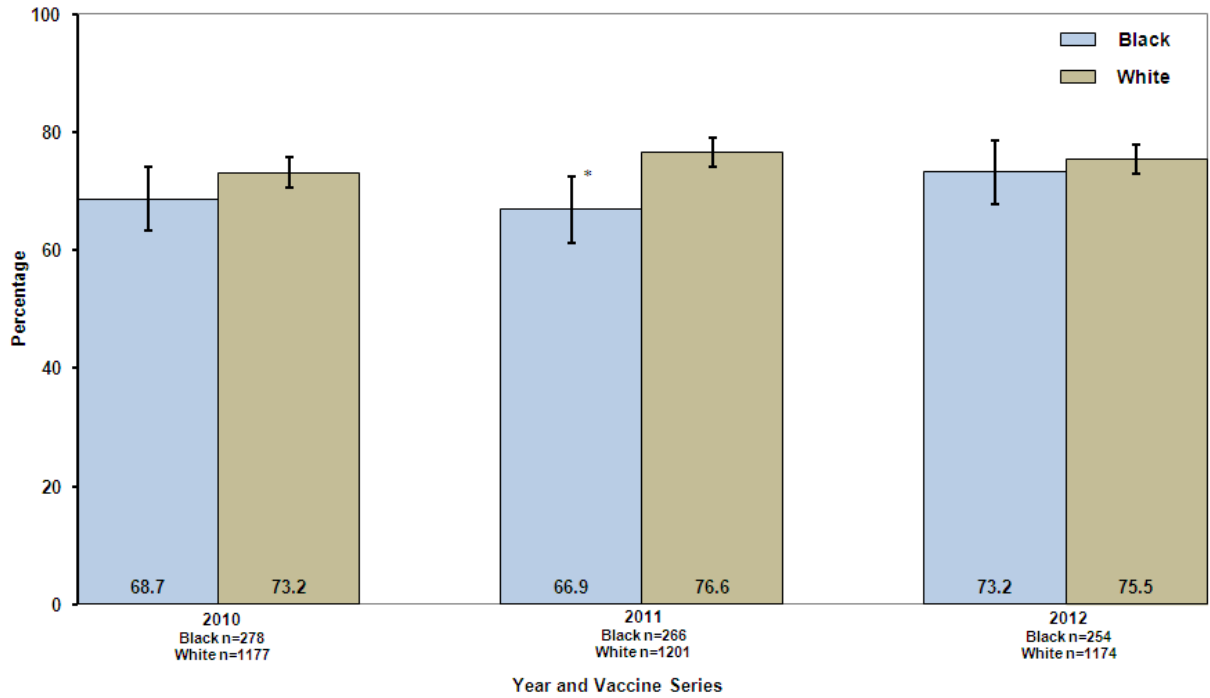
\*statistically significantly lower point estimate than the comparison group

**2012 Immunization Status of 24-Month-Old Children in Tennessee:  
Statewide percentage of children with age-appropriate immunization levels  
by vaccine and WIC enrollment status  
(point estimates and 95% confidence intervals, n=1431)**



\*statistically significantly lower point estimate than the comparison group

**2012 Immunization Status of 24-Month-Old Children in Tennessee:  
 Statewide percentage of children with age-appropriate 4:3:1:3:3:1:4 immunization levels  
 by race  
 (point estimates and 95% confidence intervals)**



# **Appendix 5**

## **2012 Immunization Status Survey Of 24-Month-Old Children in Tennessee**

### **Data Tables for Selected Analyses**

	Page
Series Complete (4:3:1:3:3:1:4)	... 39
Series Complete (4:3:1:3:3:1:4) by Provider Type	... 39
Series Complete (4:3:1:3:3:1:4) by Race	... 40
Series Complete (4:3:1:3:3:1:4) by Number of Older Siblings	... 40
Series Complete (4:3:1:3:3:1:4) by TennCare Enrollment	... 41

**Series Complete (4:3:1:3:3:1:4)**

Region	Yes		No		Total
	n=	%	n=	%	n=
Northeast TN	91	82.0%	20	18.0%	111
East TN	83	75.5%	27	24.6%	110
Southeast TN	84	76.4%	26	23.6%	110
Upper Cumberland	80	74.1%	28	25.9%	108
Mid-Cumberland	89	84.8%	16	15.2%	105
South Central	84	75.7%	27	24.3%	111
West TN	88	74.6%	30	25.4%	118
Shelby County	71	64.0%	40	36.0%	111
Davidson County	83	74.8%	28	25.2%	111
Knox County	69	63.9%	39	36.1%	108
Hamilton County	83	79.8%	21	20.2%	104
Madison County	90	79.0%	24	21.0%	114
Sullivan County	83	75.5%	27	24.5%	110
Total	1078	75.3%	353	24.7%	1431

**Series Complete (4:3:1:3:3:1:4) by Provider Type**

Region	Public			Private			Both		
	Yes	Total	%	Yes	Total	%	Yes	Total	%
Northeast TN	6	7	85.7%	77	90	85.6%	8	11	72.7%
East TN	4	5	80.0%	66	89	74.2%	13	16	81.3%
Southeast TN	4	5	80.0%	57	76	75.0%	23	28	82.1%
Upper Cumberland	4	8	50.0%	61	80	76.3%	15	18	83.3%
Mid-Cumberland	0	0	0.0%	83	95	87.3%	6	9	66.7%
South Central	4	5	80.0%	63	79	79.7%	17	21	81.0%
West TN	23	28	82.1%	43	58	74.1%	22	29	75.9%
Shelby County	3	6	50.0%	52	79	65.8%	16	24	66.7%
Davidson County	1	1	100.0%	76	98	77.6%	6	11	54.5%
Knox County	0	2	0.0%	58	86	67.4%	11	17	64.7%
Hamilton County	0	2	0.0%	74	91	81.3%	9	10	90.0%
Madison County	15	20	75.0%	62	75	82.7%	13	18	72.2%
Sullivan County	5	9	55.6%	66	85	77.6%	12	16	75.0%
Total	69	98	70.4%	838	1081	77.5%	171	228	75.0%

### Series Complete (4:3:1:3:3:1:4) by Race

Region	White			Black			Other		
	Yes	Total	%	Yes	Total	%	Yes	Total	%
Northeast TN	89	109	81.7%	2	3	66.7%	1	1	100.0%
East TN	80	107	74.8%	2	2	100.0%	2	2	100.0%
Southeast TN	80	105	76.2%	4	4	100.0%	1	2	50.0%
Upper Cumberland	78	106	73.6%	2	2	100.0%	0	0	0.0%
Mid-Cumberland	79	92	85.9%	9	12	75.0%	1	1	100.0%
South Central	81	108	75.0%	5	7	71.4%	0	0	0.0%
West TN	71	96	74.0%	18	23	78.3%	0	0	0.0%
Shelby County	29	43	67.4%	40	67	59.7%	2	2	100.0%
Davidson County	57	75	76.0%	26	36	72.2%	5	5	100.0%
Knox County	57	93	61.3%	10	13	76.9%	3	4	75.0%
Hamilton County	59	74	79.7%	23	29	79.3%	1	1	100.0%
Madison County	46	59	78.0%	43	54	79.6%	1	1	100.0%
Sullivan County	80	107	74.8%	2	2	100.0%	1	1	100.0%
Total	886	1174	75.5%	186	254	73.2%	18	20	90.0%

### Series Complete (4:3:1:3:3:1:4) by Number of Older Siblings

Region	0 Siblings			1 Siblings			2+Siblings		
	Yes	Total	%	Yes	Total	%	Yes	Total	%
Northeast TN	36	43	83.7%	36	47	76.6%	19	21	90.5%
East TN	40	49	81.6%	24	33	72.7%	19	28	67.9%
Southeast TN	38	44	86.4%	24	34	70.6%	22	32	68.8%
Upper Cumberland	29	34	85.3%	31	41	75.6%	20	33	60.6%
Mid-Cumberland	36	39	92.3%	25	35	71.4%	28	31	90.3%
South Central	35	40	87.5%	36	50	72.0%	13	21	61.9%
West TN	38	43	88.4%	30	41	73.2%	20	34	58.8%
Shelby County	30	44	68.2%	29	37	78.4%	12	30	40.0%
Davidson County	48	58	82.8%	19	27	70.4%	16	25	64.0%
Knox County	34	45	75.6%	25	41	61.0%	10	22	45.5%
Hamilton County	46	56	82.1%	22	26	84.6%	15	22	68.2%
Madison County	46	52	88.5%	23	31	74.2%	21	31	67.7%
Sullivan County	47	56	83.9%	22	33	66.7%	14	21	66.7%
Total	503	603	83.4%	346	476	72.7%	229	351	65.2%



## Series Complete (4:3:1:3:3:1:4) by TennCare Enrollment

Region	Enrolled			Not Enrolled		
	Yes	Total	%	Yes	Total	%
Northeast TN	51	61	83.6%	40	50	80.0%
East TN	48	62	77.4%	35	48	72.9%
Southeast TN	52	69	75.4%	32	41	78.1%
Upper Cumberland	56	77	72.7%	24	31	77.4%
Mid-Cumberland	36	47	76.6%	53	58	91.4%
South Central	63	77	81.8%	21	34	61.8%
West TN	61	82	74.4%	27	36	75.0%
Shelby County	49	79	62.0%	22	32	68.8%
Davidson County	51	69	73.9%	32	42	76.2%
Knox County	33	52	63.5%	36	56	64.3%
Hamilton County	44	56	78.6%	39	48	81.3%
Madison County	61	75	81.3%	29	39	74.4%
Sullivan County	14	21	66.7%	69	89	77.5%
Total	619	827	74.9%	459	604	76.0%

