

# Results of the 2007 Immunization Status Survey Of 24-Month-Old Children in Tennessee

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## Definition of Abbreviations in Charts

### 1. Vaccines

- a. **DTaP:** diphtheria, tetanus, acellular pertussis
- b. **IPV:** inactivated polio vaccine
- c. **Hep B:** hepatitis B vaccine
- d. **Hib:** *Haemophilus influenzae*, type B vaccine
- e. **MMR:** measles, mumps, rubella
- f. **Var:** varicella (chickenpox) vaccine
- g. **PCV7:** seven-valent pneumococcal conjugate vaccine
- h. **Flu:** influenza 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. **CHR:** Chattanooga-Hamilton County
  - iv. **NDR:** Nashville-Davidson County
  - v. **JMR:** Jackson-Madison County
  - vi. **MSR:** Memphis-Shelby County

# Results of the 2007 Immunization Status Survey

## Of 24-Month-Old Children in Tennessee

### General:

The 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, which are aggregated to give statewide statistics on immunization coverage levels in Tennessee.

TIP's goal is for 90% of Tennessee's children to be completely immunized with each of 6 vaccines which protect against the following 10 diseases: diphtheria, tetanus, pertussis, (combined as DTaP); poliomyelitis (IPV); measles, mumps, rubella (combined as MMR); *Haemophilus influenzae* type B (Hib); hepatitis B (Hep B); and varicella (Var). In this survey, complete immunization for a child aged 24 months is defined as having received four doses of DTaP, three doses of IPV, one dose of MMR, three doses of Hib, three doses of Hep B, and one dose of varicella vaccine (abbreviated as 4:3:1:3:3:1). Surveys conducted before 2002 defined complete immunization as the receipt of a minimum of four doses of DTaP, three doses of 3 polio vaccine and one dose of MMR (abbreviated as 4:3:1) in children 24 months of age. For this reason, 4:3:1 data are provided in some charts where trends over time are analyzed, but the more comprehensive measure is otherwise used. The 2007 survey also reports the proportion of children receiving at least 2 doses of influenza vaccine (Flu) and four doses of pneumococcal conjugate vaccine (PCV7, Prevnar<sup>®</sup>); these vaccines are not yet part of a combined immunization series measures.

The 2007 statewide sample consisted of 1583 children born in the first quarter of 2005 (January, February, March). Of the 1583, 113 were excluded from the analysis because parents refused to participate, had moved out of state or the child was deceased; 1470 children remained in the sample. Of the 1470, 26 children had no records of any immunization. Among these 26, parents reported that two children were not immunized because of the parents' personal beliefs, one for medical reasons and eight children for religious reasons. Health department staff could not locate the other 15 children or their records. By protocol, all of these children are included in the analysis as incompletely immunized.

The survey is designed to allow valid statistical comparisons of the populations in each of the 13 health department regions; however, sample sizes are too small to yield interpretable results at sub-strata smaller than the health department regional level. For example, it is not possible to assess immunization coverage levels of individual counties within multi-county rural health department regions.

Two major enhancements have been made to the analysis of the 2007 survey in order to increase the usefulness of the information provided. First, in the 2007 survey, oversampling for black children was done in each region where the random sample contained fewer black children than the proportion of black children born in the first quarter of 2005 in that region. The oversampled children were included only in state-level analysis of black-white disparities and were not included in the 1470 population for any other analysis. Second, 95% confidence intervals (CI) were calculated and are displayed as box-whisker plots on graphs in this report to permit assessment of the statistical 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. CI are not available for the results of previous surveys.

## **Limitations:**

### *Influenza (Flu) and PCV7*

Children born in the first quarter of 2005 who received every routinely recommended vaccine on time should have received 3 doses of Flu and 4 doses of PCV7 by the age of 24 months. Because the fall of 2005 was the first season in which routine immunization of children 6-23 months was recommended, a lower threshold of 2 doses was measured for 2007.

Survey methodology includes extracting immunization information out of the state immunization information system (SIIS) before sending questionnaires to the regional health department offices for completion. Records that contained all 4:3:1:3:3:1 vaccine doses in SIIS were not sent to the regional health department for additional follow-up. It is reasonable to assume that most SIIS records with complete 4:3:1:3:3:1 information were also likely to have information about all other immunizations received. However, because this was not verified by health department staff for 4:3:1:3:3:1-complete records when PCV7 or Flu were incomplete, the estimates of completion of Flu and PCV7 may somewhat underestimate actual completion.

### *Hib*

Two formulations of Hib vaccine are available, one requires 3 doses before 25 months and the other requires four. Because brand names are not captured, three doses of Hib vaccine are considered complete, although that may include some children who received only three doses of the 4-dose product. This results in an overestimation of on-time completion.

### *Minimum intervals*

On-time immunization may be overestimated because data analysis does not take into account whether dose intervals or age at administration meets Centers for Disease Control and Prevention (CDC) recommendations. Minimum intervals have not been assessed in previous surveys; to add these criteria would prevent meaningful comparison to past survey results.

### *Historical coding of individual vaccine completion*

In the 2007 Access database, it was noted that analysis program counted shots administered after 25 months of age toward completion rates for individual vaccines, resulting in small differences between actual and calculated figures for the completion of individual immunizations by 25 months. This did not affect overall 4:3:1:3:3:1 series completion results. The validated results yielded lower point-estimates for individual vaccine completion than those detected in 2006; the largest change was in the DTaP result. It is not known whether this programming issue was present in previous years. The only individual vaccine tracked over time in previous immunization surveys was DTaP; estimates of completion of the 4<sup>th</sup> DTaP by 24 months may have been overestimated in previous surveys.

## **Statewide Results and Trend Analysis:**

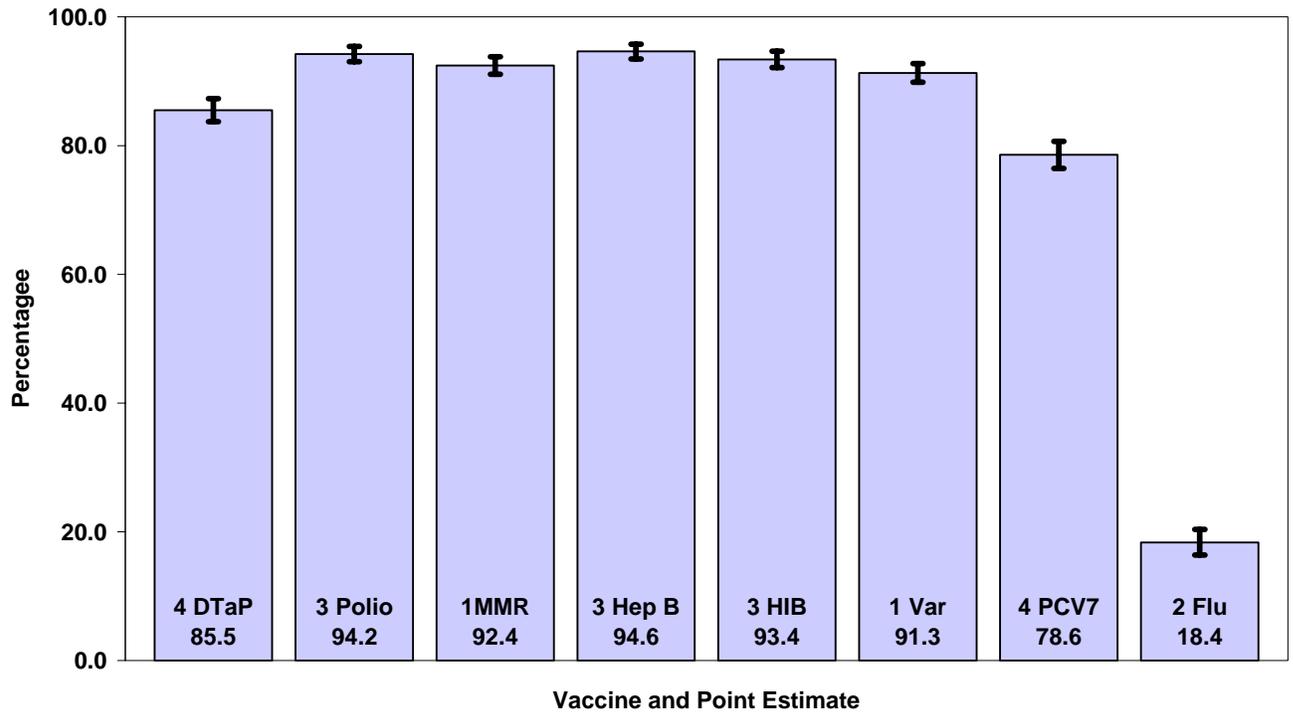
### *Vaccine specific on-time immunization coverage*

The Department of Health (TDH) goal is to achieve 90% on-time coverage for each of the 6 vaccines in the 4:3:1:3:3:1 series. The proportion of children sampled who had been immunized on-time, by individual vaccine, is in figure 1, below. In 2007, IPV, MMR, varicella, Hep B and Hib remained over 90%, as they were in 2006. DTaP decreased 4 percentage points from 89.5% in 2006 to 85.5% in 2007. The difference could be the result of a coding error overestimating coverage in the 2006 analysis (see limitations section).

Please see Appendix 1 at the end of this report for charts displaying the on-time immunization with each vaccine analyzed by public health region.

**Figure 1**

**2007 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)**

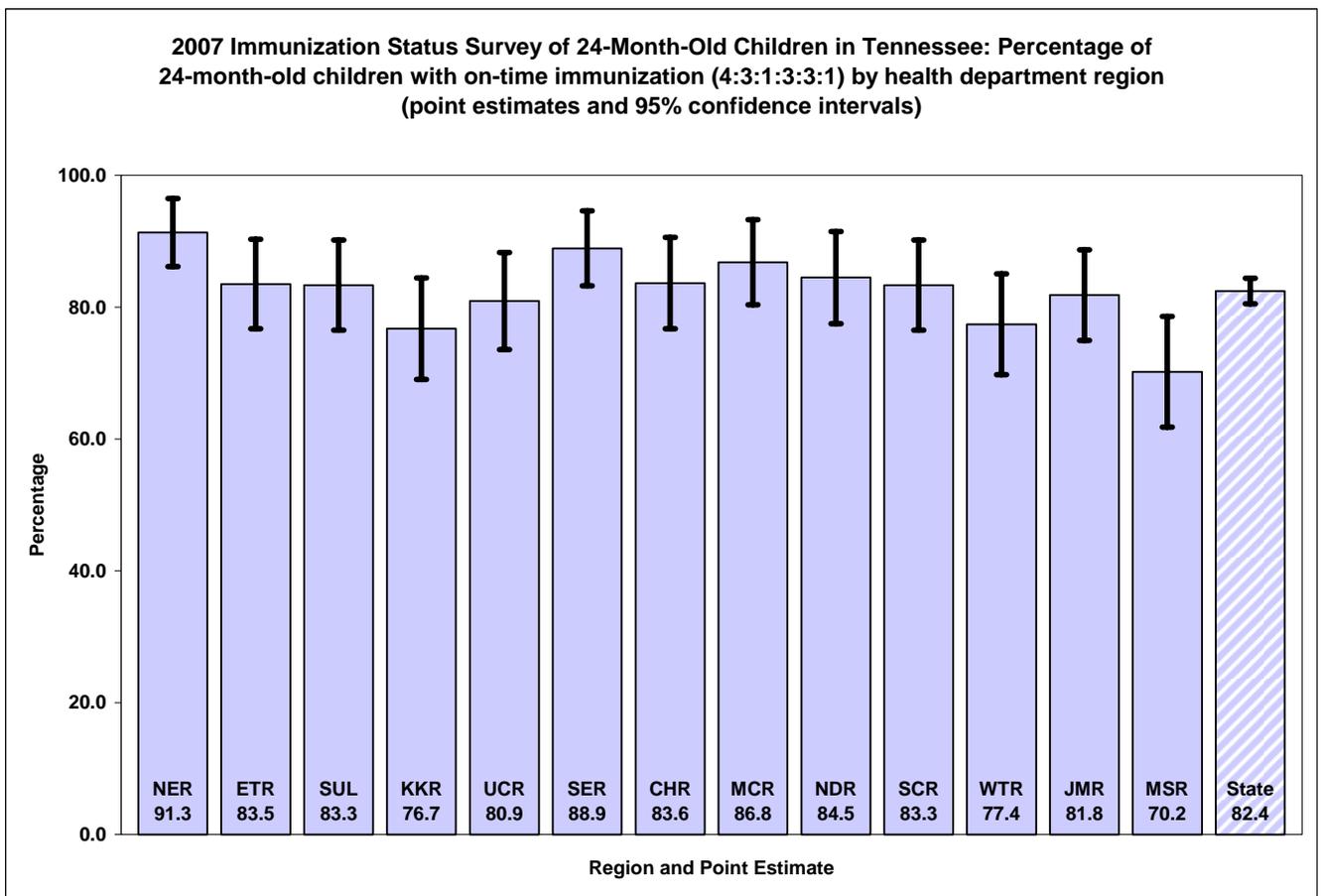


**Complete 4:3:1:3:3:1 immunization levels statewide and by public health region**

The 4:3:1:3:3:1 on-time immunization levels for 2007 statewide and by public health region are presented in figure 2 below. In 2007, the point estimates for regions ranged from 70.2% to 91.3%. In two of 13 regions, on-time immunizations were statistically significantly different than the statewide coverage level of 82.4% (95% CI: 80.5-84.4). The Memphis Shelby County Region (MSR) was lower, at 70.2% (95% CI: 61.8-78.6); the Northeast Region (NER) estimate was higher, at 91.3% (95% CI: 86.2-96.5).

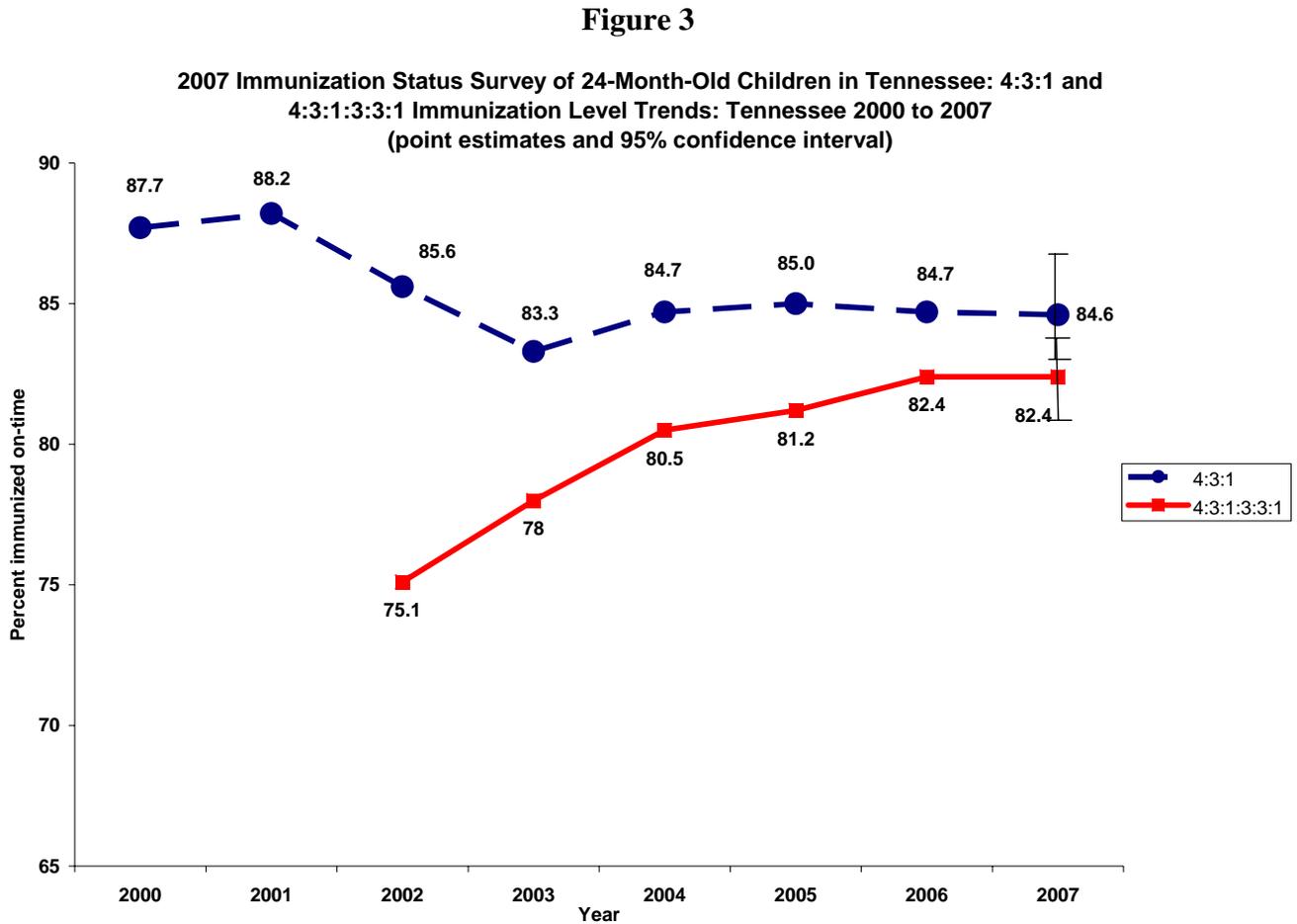
Please see Appendix 2 for a set of charts for each public health region displaying the on-time immunization numbers for all of the vaccines, plus the 4:3:1:3:3:1 series.

**Figure 2**



*State coverage trends over time*

Figure 3 below compares the 4:3:1 and 4:3:1:3:3:1 levels of on-time immunization measured by this survey from 2000 to 2007. The overlapping 95% confidence intervals show this difference not to be statistically significant, suggesting that, if children receive DTaP, IPV and MMR on time, they tend to receive all of their immunizations on time.



The decline in on-time immunization levels that began in 2002 are thought to have been, in part, due to the shortages of DTaP, MMR, and Varicella vaccines experienced during the period March 2001 to July 2002. Since July 2002, the vaccine supply situation has stabilized and a relatively uninterrupted supply has been available to providers. The recovery of on-time immunization levels has been slow, despite the steady supply of vaccine now available.

**Racial disparities**

The disparity between black and white children in on-time immunization improved with the introduction of TennCare and the Vaccines for Children (VFC) Program in the mid-1990s, as measured by state immunization surveys conducted after these programs began. However, in recent years, the gap has shown signs of widening. The gap in 2007 increased from 5.4% in 2006 to 8.3% in 2007. The sample size of children of other races (n=25) was too small to be meaningfully interpreted; this group was excluded from the analysis. Figure 4 shows the differences in the 4:3:1:3:3:1 series over time beginning in 2004. Appendix 6 of this report shows both the 4:3:1:3:3:1 series completion and the 4:3:1 series completion by race

**Figure 4**

**2007 Immunization Status Survey of 24-Month-Old Children in Tennessee: Trends in on-time immunization coverage disparities (Black vs. White): Tennessee 2004-2007**

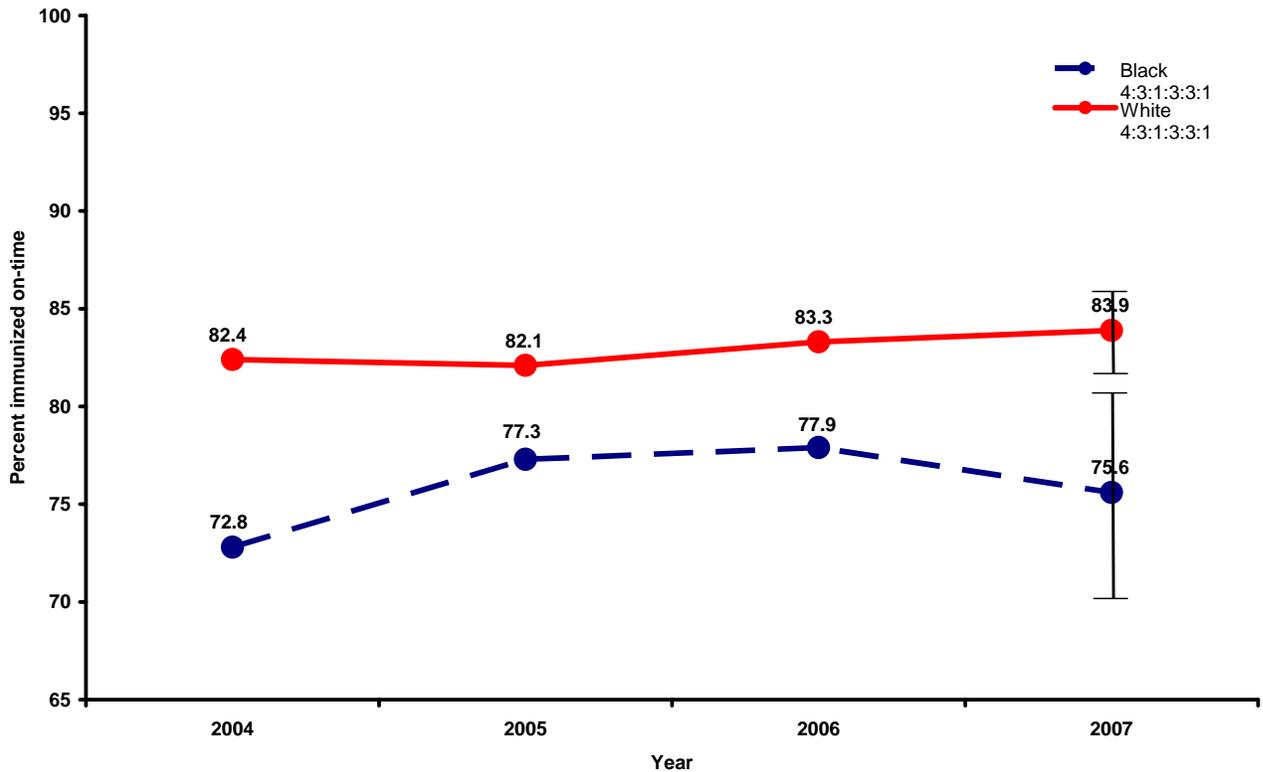
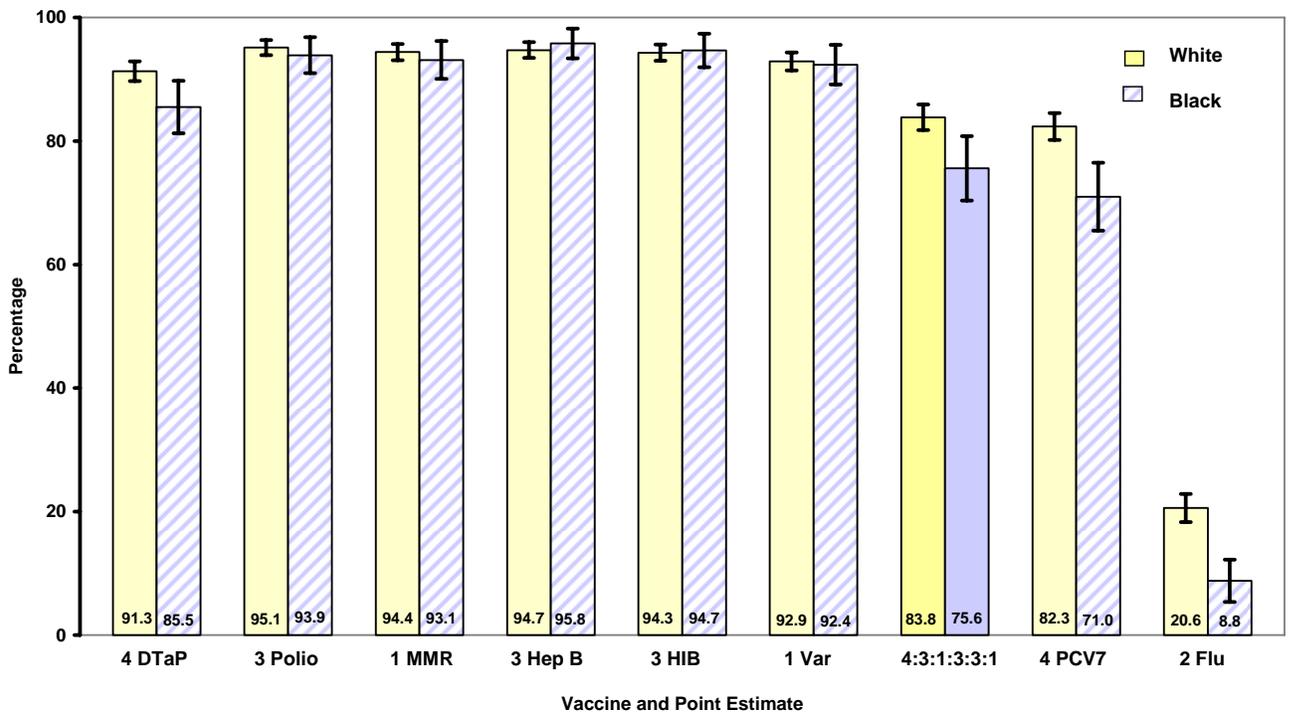


Figure 5 shows the percentages of children, categorized by race, with on-time immunization for each vaccine measured. Among vaccines included in the 4:3:1:3:3:1 series, statistically significant differences between blacks and whites existed only in on-time DTaP coverage; differences in the other vaccines were not statistically meaningful. Of note, the widest statistically significant gaps were measured in the on-time immunization against influenza and pneumococcal disease. Unlike the other vaccines measured, no state requirements address the use of these two vaccines.

**Figure 5**

**2007 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)**



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

Previous surveys have identified certain characteristics associated with failure to complete the recommended series of immunizations on time: starting immunizations at greater than 120 days of life, having two or more siblings, and being black (as described above). In the 2007 survey, children with just one sibling were significantly less likely to complete immunization on time, compared to children with no siblings (a 10 percentage point gap in the point estimate).

There was no difference found in on-time immunization of children receiving immunizations in health departments, private offices, or a combination of both. The differences in on-time immunization of children enrolled in TennCare or WIC versus those not enrolled were not statistically significant. Table 1 below summarizes the 2007 on-time completion rates for 4:3:1:3:3:1 in these groups.

**Table 1**

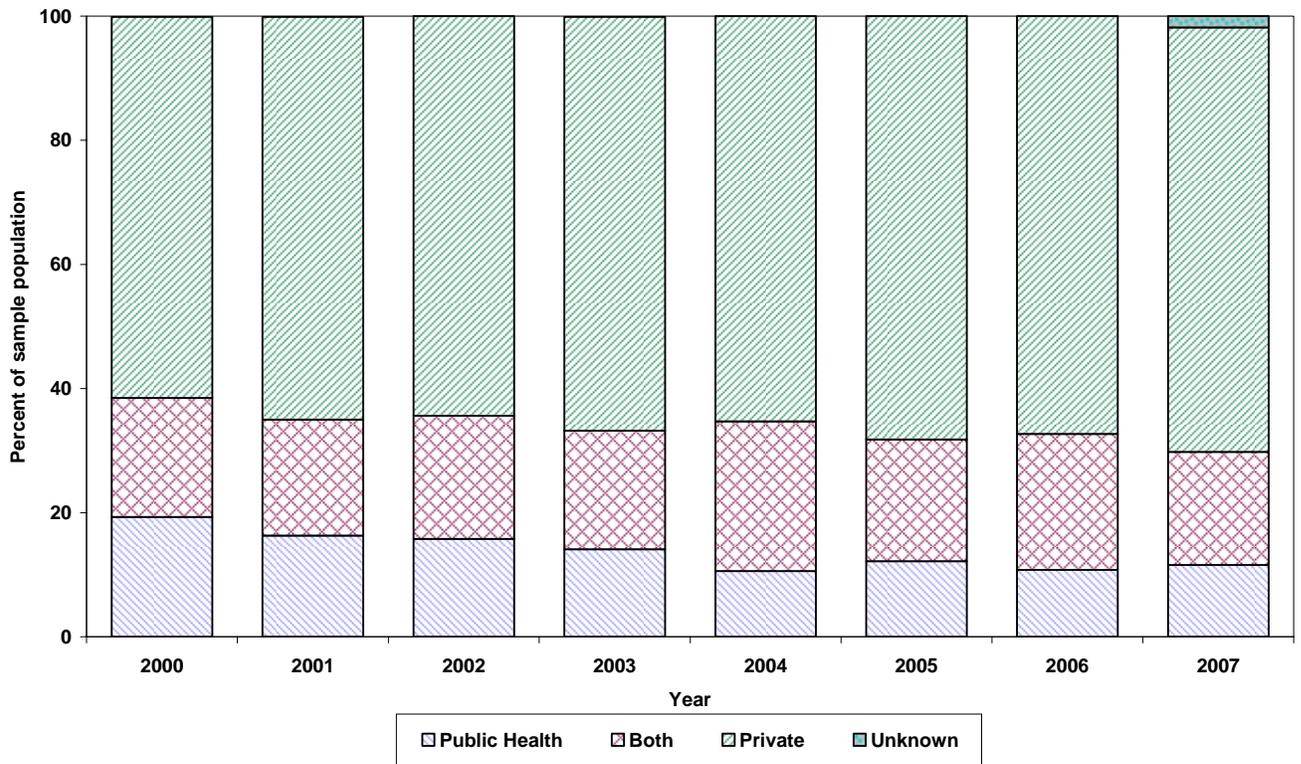
<b>4:3:1:3:3:1 Completion Levels in the 2007 Survey of 24-Month-Old Children: Selected Characteristics</b>			
<b>Provider Type</b>	Public n=143/170	Private n=845/1006	Both n=224/268
	<b>84.1% ± 5.49</b>	<b>84.0% ± 2.27</b>	<b>83.6% ± 4.44</b>
<b>TennCare Enrollment</b>	Enrolled n=639/761	Not Enrolled n=573/709	
	<b>84.0 ± 2.61</b>	<b>80.8% ± 2.90</b>	
<b>WIC Enrollment</b>	Enrolled n=766/914	Not Enrolled n=446/556	
	<b>83.8% ± 2.39</b>	<b>80.2% ± 3.31</b>	
<b>Other Siblings</b>	None n=583/652	One n=365/460	Two or more n=257/350
	<b>89.4% ± 2.36</b>	<b>79.3% ± 3.70</b>	<b>75.5% ± 4.49</b>
<b>Age at First Immunization</b>	≤120 days n=1198/1420	120 days n=14/24	
	<b>84.4% ± 1.89</b>	<b>58.3 ± 19.72%</b>	

*Immunization provider types and patient populations*

The “market share” of public health department clinics continues the decline that began when TennCare and the Vaccines for Children program enabled many children to establish a medical home that included immunization services. 11.6% of children received their immunizations exclusively at a public health facility, 68.4% received their immunizations at a private facility, and 18.2% received their immunizations at both types of facilities. Figure 6 below shows the trend over time.

**Figure 6**

**2007 Immunization Status Survey of 24-Month-Old Children in Tennessee: Source of Immunizations from 2000 to 2007**



Although survey results demonstrated equivalent on-time immunization in public and private clinics, the population of patients seen in health departments had a higher prevalence of traditional risk factors for delayed immunizations compared to those who received at least some vaccines in private offices. The table below shows the prevalence of these risk factors among patients who are immunized in health departments, private offices, and in a combination of public and private clinics.

**Table 2**

<b>Prevalence of risk factors for delayed immunizations by provider type</b>			
<b>Risk Factor</b>	<b>Health Department (n=170)</b>	<b>Both Private and Public (n=268)</b>	<b>Private Only (n=1006)</b>
Black	<b>27.7%</b>	<b>23.5%</b>	<b>13.1%</b>
2 or more siblings	<b>38.3%</b>	<b>25.8%</b>	<b>21.1%</b>
Age at first dose >120 days	<b>4.1%</b>	<b>3.4%</b>	<b>0.8%</b>
Any of above risk factors	<b>55.9%</b>	<b>43.7%</b>	<b>31.5%</b>

**Summary of key findings from the 2007 Survey:**

1. The 4:3:1:3:3:1 on-time level remained stable at 82.4%.
2. Assessed individually, all vaccines in the 4:3:1:3:3:1 series, with the exception of DTaP, were administered on-time to more than 90% of children in the survey.
3. Despite the finding that the patient population vaccinated in health departments had a higher prevalence of traditional risk factors for failure to complete immunizations on time, on-time completion of the 4:3:1:3:3:1 series did not differ by where the immunizations were given.
4. In the 2006 survey, on-time 4:3:1:3:3:1 immunization rates of WIC-enrolled children were 12.1 percentage points lower than those not enrolled. In the 2007 survey, the point estimate for WIC-enrolled children was much improved at 2.8 percentage points higher than those not enrolled; a difference not statistically significant.
5. The disparity in on-time immunization for the 4:3:1:3:3:1 series between black and white children, which had emerged in 2002 and has fluctuated since, was statistically significant. However, among the individual vaccines in the series, a statistically-significant difference was detected only in completion of DTaP.
6. On-time vaccination with PCV7 and influenza were the lowest measured; the racial disparity in the uptake of those two vaccines was the most pronounced. These are the only two recommended vaccines that are not required for pre-school or school entry.
7. Significant regional differences exist in the on-time vaccination of children, particularly for influenza and PCV7.

**Proposed actions based on survey results:**

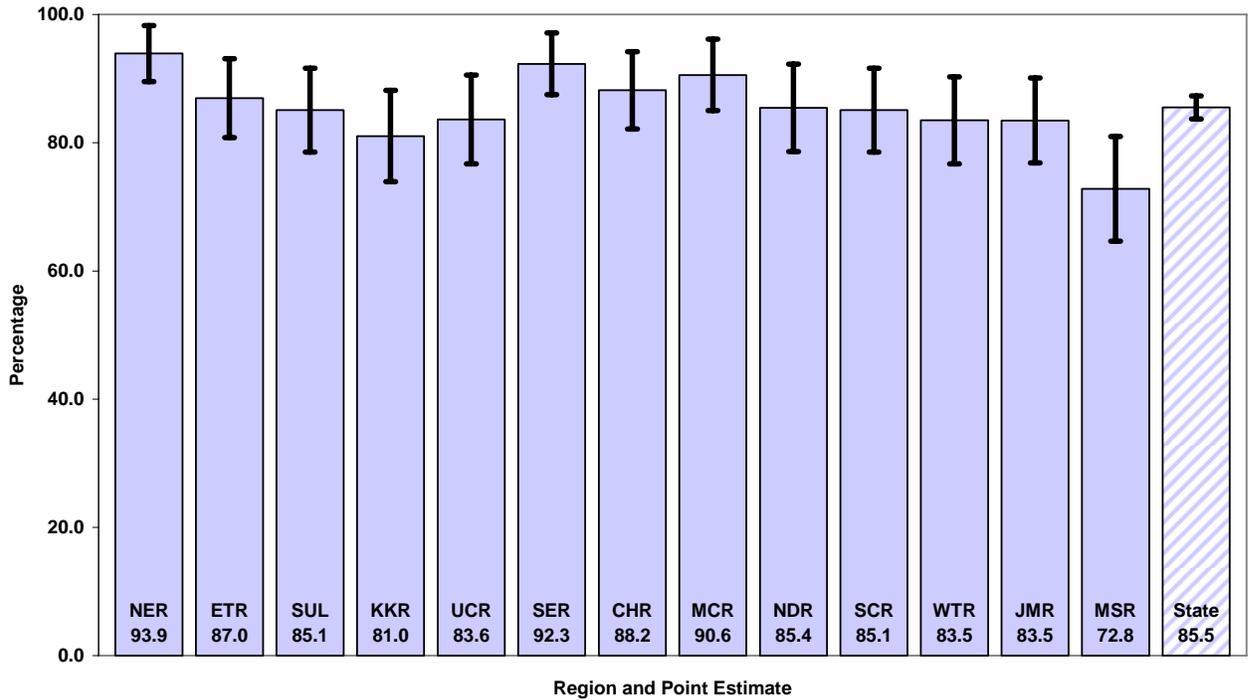
The Immunization Program (TIP) plans to take the following steps as a result of the findings of this survey of 24-month-old children.

1. TIP will continue to encourage both public and private providers to improve the DTaP 4 level by ensuring that the DTaP 3 is administered by 6 months of age so DTaP 4 may be administered by 12 months of age whenever possible.
2. TIP also will emphasize the importance of having a system to recall patients who have missed doses of vaccine, such as those who are in need of DTaP 4.

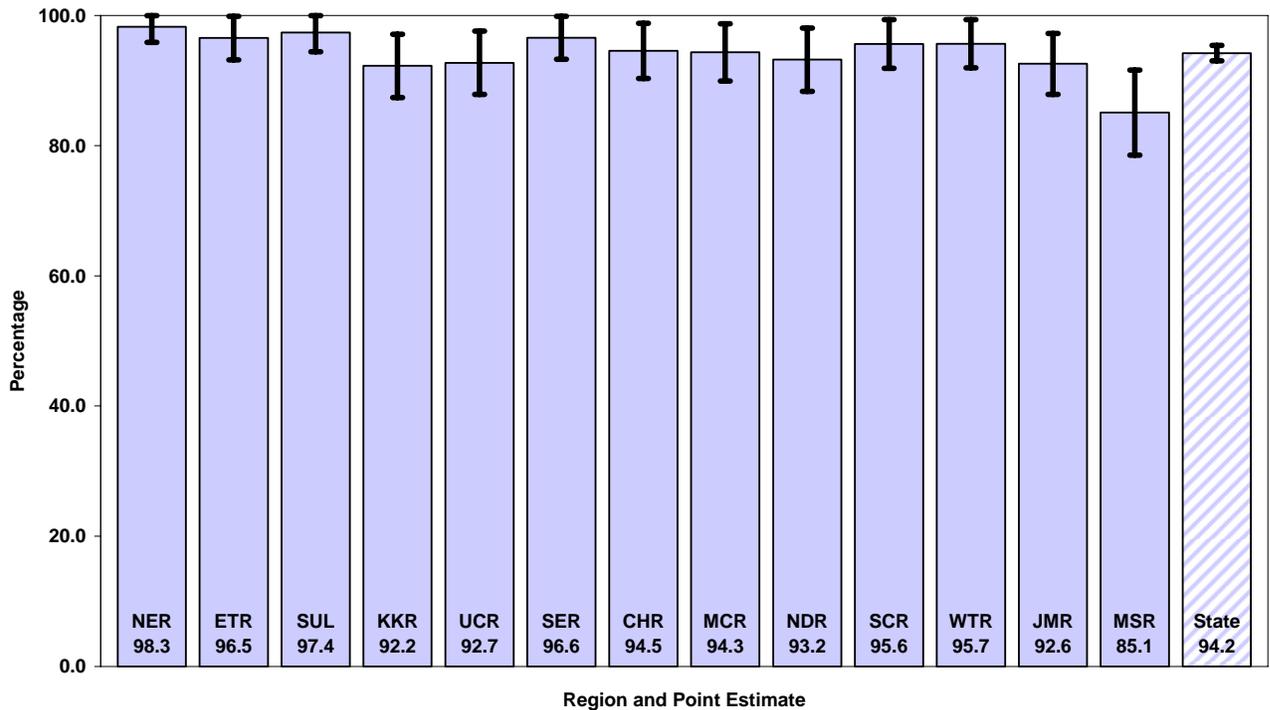
3. TIP will coordinate with the WIC Program to facilitate using WIC visits most effectively and consistently to support the on-time immunization of enrolled children.
4. TIP will work to increase awareness among public and private providers of risk factors for delayed immunization, including black race, having multiple siblings, delayed DTaP3 administration and delayed start to immunization.
5. TIP will pursue a regulation change to require PCV7 for daycare entry among children <5 years
6. TIP will work to configure its new Comprehensive Clinic Assessment Software Application (CoCASA) in order to resume providing regular reports of children who start immunizations at >120 days and children who have two or more siblings (those at high risk of not completing immunizations) to the regional offices for their use.
7. TIP will continue to educate public and private immunization providers about their performance and opportunities to improve through assessment site visits conducted in 25-33% of health department clinics and private Vaccines for Children Program participant offices each year. These visits include reports generated by CoCASA that define levels of on-time immunization and identify areas of opportunity for improvement in immunization service delivery.
8. The 2008 survey will continue to report on the recommended vaccines, PCV7 and influenza.

**Appendix 1**  
**Immunization Survey of 2005 Births**  
**Percentage of children completing each vaccine by health department**  
**region**

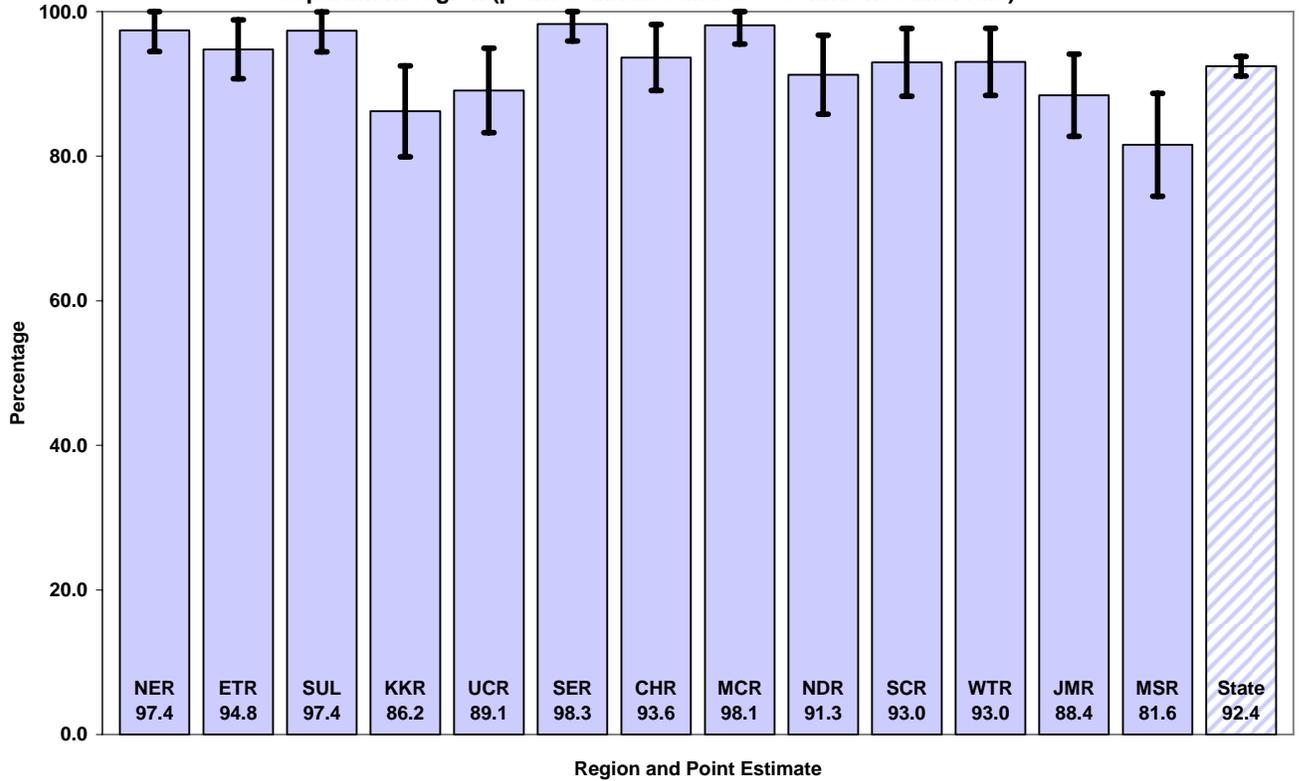
**2007 Immunization Status Survey of 24-Month-Old Children in Tennessee: Percentage of children with complete diphtheria, tetanus and acellular pertussis (DTaP) series (4 doses) by health department region (point estimates and 95% confidence intervals)**



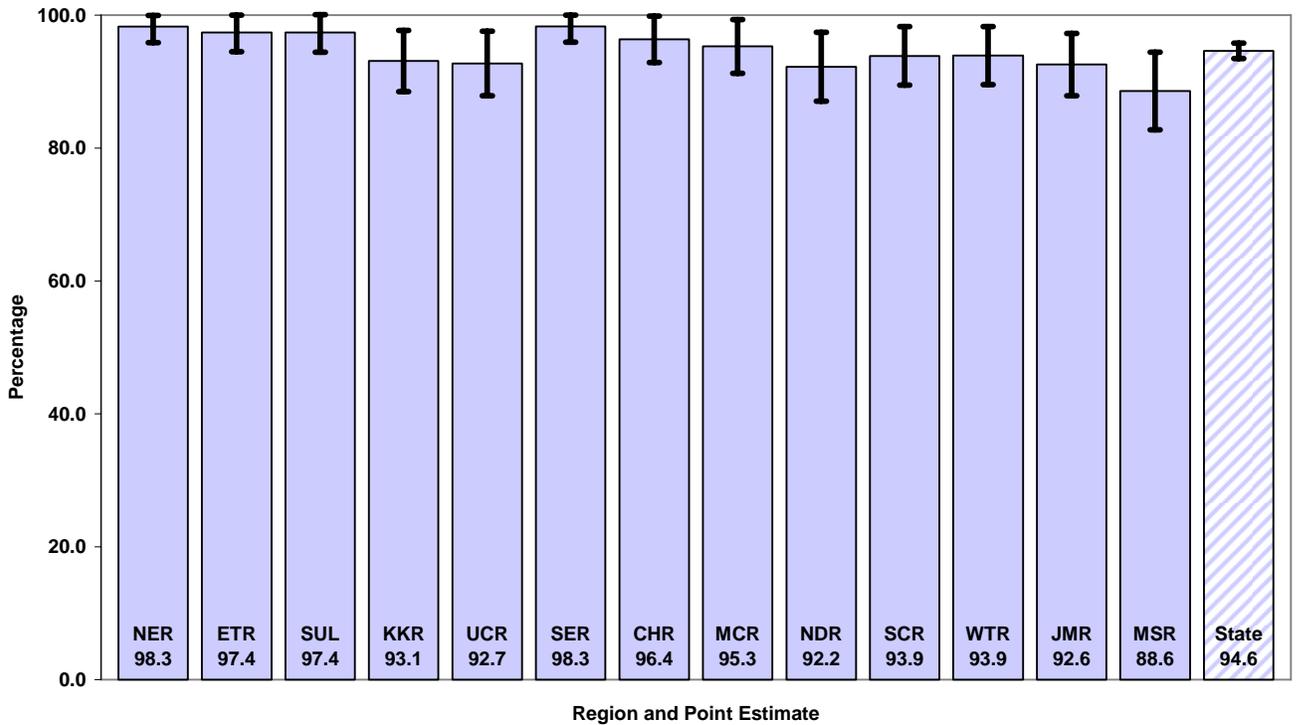
**2007 Immunization Status Survey of 24-Month-Old Children in Tennessee: Percentage of children with complete polio (IPV) series (3 doses) by health department region (point estimates and 95% confidence intervals)**



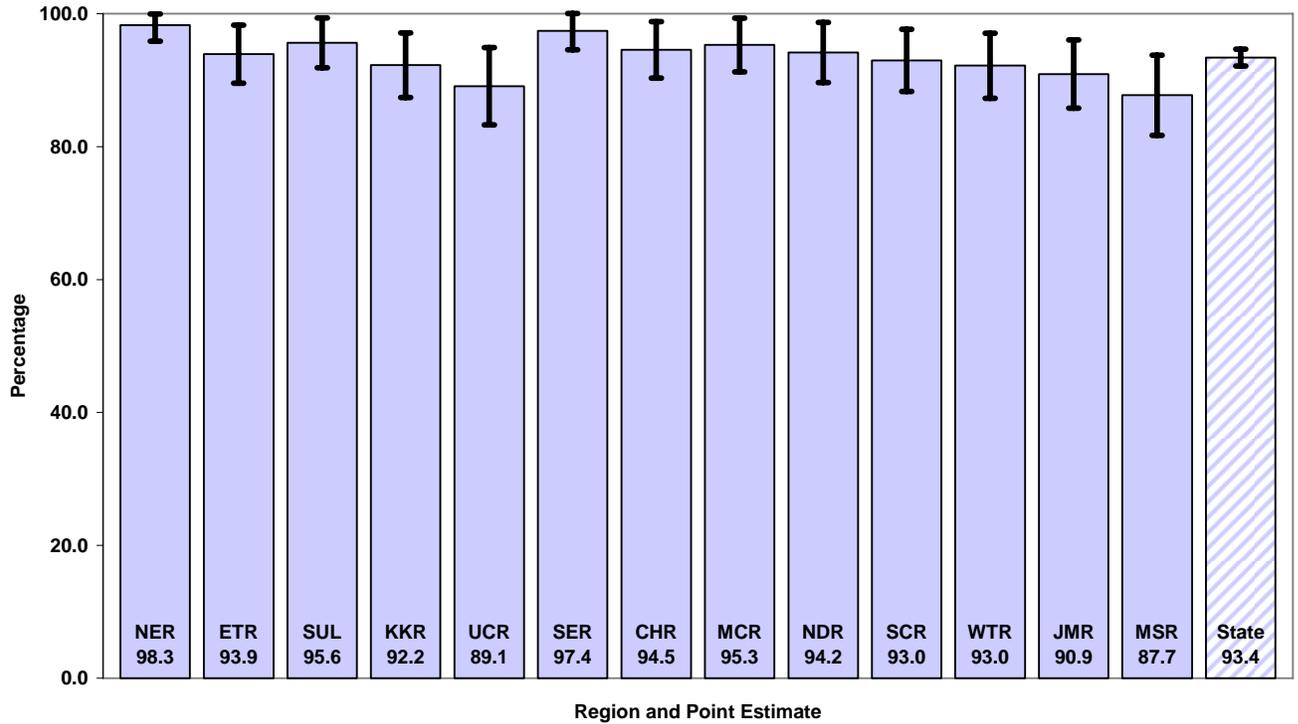
2007 Immunization Status Survey of 24-Month-Old Children in Tennessee: Percentage of children with complete measles, mumps, and rubella (MMR) series (1 dose) by health department region (point estimates and 95% confidence intervals)



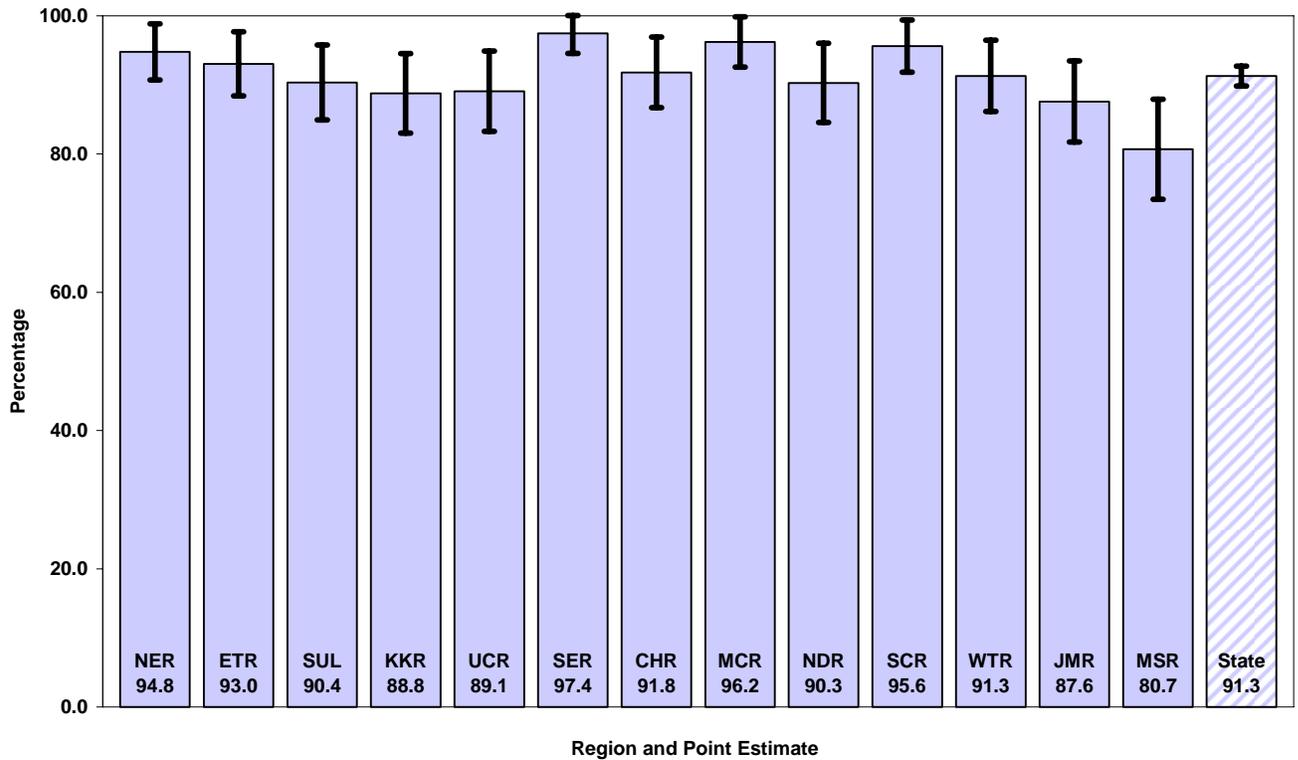
2007 Immunization Status Survey of 24-Month-Old Children in Tennessee: Percentage of children with complete Hepatitis B (HBV) series ( $\geq 3$  doses) by health department region (point estimates and 95% confidence intervals)



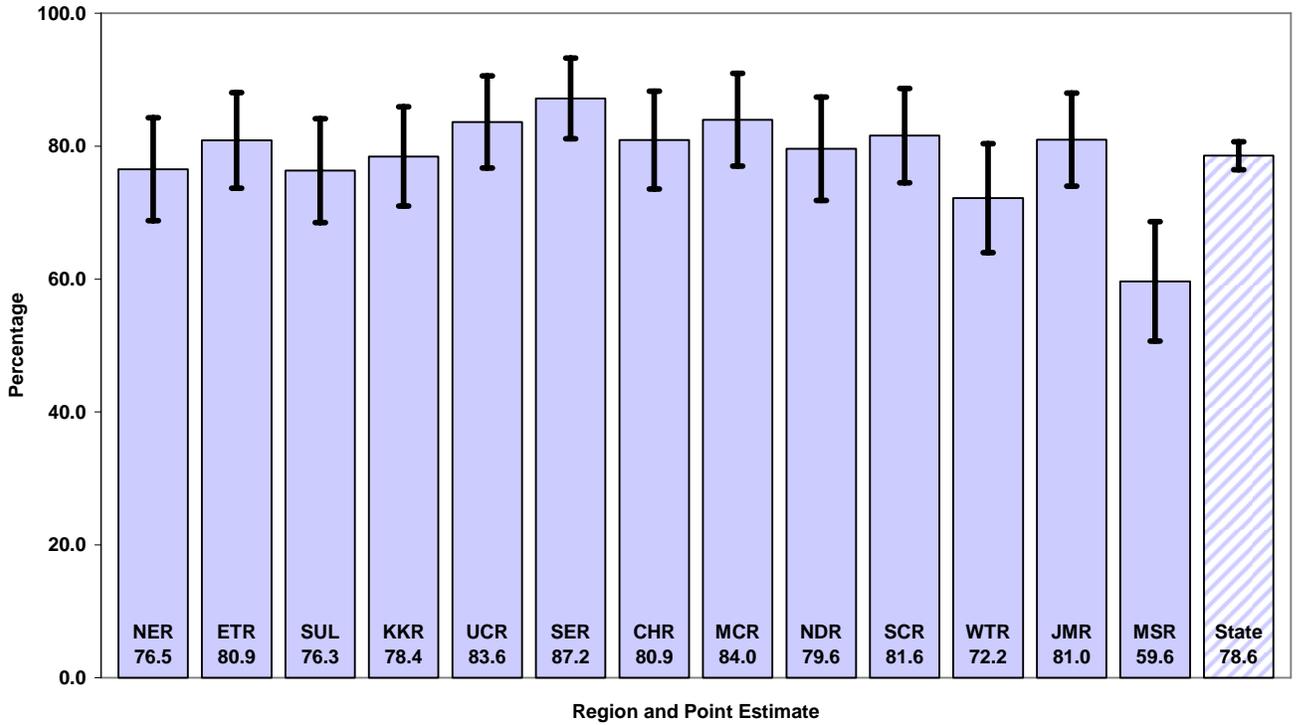
2007 Immunization Status Survey of 24-Month-Old Children in Tennessee: Percentage of children with complete *Haemophilus influenzae* type B (Hib) series (3 or 4 doses) by health department region (point estimates and 95% confidence intervals)



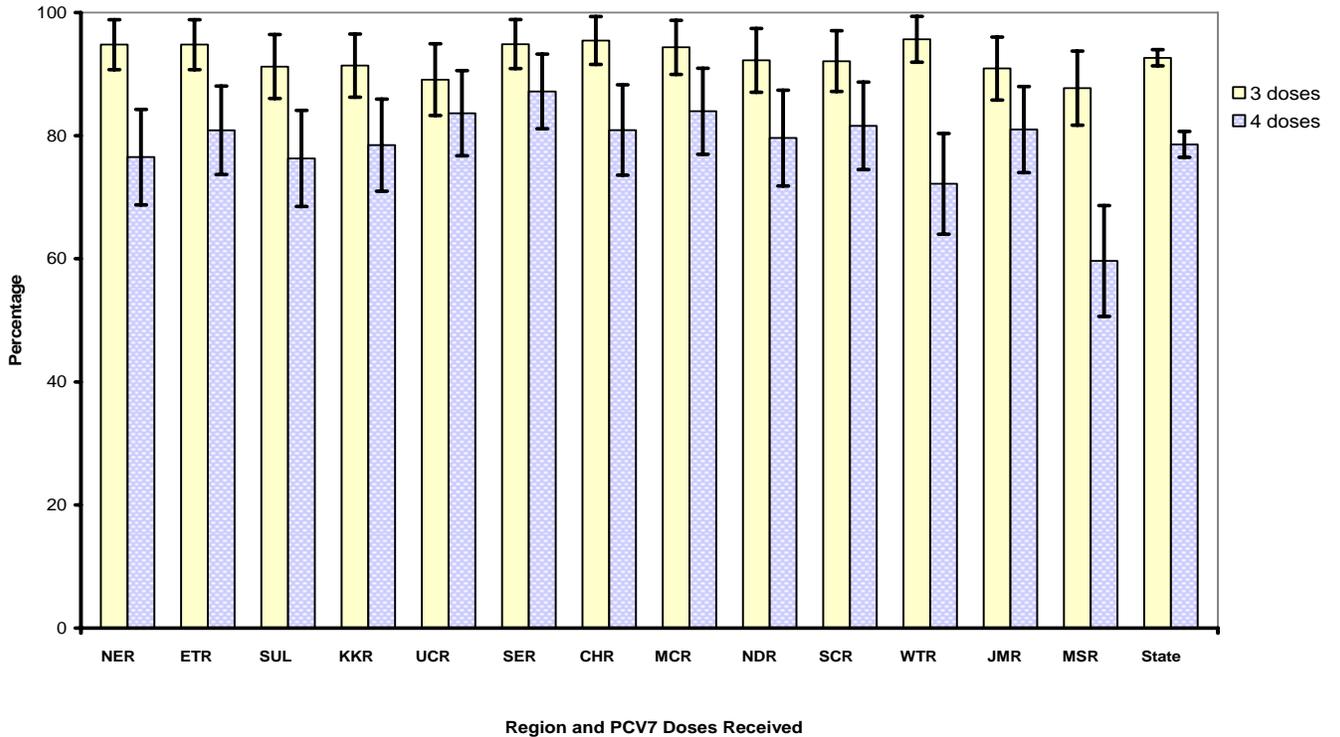
2007 Immunization Status Survey of 24-Month-Old Children in Tennessee: Percentage of children with complete varicella series (1 dose) by health department region (point estimates and 95% confidence intervals)



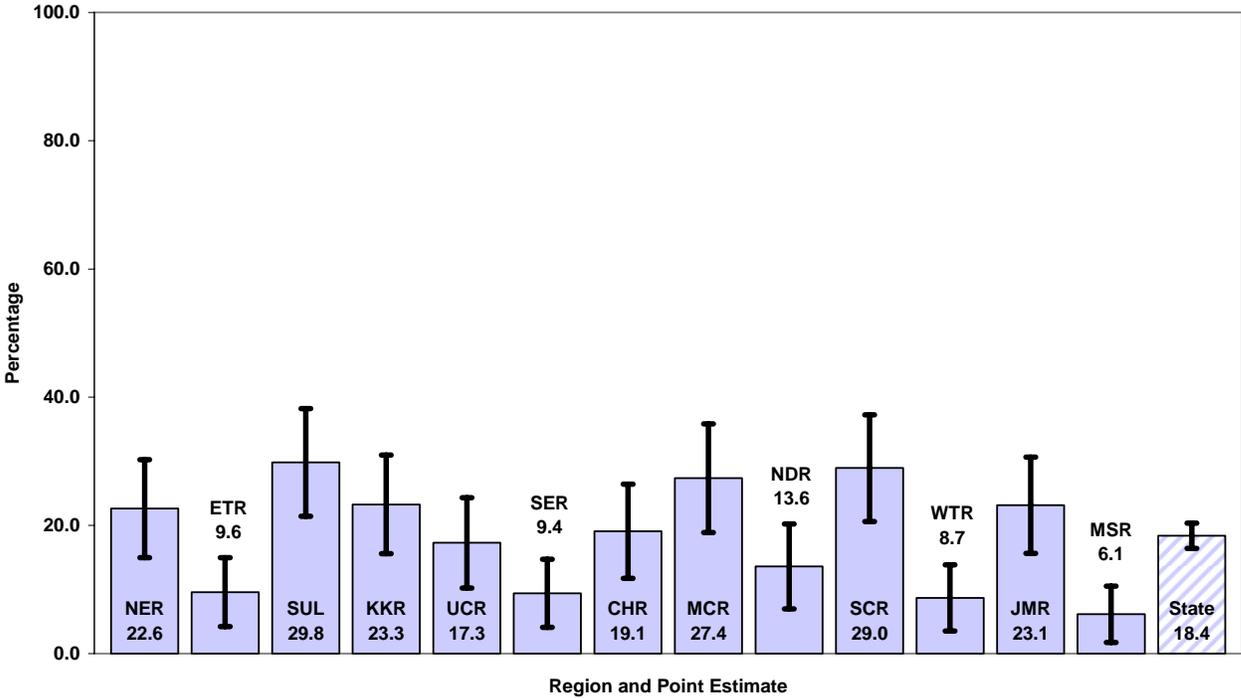
**2007 Immunization Status Survey of 24-Month-Old Children in Tennessee: Percentage of children with complete PCV7 series (4 doses) by health department region (point estimates and 95% confidence intervals)**



**2007 Immunization Status Survey of 24-Month-Old Children in Tennessee: Percentage of children with 3 or 4 doses of PCV7 by health department region**

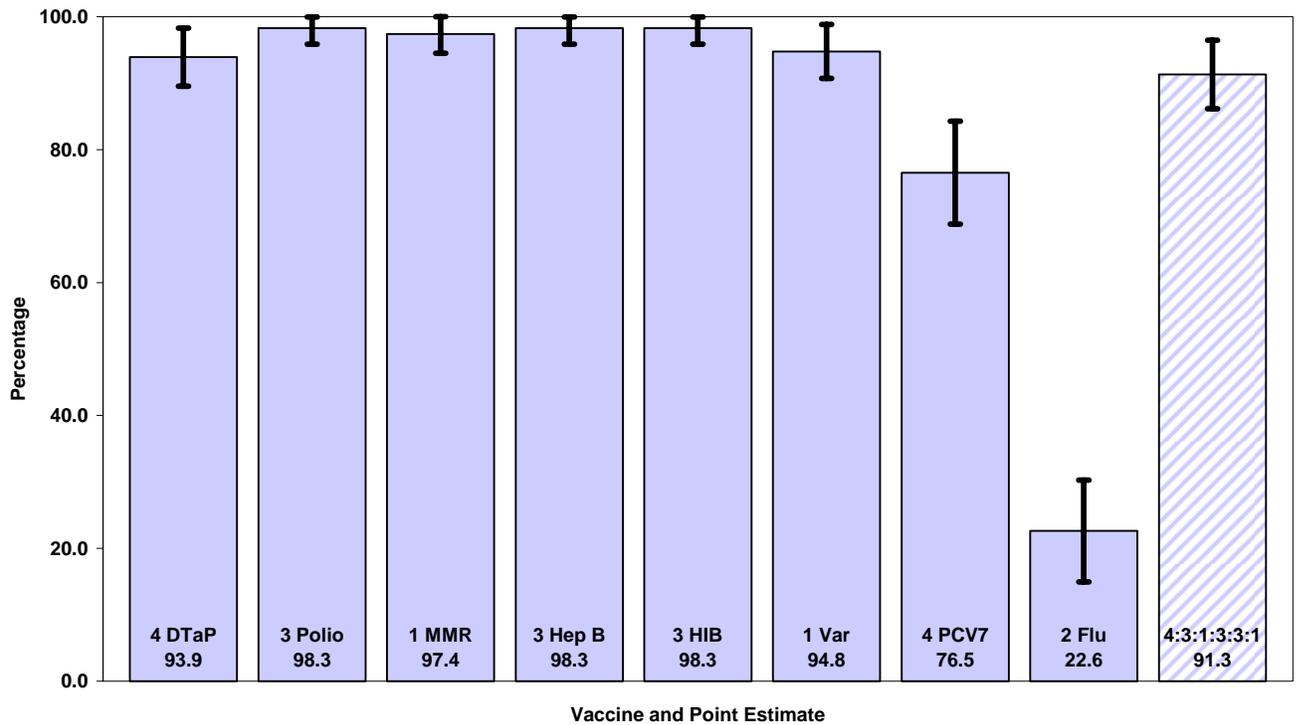


2007 Immunization Status Survey of 24-Month-Old Children in Tennessee: Percentage of children with complete influenza (FLU) series (2 doses) by health department region (point estimates and 95% confidence intervals)

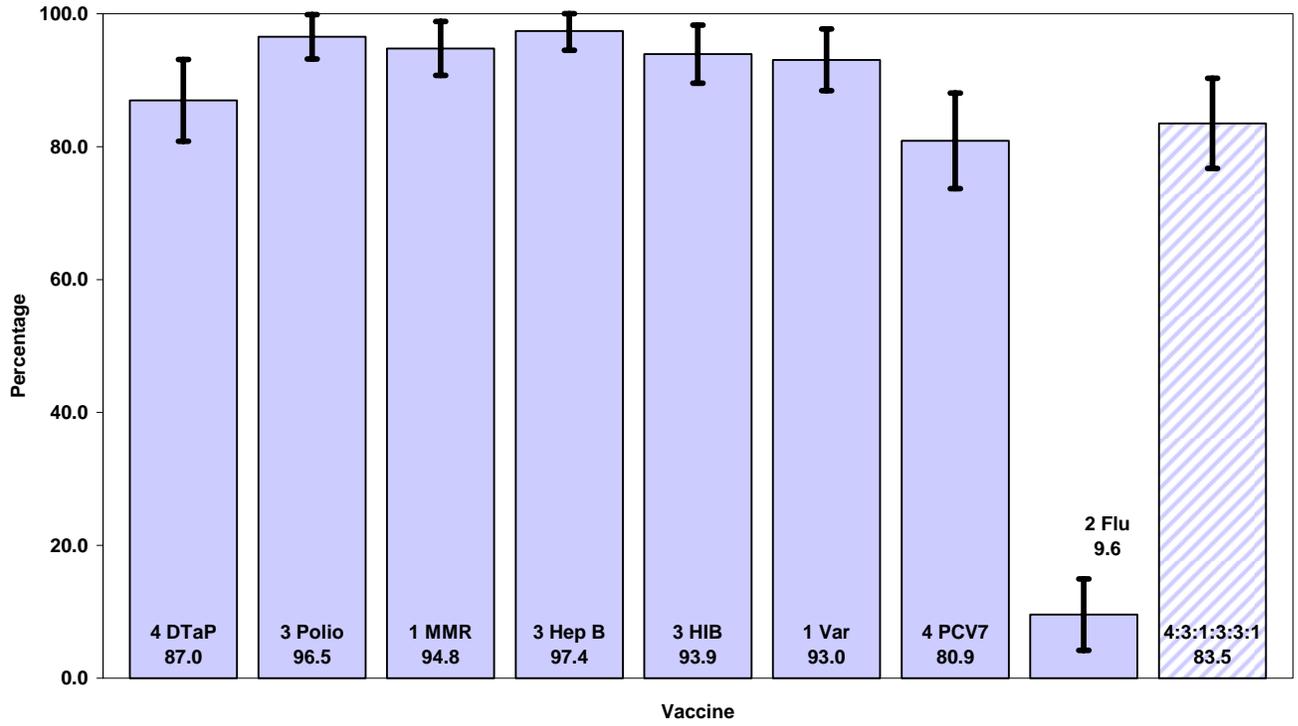


**Appendix 2**  
**Immunization survey of 2005 births**  
**Performance of each Public Health Region**

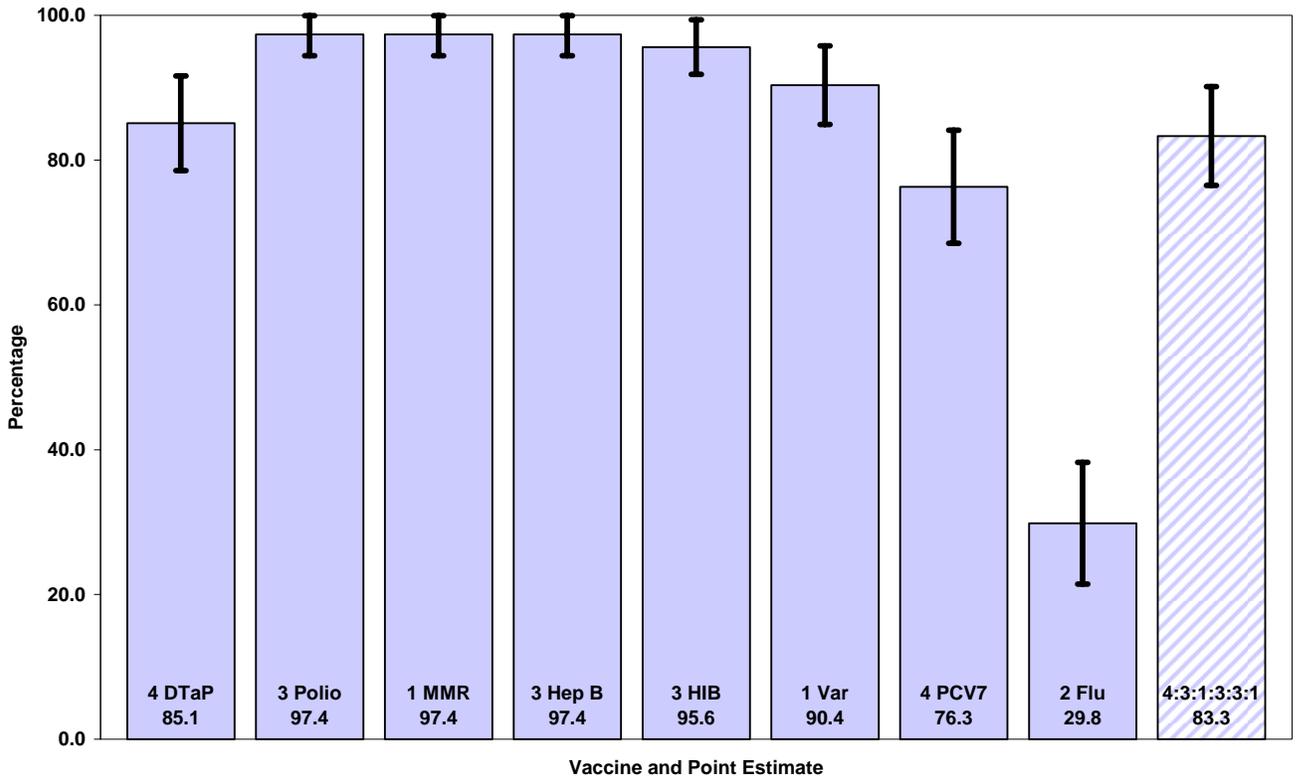
**2007 Immunization Status Survey of 24-Month-Old Children in Tennessee: Percentage of children complete in Northeast Region (NER) by vaccine (point estimates and 95% confidence intervals) of 24-Month-Old Children in**



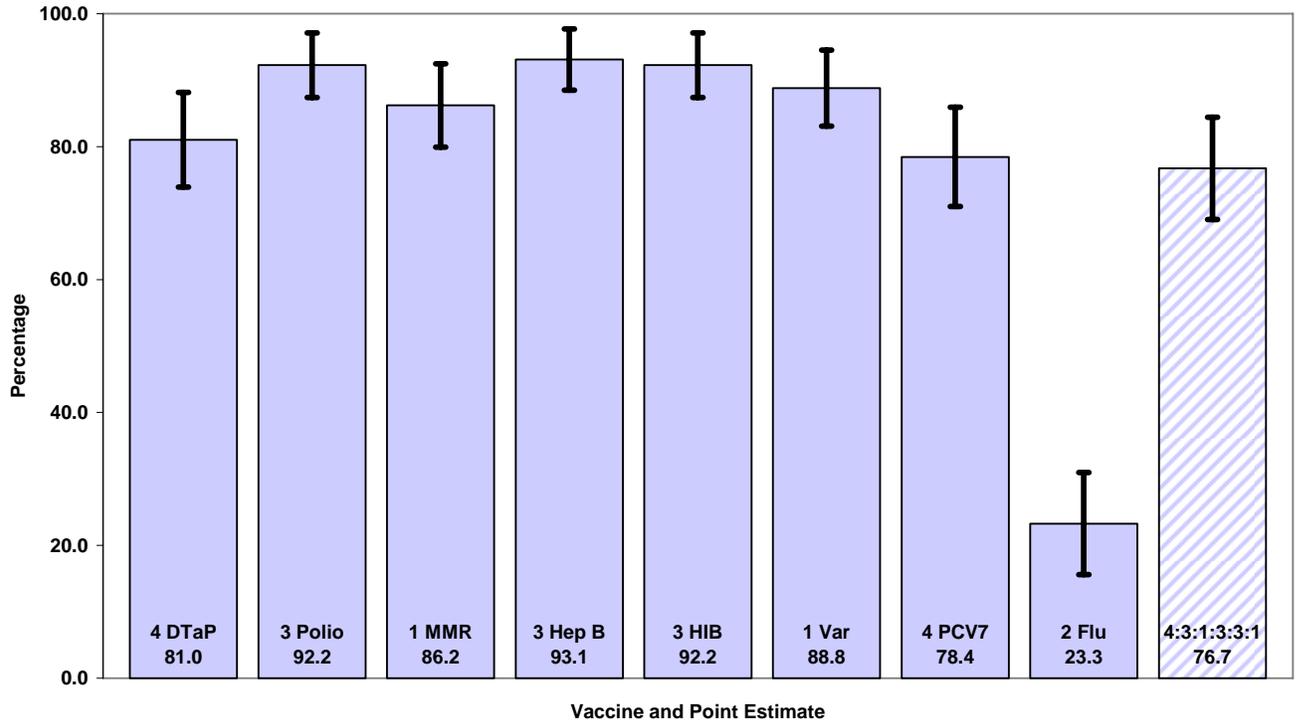
**2007 Immunization Status Survey of 24-Month-Old Children in Tennessee: Percentage of children complete in East Tennessee Region (ETR) by vaccine (point estimates and 95% confidence intervals)**



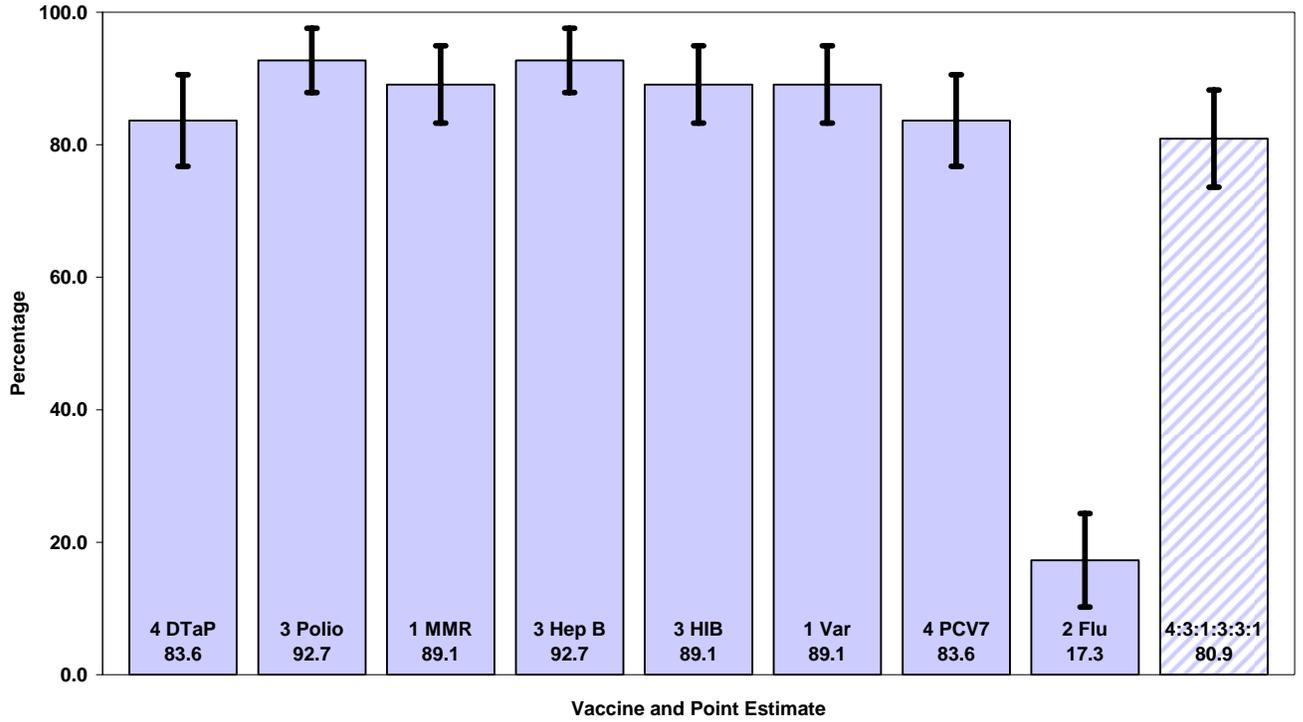
2007 Immunization Status Survey of 24-Month-Old Children in Tennessee: Percentage of children complete in Sullivan Region (SUL) by vaccine (point estimates and 95% confidence intervals)



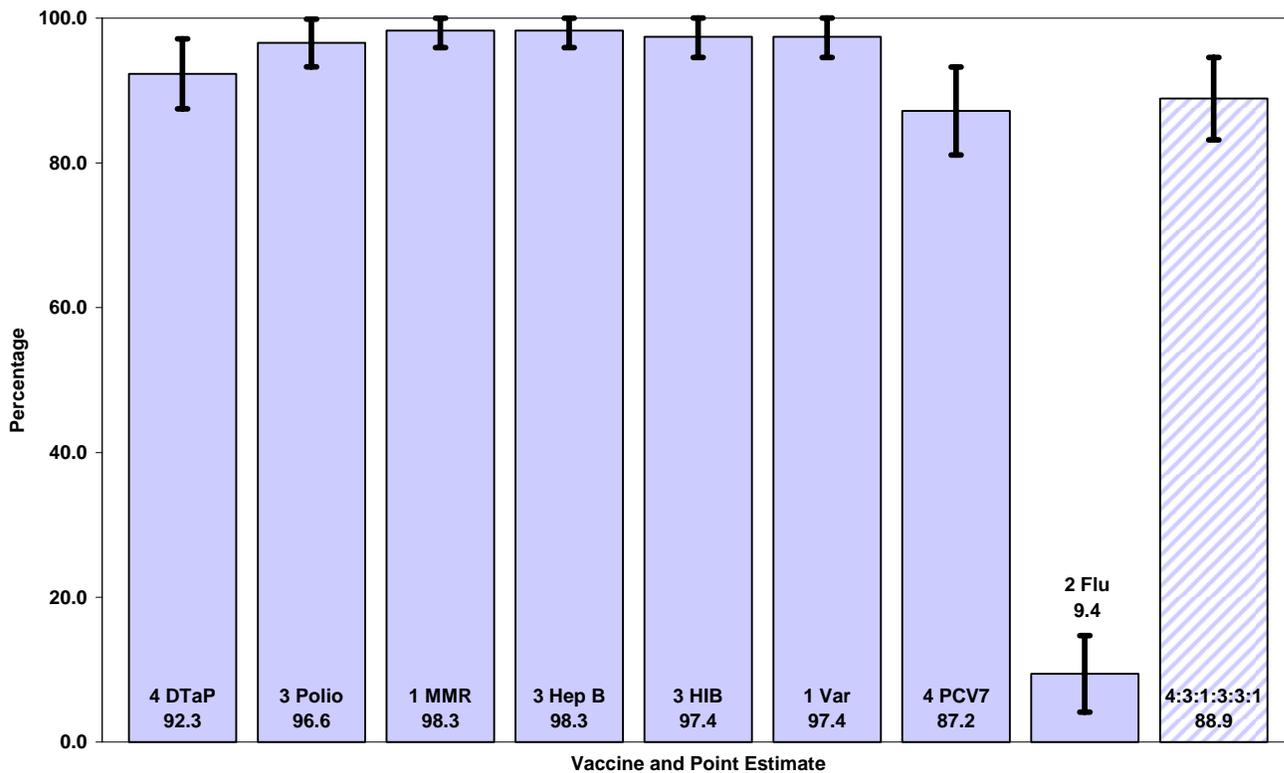
**2007 Immunization Status Survey of 24-Month-Old Children in Tennessee: Percentage of children complete in Knoxville Region (KKR) by vaccine (point estimates and 95% confidence intervals)**



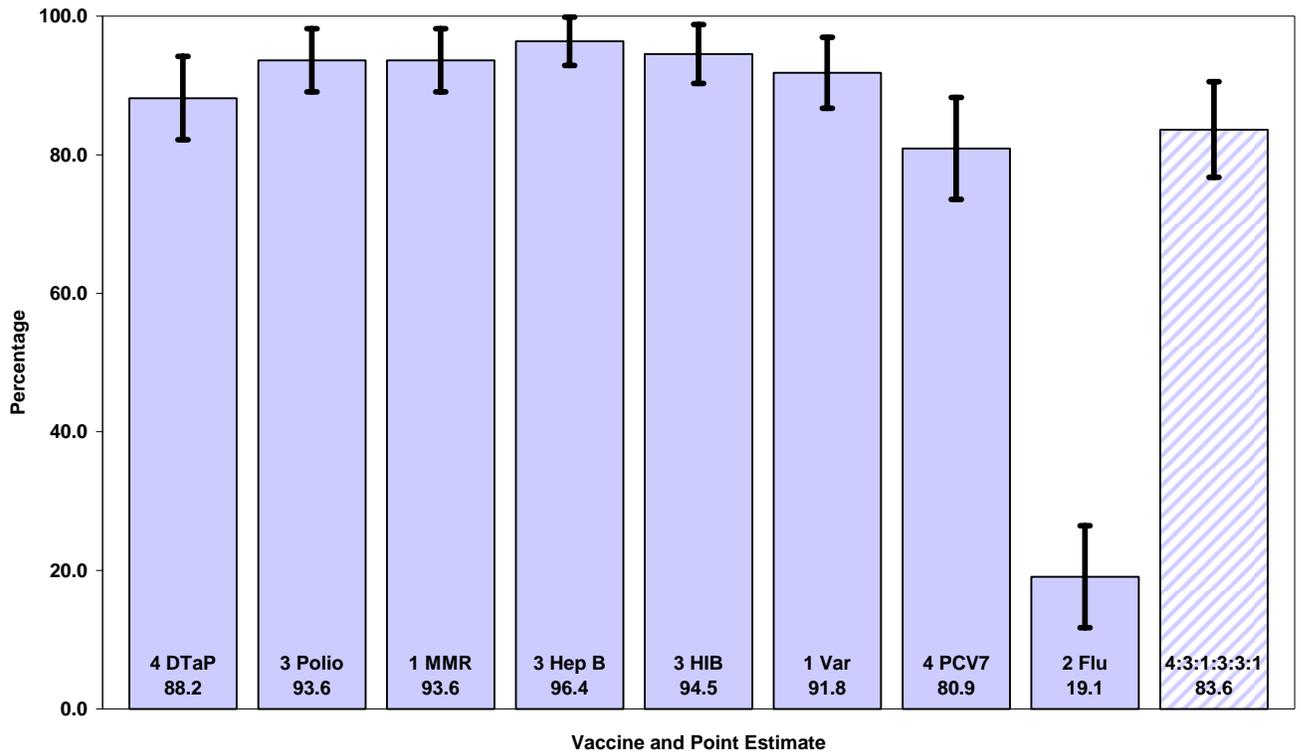
**2007 Immunization Status Survey of 24-Month-Old Children in Tennessee: Percentage of children complete in Upper Cumberland Region (UCR) by vaccine (point estimates and 95% confidence intervals)**



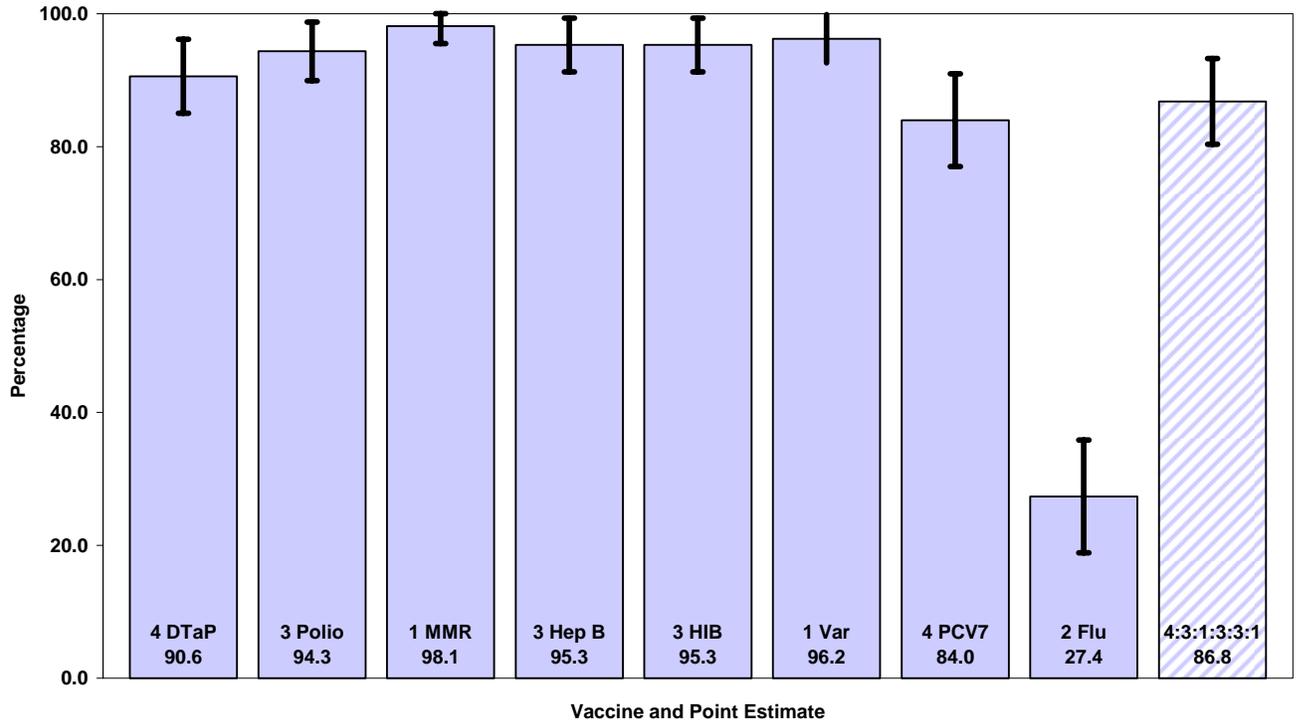
2007 Immunization Status Survey of 24-Month-Old Children in Tennessee: Percentage of children complete in Southeast Region (SER) by vaccine (point estimates and 95% confidence intervals)



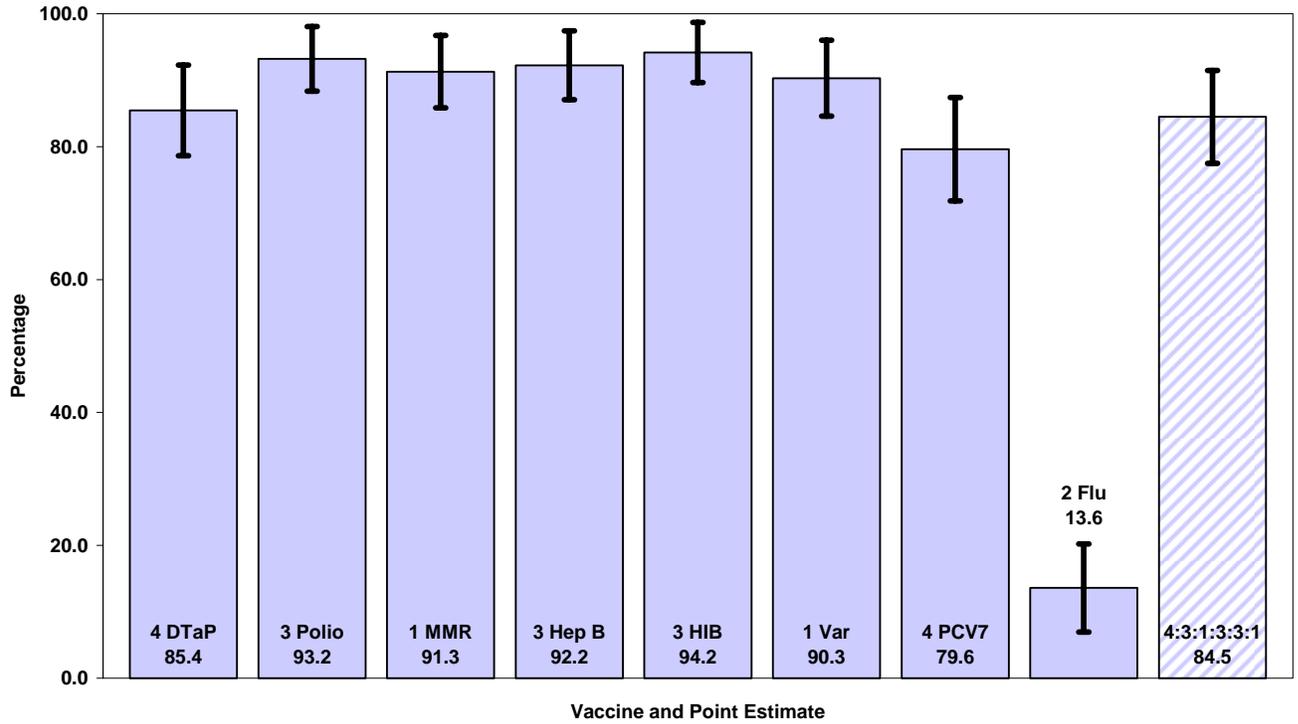
2007 Immunization Status Survey of 24-Month-Old Children in Tennessee: Percentage of children complete in Chattanooga Hamilton Region (CHR) by vaccine (point estimates and 95% confidence intervals)



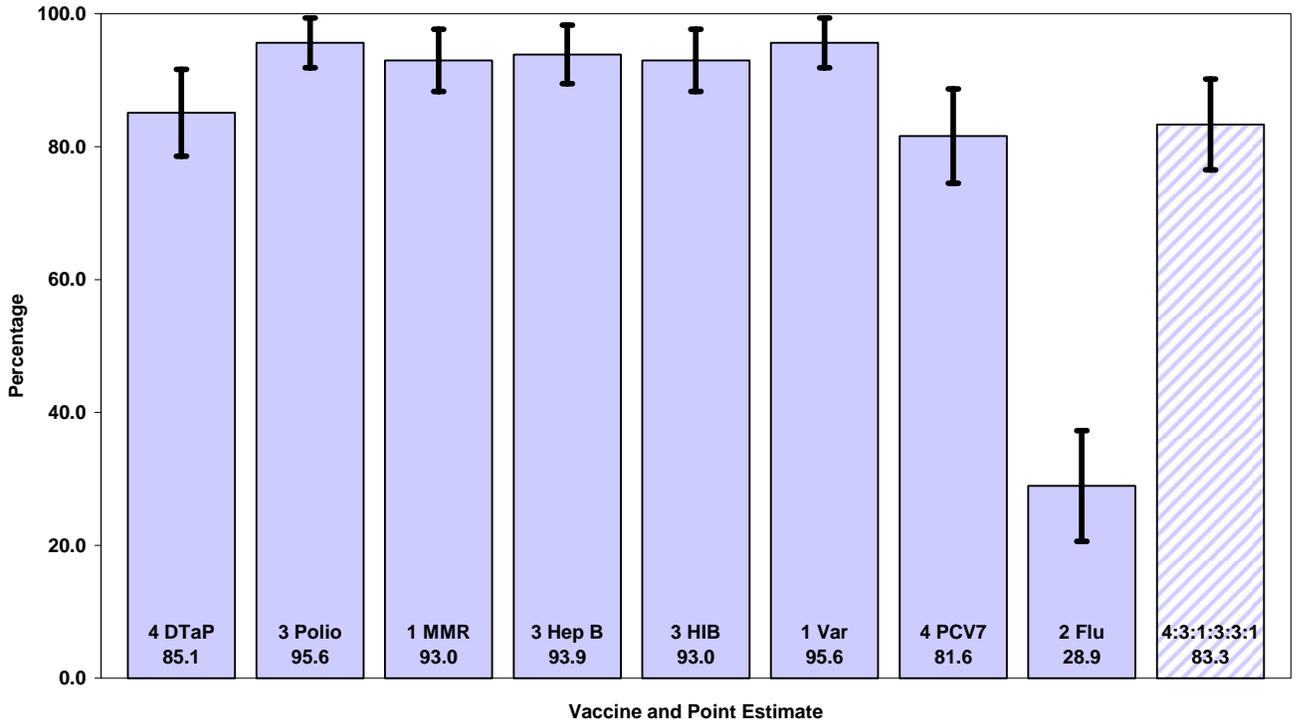
2007 Immunization Status Survey of 24-Month-Old Children in Tennessee: Percentage of children complete in Mid-Cumberland Region (MCR) by vaccine (point estimates and 95% confidence intervals)



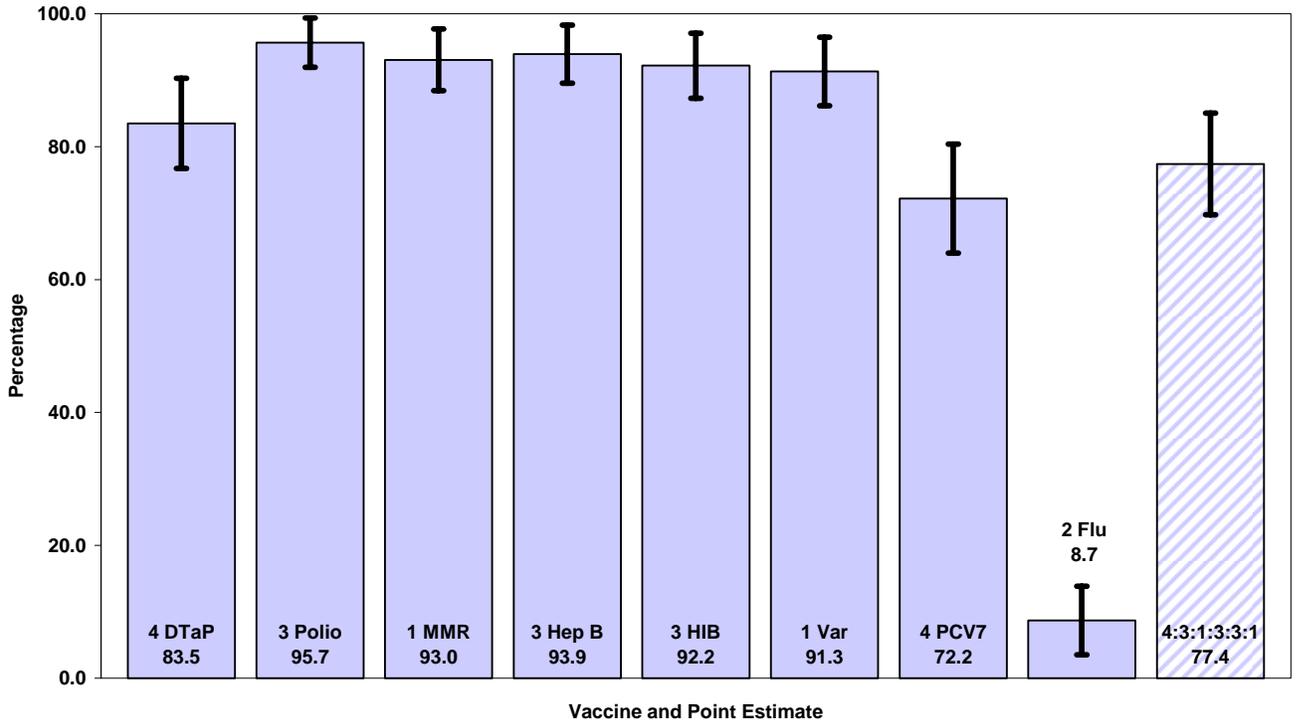
**2007 Immunization Status Survey of 24-Month-Old Children in Tennessee: Percentage of children complete in Nashville Davidson Region (NDR) by vaccine (point estimates and 95% confidence intervals)**



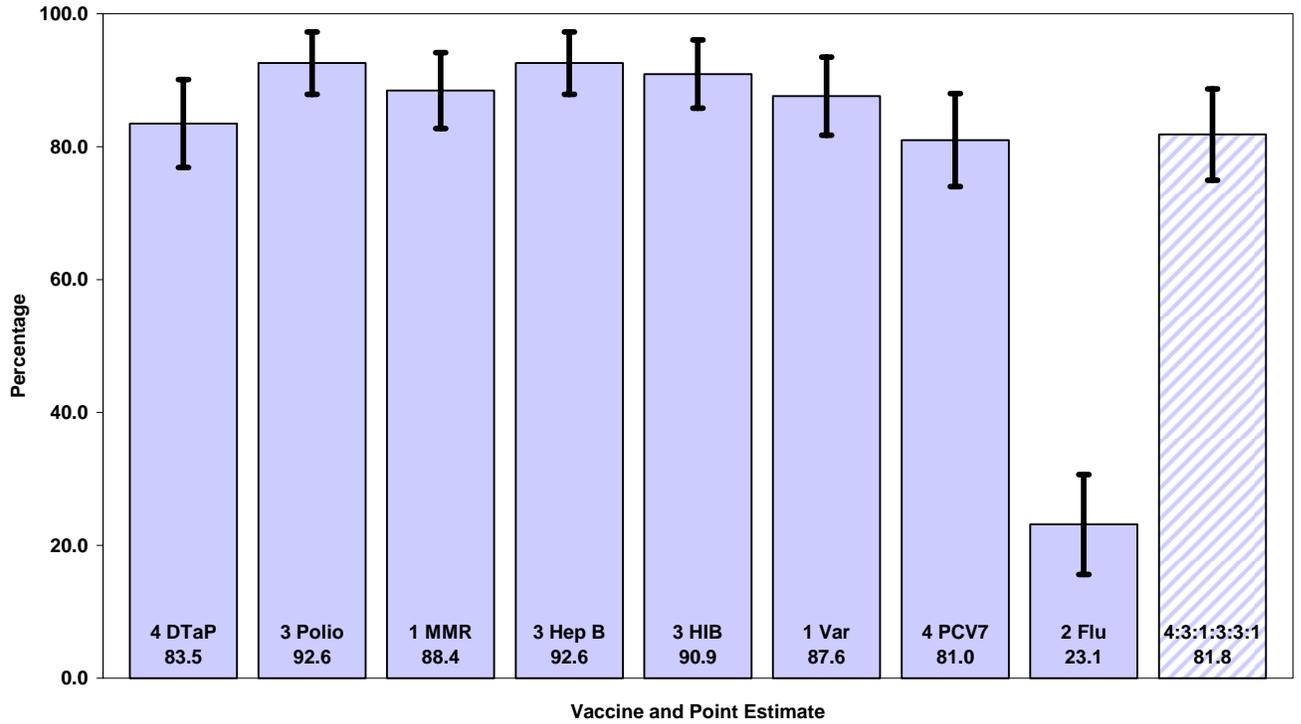
**2007 Immunization Status Survey of 24-Month-Old Children in Tennessee: Percentage of children complete in South Central Region (SCR) by vaccine (point estimates and 95% confidence intervals)**



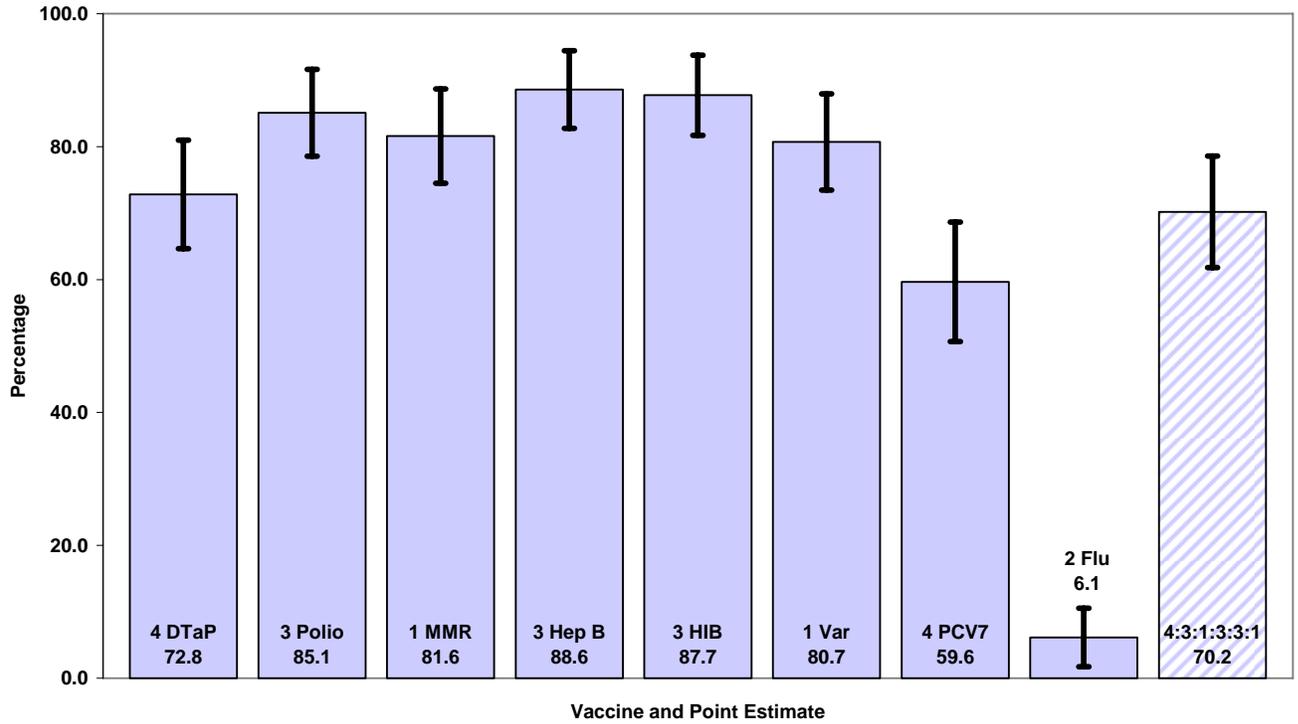
**2007 Immunization Status Survey of 24-Month-Old Children in Tennessee: Percentage of children complete in West Tennessee Region (WTR) by vaccine (point estimates and 95% confidence intervals)**



2007 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)



**2007 Immunization Status Survey of 24-Month-Old Children in Tennessee: Percentage of children complete in Memphis Shelby Region (MSR) by vaccine (point estimates and 95% confidence intervals)**



### Appendix 3

#### Immunization survey of 2005 births

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

Region	Yes		No		Total n=
	n=	%	n=	%	
Northeast TN	105	91.3%	10	8.7%	115
East TN	96	83.5%	19	16.5%	115
Southeast TN	104	88.9%	13	11.1%	117
Upper Cumberland	89	80.9%	21	19.1%	110
Mid-Cumberland	92	86.8%	14	13.2%	106
South Central	95	83.3%	19	16.7%	114
West TN	89	77.4%	26	22.6%	115
Shelby County	80	70.2%	34	29.8%	114
Davidson County	87	84.5%	16	15.5%	103
Knox County	89	76.7%	27	23.3%	116
Hamilton County	92	83.6%	18	16.4%	110
Madison County	99	81.8%	22	18.2%	121
Sullivan County	95	83.3%	19	16.7%	114
Total	1212	82.4%	258	17.5%	1470

**Appendix 4**  
**Immunization survey of 2005 births**  
**Series Complete (4:3:1)**

<b>Region</b>	<b>Yes</b>		<b>No</b>		<b>Total</b>
	<b>n=</b>	<b>%</b>	<b>n=</b>	<b>%</b>	
Northeast TN	108	93.9%	7	6.1%	115
East TN	98	85.2%	17	14.8%	115
Southeast TN	106	90.6%	11	9.4%	117
Upper Cumberland	91	82.7%	19	17.3%	110
Mid-Cumberland	96	90.6%	10	9.4%	106
South Central	97	85.1%	17	14.9%	114
West TN	95	82.6%	20	17.4%	115
Shelby County	81	71.1%	33	28.9%	114
Davidson County	88	85.4%	15	14.6%	103
Knox County	91	78.4%	25	21.6%	116
Hamilton County	96	87.3%	14	12.7%	110
Madison County	100	82.6%	21	17.4%	121
Sullivan County	97	85.1%	17	14.9%	114
<b>Total</b>	<b>1244</b>	<b>84.6%</b>	<b>226</b>	<b>15.4%</b>	<b>1470</b>

## Appendix 5

### Immunization survey of 2005 births

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

Region	Public			Private			Both		
	Yes	Total	%	Yes	Total	%	Yes	Total	%
Northeast TN	11	11	100.0%	79	86	91.9%	15	18	83.3%
East TN	4	4	100.0%	77	90	85.6%	15	20	75.0%
Southeast TN	17	19	89.5%	58	67	86.6%	29	30	96.7%
Upper Cumberland	14	17	82.4%	66	79	83.5%	9	13	69.2%
Mid-Cumberland	5	6	83.3%	75	87	86.2%	12	13	92.3%
South Central	4	6	66.7%	71	81	87.7%	20	23	87.0%
West TN	29	34	85.3%	37	52	71.2%	23	29	79.3%
Shelby County	10	14	71.4%	44	59	74.6%	26	31	83.9%
Davidson County	3	4	75.0%	66	78	84.6%	18	21	85.7%
Knox County	7	8	87.5%	69	88	78.4%	13	18	72.2%
Hamilton County	4	5	80.0%	75	90	83.3%	13	14	92.9%
Madison County	30	35	85.7%	47	54	87.0%	22	27	81.5%
Sullivan County	5	7	71.4%	81	95	85.3%	9	11	81.8%
Total	143	170	84.1%	845	1006	84.0%	224	268	83.6%

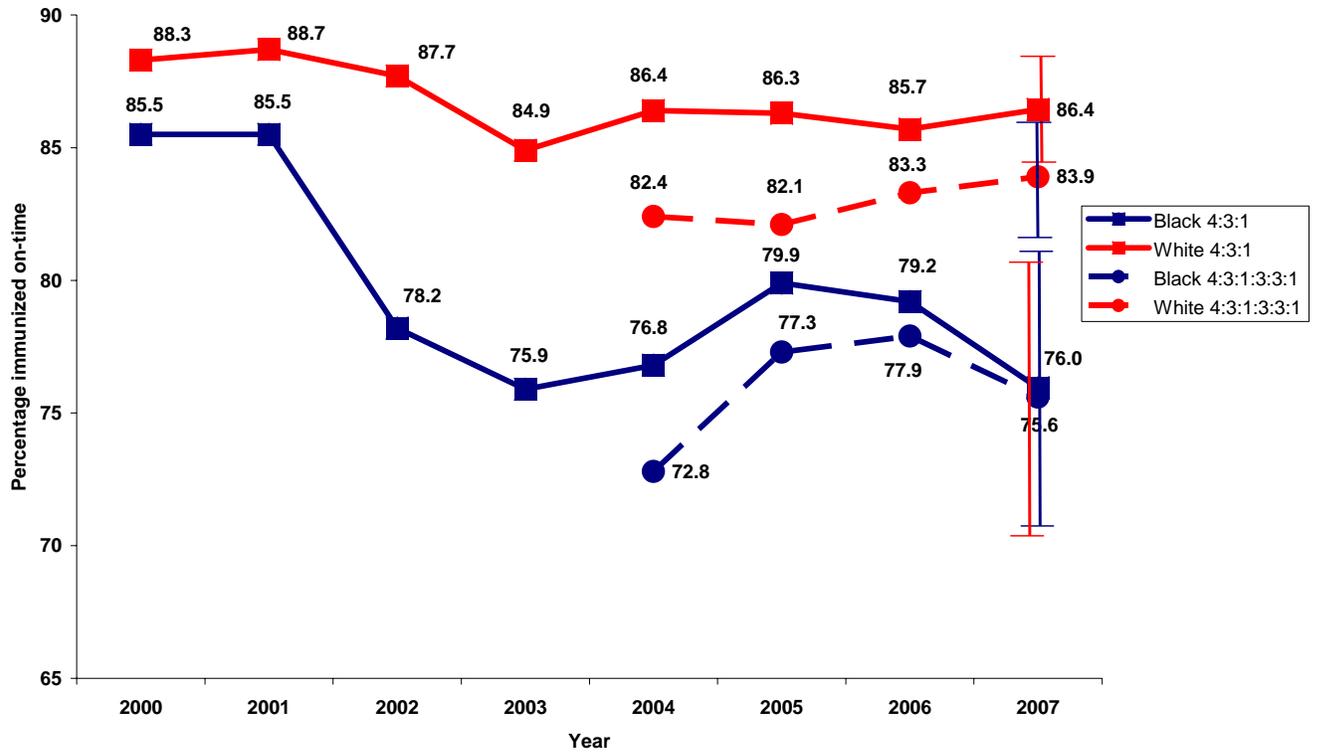
## Appendix 6

### Immunization survey of 2005 births

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

Region	White			Black			Other		
	Yes	Total	%	Yes	Total	%	Yes	Total	%
Northeast TN	103	112	92.0%	2	3	66.7%	1	1	100.0%
East TN	93	112	83.0%	3	3	100.0%	2	2	100.0%
Southeast TN	100	111	90.1%	4	6	66.7%	0	0	0.0%
Upper Cumberland	86	107	80.4%	1	1	100.0%	3	3	100.0%
Mid-Cumberland	82	93	88.2%	8	11	72.7%	2	2	100.0%
South Central	85	101	84.2%	9	12	75.0%	1	1	100.0%
West TN	73	96	76.0%	18	23	78.3%	2	2	100.0%
Shelby County	29	44	65.9%	46	66	69.7%	5	6	83.3%
Davidson County	51	61	83.6%	32	37	86.5%	4	5	80.0%
Knox County	76	97	78.4%	12	16	75.0%	1	3	33.3%
Hamilton County	69	81	85.2%	25	31	80.7%	3	3	100.0%
Madison County	61	69	88.4%	37	50	74.0%	1	3	33.3%
Sullivan County	94	111	84.7%	1	3	33.3%	0	0	0.0%
Total	1002	1195	83.9%	198	262	75.6%	25	31	80.6%

2007 Immunization Status Survey of 24-Month-Old Children in Tennessee: Trends in on-time immunization coverage disparities (Black vs. White): Tennessee 2000-2007



## Appendix 7

### Immunization survey of 2005 births

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

Region	0 Siblings			1 Siblings			2+Siblings		
	Yes	Total	%	Yes	Total	%	Yes	Total	%
Northeast TN	60	64	93.8%	31	35	88.6%	14	16	87.5%
East TN	40	45	88.9%	35	41	85.4%	21	29	72.4%
Southeast TN	48	50	96.0%	37	44	84.1%	19	23	82.6%
Upper Cumberland	39	42	92.9%	29	36	80.6%	21	32	65.6%
Mid-Cumberland	43	45	95.6%	24	29	82.8%	25	32	78.1%
South Central	50	56	89.3%	26	31	83.9%	19	27	70.4%
West TN	43	50	86.0%	28	38	73.7%	18	26	69.2%
Shelby County	39	48	81.3%	24	38	63.2%	17	28	60.7%
Davidson County	30	34	88.2%	26	31	83.9%	29	36	80.6%
Knox County	51	63	81.0%	26	32	81.3%	12	21	57.1%
Hamilton County	45	49	91.8%	25	33	75.8%	22	28	78.6%
Madison County	47	52	90.4%	26	36	72.2%	21	28	75.0%
Sullivan County	48	54	88.9%	28	36	77.8%	19	24	79.2%
Total	583	652	89.4%	365	460	79.4%	257	350	73.4%

## Appendix 8

### Immunization survey of 2005 births

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

Region	Enrolled			Not Enrolled		
	Yes	Total	%	Yes	Total	%
Northeast TN	64	69	92.8%	41	46	89.1%
East TN	55	67	82.1%	41	48	85.4%
Southeast TN	58	65	89.2%	46	52	88.5%
Upper Cumberland	51	62	82.3%	38	48	79.2%
Mid-Cumberland	37	40	92.5%	55	66	83.3%
South Central	58	64	90.6%	37	50	74.0%
West TN--Jackson	51	67	76.1%	38	48	79.2%
Shelby County	47	66	71.2%	33	48	68.8%
Davidson County	46	56	82.1%	41	47	87.2%
Knox County	24	29	82.8%	65	87	74.7%
Hamilton County	36	44	81.8%	56	66	84.8%
Madison County	62	73	84.9%	37	48	77.1%
Sullivan County	50	59	84.7%	45	55	81.8%
Total	639	761	84.0%	573	709	80.8%

## Appendix 9

### Immunization survey of 2005 births

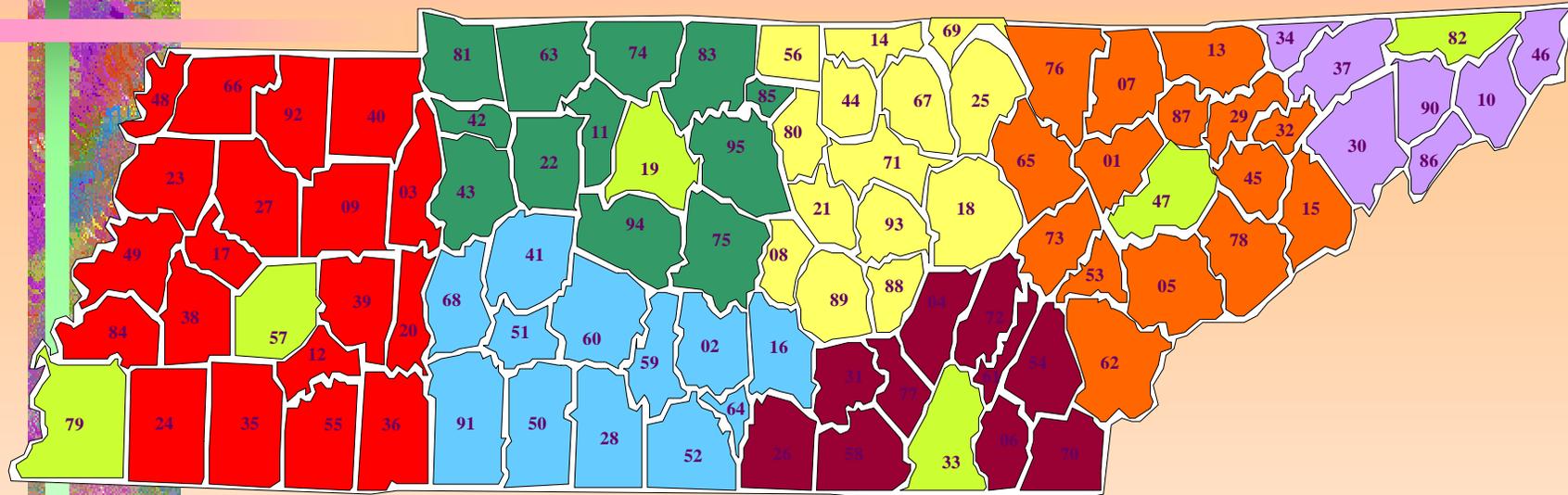
#### DTaP Immunizations Received by 25 Months

<b>Region</b>	<b>0</b>		<b>1</b>		<b>2</b>		<b>3</b>		<b>4</b>		<b>Total</b>
Northeast TN	0	0.0%	1	0.9%	1	0.9%	0	0.0%	108	98.2%	110
East TN	1	0.9%	1	0.9%	0	0.0%	6	5.6%	100	92.6%	108
Southeast TN	1	0.9%	0	0.0%	0	0.0%	4	3.5%	108	95.6%	113
Upper Cumberland	1	1.0%	2	1.9%	3	2.9%	6	5.8%	92	88.5%	104
Mid-Cumberland	0	0.0%	2	2.0%	2	2.0%	2	2.0%	96	94.1%	102
South Central	4	3.7%	0	0.0%	1	0.9%	5	4.7%	97	90.7%	107
West TN	0	0.0%	0	0.0%	2	1.9%	8	7.6%	96	90.6%	106
Shelby County	10	9.4%	0	0.0%	2	1.9%	11	10.4%	83	78.3%	106
Davidson County	2	2.0%	0	0.0%	2	2.0%	9	8.9%	88	87.1%	101
Knox County	2	1.8%	1	0.9%	3	2.7%	11	9.9%	94	84.7%	111
Hamilton County	1	0.9%	0	0.0%	4	3.7%	7	6.4%	97	89.0%	109
Madison County	5	4.2%	1	0.8%	3	2.5%	9	7.6%	101	84.9%	119
Sullivan County	1	1.0%	2	1.9%	1	1.0%	3	2.9%	97	93.3%	104
<b>Total</b>	<b>28</b>	<b>2.0%</b>	<b>10</b>	<b>0.7%</b>	<b>24</b>	<b>1.7%</b>	<b>81</b>	<b>5.8%</b>	<b>1257</b>	<b>89.8%</b>	

Note: Of the 28 children with no DTaP doses, 13 were not immunized for medical, personal or religious reasons and 15 children could not be located by health department staff

## Appendix 10

### Tennessee's 13 Regional Health Departments



West		Mid Cumberland		South Central		Southeast		Upper Cumberland		East		North East	
#	County	#	County	#	County	#	County	#	County	#	County	#	County
03	Benton	11	Cheatham	02	Bedford	04	Bledsoe	08	Cannon	01	Anderson	10	Carter
09	Carroll	22	Dickson	16	Coffee	06	Bradley	14	Clay	05	Blount	30	Greene
12	Chester	42	Houston	28	Giles	26	Franklin	18	Cumberland	07	Campbell	34	Hancock
17	Crockett	43	Humphreys	41	Hickman	31	Grundy	21	DeKalb	13	Claiborne	37	Hawkins
20	Decatur	63	Montgomery	50	Lawrence	54	McMinn	25	Fentress	15	Cocke	46	Johnson
23	Dyer	74	Robertson	51	Lewis	58	Marion	44	Jackson	29	Grainger	86	Unicoi
24	Fayette	75	Rutherford	52	Lincoln	61	Meigs	56	Macon	32	Hamblen	90	Washington
27	Gibson	81	Stewart	59	Marshall	70	Polk	67	Overton	45	Jefferson		
35	Hardeman	83	Sumner	60	Maury	72	Rhea	69	Pickett	53	Loudon		
36	Hardin	85	Trousdale	64	Moore	77	Sequatchie	71	Putnam	62	Monroe		<b>METROS</b>
38	Haywood	94	Williamson	68	Perry			80	Smith	65	Morgan	#	County
39	Henderson	95	Wilson	91	Wayne			88	Van Buren	73	Roane	19	Davidson
40	Henry							89	Warren	76	Scott	33	Hamilton
48	Lake							93	White	78	Sevier	47	Knox
49	Lauderdale									87	Union	57	Madison
55	McNairy											79	Shelby
66	Obion											82	Sullivan
84	Tipton												
92	Weakley												